

G20 POLICY RECOMMENDATIONS FOR ADVANCING FINANCIAL INCLUSION AND PRODUCTIVITY GAINS THROUGH DIGITAL PUBLIC INFRASTRUCTURE



G20 POLICY RECOMMENDATIONS FOR ADVANCING FINANCIAL INCLUSION AND PRODUCTIVITY GAINS THROUGH DIGITAL PUBLIC INFRASTRUCTURE

Global Partnership for Financial Inclusion
2023



GPFI

Global Partnership
for Financial Inclusion



THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

ABBREVIATIONS

AE	advanced economies
ACH	automated clearing house
AML/CFT	anti-money-laundering/countering the financing of terrorism
API	application programming interface
BIS	Bank for International Settlements
BSP	Bangko Sentral ng Pilipinas (Central Bank of Philippines)
CDD	customer due diligence
CPMI	Committee on Payments and Market Infrastructures
DEWG	Digital Economy Working Group
DFE	digital financial ecosystem
DFS	digital financial services
DPI	Digital Public Infrastructure
EMDEs	emerging markets and developing economies
FIAP	financial inclusion action plan
FPS	fast payment systems
FSP	financial service provider
G20	Group of twenty countries
G2P	government to person
GPFI	Global Partnership for Financial Inclusion
GSMA	Global system for mobile communications association
HLPs	G20 High-Level Principles for Digital Financial Inclusion
ICT	information and communication technology
ITU	International Telecommunication Union
KYC	know your customer
MSME	micro, small, and medium-sized enterprise
OECD	Organization for Economic Co-operation and Development
P2P	person to person
POS	point of sale
RTGS	real-time gross settlement
SDG	United Nations sustainable development goals
SME	small and medium-sized enterprise
WEF	World Economic Forum

All dollar amounts are US dollars unless otherwise indicated.

CONTENTS

Abbreviations	ii
Acknowledgments	v
Foreword	vii
Executive Summary	1
1. Introduction and Background	5
2. DPIs and their role in the financial sector	9
3. How DPIs Can Effectively Advance Financial Inclusion and Productivity Gains	16
3.1 The Role of DPIs in Advancing Financial Inclusion	16
3.2 The Role of DPIs in Enabling	
3.3 DPI Use Cases	23
3.3.1 Account Opening	23
3.3.2 Government-to-Person Payments	25
3.3.3 Remittances	28
3.3.4 MSME Finance	29
4. An Enabling Ecosystem to Foster the Impact of DPIs on Financial Inclusion and Productivity Gains	32
4.1 Digital Financial Ecosystem Enablers That Support Financial Inclusion and Productivity Gains through DPIs	32
4.2 Risks and Challenges for DPIs in Achieving Financial Inclusion and Productivity Gains	35
5. Policy Recommendations	38
6. Potential Areas for Further Exploration	41
7. Country Case Studies	44
7.1 Digital ID, Digital Payments, and Data Exchange Infrastructure in Action: Country Case Studies	44
7.1.1 Argentina	44
7.1.2 Bangladesh	44
7.1.3 Colombia	46
7.1.4 Ghana	47
7.1.5 Indonesia	48
7.1.6 Philippines	49

7.1.7 Rwanda	50
7.1.8 Saudi Arabia	51
7.2 Case Studies on Programs/Initiatives to Advance Financial Inclusion	52
7.2.1 Jan Dhan for Advancing Financial Inclusion	52
7.2.2 Designing Digital Remittance Solutions for Domestic Workers in Indonesia	53
7.2.3 Improving Digital Literacy in the United Arab Emirates	54
Annex A: Work Developed by the GPFI to Support Financial Inclusion	56
G20 Financial Inclusion Action Plan 2020	56
Applicable G20 Principles and Work Done under Previous Presidencies	56
Annex B: Interlinkages between DPIs and Implementation of the HLPs on Digital Financial Inclusion	59
Annex C: Additional Explanations for Voluntary and Nonbinding Policy Recommendations	61
Public and Private Collaboration	61
Regulation, Supervision, and Oversight	61
Building Inclusive Products and Services	62
Protection of Vulnerable and Formerly Excluded Users	62
References	64

ACKNOWLEDGMENTS

This G20 Global Partnership for Financial Inclusion (GPFI) document has been prepared by the World Bank* as an implementing partner of GPFI with the guidance of and inputs from the G20 India Presidency represented by the Ministry of Finance (MoF) of the Government of India and the Reserve Bank of India (RBI). The team of MoF, Government of India, was led by Chanchal C. Sarkar, Adviser, and that of RBI was led by Ms. Sonali Sengupta, CGM.

The Presidency would like to express its sincere gratitude to the G20 Troika and all the GPFI member countries for their support and contributions, the GPFI Honorary Patron (UN Secretary General's Special Advocate for Inclusive Finance for Development) for her valuable guidance, GPFI Implementing and Affiliated Partners and GPFI Co-Chair Magda Bianco for their active contributions and constructive feedback which have enriched the document significantly.

The World Bank drafting team comprised of Oya Ardic, Guillermo Galicia Rabadan, Georgina Marin, Harish Natarajan, Thomas Piveteau, Nilima Ramteke and Arpita Sarkar with inputs from Vyjayanti Desai and Jonathan Marskell; Julia Clark (World Bank), Stefan Staschen (CGAP), Ghada Teima (IFC), and Alan Gelb (Center for Global Development) provided valuable comments and inputs; Jean Pesme (Global Director, Finance, Competitiveness and Innovation Global Practice, World Bank) and Christine Zhenwei Qiang (Director, Digital Development Global Practice, World Bank) provided overall guidance; Charles Hagner provided editorial assistance and Naylor Design Inc. designed the report. The Better Than Cash Alliance and Women's World Banking drafted several case studies in the report.

*The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of The World Bank concerning the legal status of any country, territory, city or area or of its authorities or concerning the delimitation of its frontiers or boundaries. The findings, interpretations, and conclusions expressed in this work do not necessarily reflect the views of The World Bank, its Board of Executive Directors, or the governments they represent.

The World Bank does not guarantee the accuracy, completeness, or currency of the data included in this work and does not assume responsibility for any errors, omissions, or discrepancies in the information, or liability with respect to the use of or failure to use the information, methods, processes, or conclusions set forth. Nothing herein shall constitute or be construed or considered to be a limitation upon or waiver of the privileges and immunities of The World Bank, all of which are specifically reserved.



Financial Inclusion and Productivity Gains
through Digital Public Infrastructures

FOREWORD

G20 Global Partnership for Financial Inclusion **Policy Recommendations for Advancing Financial Inclusion and Productivity** **Gains through Digital Public Infrastructures**

Her Majesty Queen Máxima of the Netherlands, United Nations Secretary-General's Special Advocate for Inclusive Finance for Development (UNSGSA) and Honorary Patron of the G20 GPFI



The G20 Global Partnership for Financial Inclusion's (GPFI) policy recommendations on digital public infrastructure (DPI) highlight a promising approach to fostering inclusive economies and empowering vulnerable individuals for a better future.

DPI, as interoperable, open, and inclusive systems supported by technology, serves to provide essential public and private services for the common good. As the UN Secretary-General's Special Advocate for nearly 15 years, I have witnessed firsthand the transformative potential of inclusive DPI, even for the most economically challenged households and enterprises.

Safe, transparent, and interoperable systems for payments, identity, and data sharing have empowered millions of small merchants, enabling them to easily manage transactions through their mobile phones. Inclusive DPI can spark digital contracts and e-commerce, fostering efficient markets and opening doors for previously marginalized individuals.

The impact of DPI goes beyond inclusive finance—it can support health, education, and sustainability. Amid the COVID-19 pandemic, DPI enabled emergency support to be directly delivered to the digital wallets of those in need as well as helped facilitate swift vaccine distribution.

The India Stack exemplifies this approach, combining digital ID, interoperable payments, a digital credentials ledger,

and account aggregation. In just six years, it has achieved a remarkable 80% financial inclusion rate—a feat that would have taken nearly five decades without a DPI approach. Other nations, including Brazil, Estonia, Peru, and Singapore, have similarly embraced DPI models, yielding tangible results that underscore the efficacy of this approach.

While DPI will vary by country, successful cases share key principles reflected in these recommendations: inclusivity, openness, interoperability, and support for essential public and private services. These DPIs should ensure that they prioritize safety, trust, and robust data protection. So, let's continue sharing experiences and learning from the best examples to extend these benefits.

As Honorary Patron of the G20 GPFI, I am delighted with the DPI policy recommendations crafted under the Indian G20 Presidency. This report is essential reading for those embracing digital transformation.

Uniting the public and private sectors through truly inclusive DPI can drive progress toward the UN Sustainable Development Goals and bolster resilience for people and businesses. I anticipate the GPFI's ongoing dedication to this topic and look forward to celebrating our achievements in the coming years.



Digital public infrastructure has the potential to help countries leapfrog their digital transformation.

Increasingly, households and businesses can digitally access the services and products they need.



EXECUTIVE SUMMARY

This report was developed by the Global Partnership for Financial Inclusion (GPFI) under the G20 India Presidency.

The G20 India Presidency is anchored in the overarching theme of “Vasudhaiva Kutumbakam” or “One Earth, One Family, One Future,” which underlines the message of equitable growth and a shared future for all. Guided by this vision, the GPFI has focused on leveraging Digital Public Infrastructure (DPI) in advancing financial inclusion and productivity gains. The objective of this report is to analyze and present the role of DPI in advancing financial inclusion and productivity gains and formulate policy recommendations for how countries can best harness this potential. Each country will face different challenges and opportunities, given its specific context. However, the analysis and policy recommendations in this report aim to provide general guidance that can help authorities in promoting the development, ongoing functioning, and evolution of DPIs in a way that contributes to advancing financial inclusion and productivity gains rapidly.

Powered by digital financial services (DFS), there has been progress globally on financial inclusion, but several challenges remain. About 1.4 billion adults remain financially excluded, over 50 percent of which are in seven emerging markets and developing economies (EMDEs). Globally, pockets of exclusion and limited usage of financial services (for example, payments, savings, credit, pensions, insurance) persist. Moreover, there is a large and increasing financing gap for micro, small, and medium-sized enterprises (MSMEs), with 40 percent of formal MSMEs in EMDEs having unmet financing needs and women-owned MSMEs accounting for 34 percent of the gap (\$1.9 trillion). It should also be noted that this financing gap is much wider when informal MSMEs are accounted for. Overall, the unmet MSME financing needs are 1.5 times the existing supply of financing to MSMEs.

In the rapidly evolving DFS¹ landscape and against the backdrop of widespread digital transformation across sectors, DPI has the potential to help countries leapfrog their digital transformation. Increasingly, households and businesses can digitally access the services and products they need. Financial lives and interactions with the government have also become progressively more automated and digitally enhanced. Leveraging DPI for financial inclusion not only can contribute to closing these aforementioned gaps but also can help countries leapfrog in their DFS journey, therefore rapidly advancing financial inclusion.

DPI, generally understood as interoperable, open, and inclusive systems supported by technology to provide essential, society-wide, public and private services, can play a critical role in accelerating this digital transformation in an inclusive way. In this context, “system” should be interpreted broadly to include protocols, frameworks, and governance arrangements that market players rely on and use to provide products and services to their customers. Conceptually, DPIs could be seen as a core set of foundational systems that enable intensive use and provision of digital services across a range of economic and social interactions and actors. What constitutes a DPI could vary by country context, but, in general, includes digital ID, digital payments, and data exchange in the financial sector. Examples of DPIs, all of which play a leading role in the advancement of financial inclusion in many countries, are (i) digital ID systems, such as India’s Aadhaar, Singapore’s Singpass, the Philippines’ PhilSys, and the United Arab Emirates’ UAE-Pass; (ii) digital payment systems, especially

1. Digital financial services are financial services that rely on digital technologies for their delivery and use by consumers. See World Bank (2020c).

fast payment systems, such as Brazil's Pix, India's UPI, Türkiye's FAST, the European Union's TIPS, and Thailand's PromptPay; and (iii) data-exchange platforms, in particular those incorporating trust and consent, such as India's Digilocker and Account Aggregator, Estonia's X-Road, Singapore's MyInfo, Australia's Customer Data Right, and the United Kingdom's Open Banking.

DPIs can have a multiplier effect on the gains achievable through DFS by accelerating financial inclusion and closing the existing gaps. DPIs, if well managed, can lower transaction costs, catalyze innovation, foster competition and interoperability, enhance individual user experiences and choice, and, through their design, provide new avenues to address many of the risks inherent to DFS. These effects may translate into faster progress in financial inclusion and enhance productivity over and above that which can be achieved by DFS provided by financial service providers operating without such shared infrastructure. In this report, four use cases of financial inclusion are studied to illustrate the role of DPIs and the critical considerations that determine their effective use: account opening, government-to-person payments, international remittances, and MSME finance. The policy recommendations in this report are derived from this analysis, keeping in mind the overarching G20 High-Level Principles for Digital Financial Inclusion (HLPs).

DPIs are similar to other digital and financial infrastructures but, depending on country context, could differ on account of DPIs being foundational and cross-cutting while also having an emphasis on serving key public policy objectives. They are called public because of equal, fair, and transparent access to all relevant users in accordance with the rules of governance. Even though DPIs in practice can be developed by the public or private sector, the "public" in DPI refers to their focus on advancing public policy objectives, such as economic welfare and financial inclusion. Depending on the country, DPIs could differ from traditional financial infrastructures, such as automated clearing houses (ACH), and credit reporting systems, in terms of the following: a cross-sectoral nature and use across a wide range of economic and social interactions, having been designed for the digital context, being more widely accessible, and an emphasis on serving public policy objectives.

DPIs can be combined to unlock even more innovation and extend further benefits to users and the market. For example, in Singapore, a person can use a digital ID to exercise consent over the sharing of personal data from official sources to apply for a loan, thanks to the three current DPIs coming together—digital ID, digital payments, and data exchange. DPIs can also allow countries to leapfrog traditional develop-

ment time scales. For example, in India, the implementation of DPIs such as Aadhaar (a foundational digital ID system), along with the Jan Dhan bank accounts and mobile phones, is considered to have played a critical role in moving ownership of transaction accounts from approximately one-fourth of adults in 2008 to over 80 percent now—a journey that it is estimated could have taken up to 47 years without DPIs.² While DPIs' role in this leapfrogging is undoubtable, other ecosystem variables and policies that build on the availability of DPIs were critical. These included interventions to create a more enabling legal and regulatory framework, national policies to expand account ownership, and leveraging Aadhaar for identity verification.

However, DPIs may also introduce new risks or exacerbate existing risks. These include (i) **operational risks**, which can be amplified in the context of DPIs, given that they are deeply interlinked among themselves and with other infrastructures in the financial system; (ii) **legal and regulatory risks**, which are challenging to address in a multisectoral structure such as DPIs (there may be legal uncertainty and loopholes, which can be exacerbated when DPIs interlink, and new technologies adopted by DPIs may also make existing legal frameworks obsolete); (iii) **insolvency risks**, which can endanger the ecosystem at large if some of its critical components, including entities that manage DPIs, were to become financially unsustainable; (iv) **exclusion risk**, which can be reinforced if DPIs are not designed following good principles and global standards; and (v) **financial consumer protection risks**, which can be heightened by the misuse of DPIs and if exploitative practices are adopted by its operators or by financial service providers that distribute their services using DPIs. Moreover, if data governance is not well managed, financial consumer protection risks may instead be amplified due to the use of DPIs for the provision of DFS. At the same time, while DPIs enhance competition at the DFS service provider level, if not well governed, competition in the provision of DPIs could be affected, and this lack of competitive pressure could lead to lack of continuous innovation. However, this may not necessarily be a disadvantage for DPIs due to minimalism and the culture of innovation embedded in DPIs. As DPIs are designed with a minimal core function, enabling services and functionalities to be layered on top in addition to the premise on innovation, lack of competitive pressure would not inhibit innovation or render a DPI obsolete, provided that the DPIs are well governed and adequately regulated.

The policy recommendations proposed in this report are indicative, voluntary, and nonbinding and seek to com-

2. D'Silva et al., 2019

plement the existing guidance. The G20 HLPs for Digital Financial Inclusion advocate for a holistic approach to financial inclusion, and as such, they remain relevant, as do the standards and guidance from various bodies covering individual DPI components. To realize the full effects of DPIs, several of the enablers identified in the HLPs for Digital Financial Inclusion and other standards and guidance (for example, the Principles on ID for Sustainable Development, the CPMI-IOSCO Principles for Financial Market Infrastructures, and the General Principles for Credit Reporting Systems) need to be in place. The policy recommendations are intended to help authorities support the development, functioning, and evolution of DPIs according to their jurisdictions and country circumstances in a way that maximizes the potential of DPIs to advance financial inclusion and productivity gains. The policy recommendations have been drafted keeping in mind the three current examples of DPIs—digital payments, digital ID,

and data-exchange DPIs—but are framed broadly enough to be applicable to other types of DPIs.

The policy recommendations (box 1) are grouped around five key dimensions that collectively seek to ensure that DPIs adhere to a basic set of principles for achieving the following: (i) enabling and fostering the use of DPIs in accelerating financial inclusion; (ii) fostering well-designed DPIs and the enabling environment; (iii) implementing appropriate regulation, supervision, and oversight; (iv) ensuring sound and effective institutional and governance arrangements by DPIs; and (v) protecting customers and leaving no one behind. The policy recommendations are aimed to encourage policy makers, which could comprise different arms of the government, sectoral regulators, and/or other relevant agencies, to leverage DPIs to implement specific financial inclusion use cases, depending on the country context.

BOX 1

Indicative, Voluntary, and Nonbinding Policy Recommendations for Advancing Financial Inclusion and Productivity Gains through the Use of DPIs in the Financial Sector

The policy recommendations for advancing financial inclusion and productivity gains through DPIs are intended for use by public authorities but could have relevance for other stakeholders, as the recommendations seek to advance financial inclusion and productivity gains through DPIs rapidly. The policy recommendations reflect good practices and should be read in conjunction with the G20 High-Level Principles for Digital Financial Inclusion, as well as with established standards and good practices for the individual DPIs as established by the relevant standard-setting bodies.

POLICY RECOMMENDATION 1: Enable and foster the use of DPIs to accelerate financial inclusion and productivity gains.

POLICY RECOMMENDATION 2: Develop well-designed DPIs and the broader enabling environment through a widely accepted set of good practices.

POLICY RECOMMENDATION 3: Encourage appropriate risk-based regulation, supervision, and oversight arrangements for financial-sector use of DPIs.

POLICY RECOMMENDATION 4: Promote sound internal governance arrangements.

POLICY RECOMMENDATION 5: Enable DPIs to offer products and services in a way that no one is left behind and the interests of the consumer are safeguarded.



Financial lives are becoming increasingly automated and integrated—from individuals opening an account without leaving home, to emergency social assistance that transfers into an account shortly after an account holder applies through an SMS text, to individuals transferring funds by a simple click on their phone, to micro, small, and medium-sized enterprises accessing credit using their transaction history data as proof of creditworthiness.



BACKGROUND AND INTRODUCTION

Digital transformation is changing the way the world interacts and transacts. Financial lives are becoming increasingly automated and integrated—from individuals opening an account without leaving home, to emergency social assistance that beneficiaries receive by a transfer into their account shortly after applying through an SMS text, to individuals transferring funds to relatives with a simple click on their phone, to micro, small, and medium-sized enterprises (MSMEs) accessing credit using their transaction history data as proof of creditworthiness.

Digital transformation has also brought Digital Public Infrastructure (DPI) to the forefront as an enabler that can facilitate foundational functions at a societal scale, for better and more inclusive service delivery and innovation across sectors. From individuals accessing and sharing their health records across providers to businesses applying remotely for licenses, countries are embracing this digital transformation, shifting toward efficient, paperless, and remote interactions that increasingly leverage technology. As in the past, when the original protocols underpinning the internet (TCP-IP, SMTP for interoperable email, HTTP, and so forth), as well as the open standards behind globally interoperable mobile networks (GSM, LTE, and the like), provided the foundations to drive transformative innovation, the use of DPIs can help accelerate digital innovation. They have the potential to enable cost reductions, promote innovation, and create opportunities to improve services for wide segments of the population.

DPI, generally understood as interoperable, open, and inclusive systems supported by technology to provide essential, society-wide, public and private services, can play a critical role in accelerating this transformation in an inclusive way. In this context, “system” should be inter-

preted broadly to include protocols, frameworks, and governance arrangements that market players rely on and use to provide products and services to their customers. Conceptually, DPIs could be seen as a core set of foundational systems that enable the intensive use and provision of digital services across a range of economic and social interactions and actors. What constitutes a DPI could vary by country but, in general, includes digital ID, digital payments, and data exchange. Examples of DPIs, all of which play leading roles in the advancement of financial inclusion in many countries, are (i) digital ID systems, such as India’s Aadhaar, Singapore’s Singpass, the Philippines’ PhilSys, and the United Arab Emirates’ UAE-Pass; (ii) digital payment systems, especially fast payment systems (FPS), such as Brazil’s Pix, India’s UPI, the European Union’s TIPS, and Thailand’s PromptPay; and (iii) data-exchange platforms, in particular those incorporating trust and consent, such as India’s Digilocker and Account Aggregator, Estonia’s X-Road, Singapore’s MyInfo, Australia’s Customer Data Right, and the United Kingdom’s Open Banking.

In the financial sector, DPIs have the potential to create new opportunities to advance financial inclusion and enable productivity gains. DPIs such as interoperable FPS can have a truly transformational impact on financial inclusion outcomes. Digital financial services (DFS) models, such as mobile money and platform ecosystems, have already been contributing to a significant advancement in financial inclusion across developing countries. However, there are still gaps, especially when trying to reach MSMEs and underserved populations. DPIs have the potential to help bring DFS to the next stage by promoting competition, unlocking barriers to financial inclusion, and catalyzing further innovations in the DFS space that respond to the needs of currently un(der)served populations. In doing so, DPIs can help individuals and businesses participating in a DFS ecosys-

tem to tap economic efficiencies, leading to productivity gains. In adopting DPIs to further enhance financial inclusion, countries may follow the guiding principles laid down under the High-Level Principles (HLPs) for Digital Financial Inclusion. (See box 2.)

DPIs can, individually, have a significant impact on financial inclusion, but when collectively integrated into a digital financial ecosystem (DFE)³ and jointly leveraged, they can generate powerful multiplier effects. The three current examples of DPIs—digital payments, digital ID, and data exchange—have two roles in the provision of financial services: as self-standing infrastructures whose core services can be leveraged for a specific process within the provision of a financial product, and as components of broader financial and nonfinancial digital infrastructures, working together to reduce frictions for users and automate the processes carried out by financial service providers (FSPs).

Further, when well-designed DPIs are leveraged as part of the foundations of a DFE, they can contribute to creating a level playing field and promote market innovation, entrepreneurship, and increased customer adoption. They can

encourage fair competition and propel market participants to continuously develop customer-centric innovations that assure customers of a better user experience. This not only leads to better and more innovative solutions but also improves the long-term sustainability of the ecosystem.

The report builds on the work done on digital financial inclusion by the GPFI and its implementing and affiliated partners under previous G20 Presidencies. It seeks to provide guidance on how DPIs can be harnessed to advance financial inclusion and increase productivity gains by building on the solid foundations of the G20 Financial Inclusion Action Plans (FIAPs) and the HLPs for Digital Financial Inclusion (annex A and annex B).^{4,5}

This report also complements the work done by the Digital Economy Working Group (DEWG) under the G20 India Presidency. One of the priority areas for the DEWG this year is to develop a suggestive framework and description for DPI that outlines core principles. This framework has informed, and is complemented by, the financial sector focus in this report.

3. For the purposes of this note, the definition of a digital financial ecosystem will be consistent with the definition of a DFS ecosystem provided by the ITU (2016). The definition of a DFS ecosystem has been adapted as follows: *The DFS ecosystem consists of users (consumers, businesses, and government agencies) who have needs for digital and interoperable financial products and services; the providers (banks and nonbanks) that supply those products and services through digital means; the financial, technical, and other infrastructures that make them possible; and the governmental policies, laws, and regulations that enable them to be delivered in an accessible, affordable, and safe manner.*

4. The HLPs articulate the need for a holistic approach to financial inclusion. Notably, they call for the implementation and expansion of infrastructures, such as payment infrastructures and digital ID systems, which can be considered foundational DPIs. The HLPs also call for a strong public- and private-sector commitment; a conducive legal, regulatory, supervisory, and oversight framework; and active engagement by a range of stakeholders. All of these are also relevant for DPIs to be effective. Annex B provides a summary of the key interlinkages between DPIs and the implementation of the HLPs (GPFI, 2016).

5. The GPFI has placed special emphasis on women, youth, and small and medium enterprises (SMEs) as groups requiring targeted policy interventions.

**BOX 2****G20 High-Level Principles for Digital Financial Inclusion, 2016**

PRINCIPLE 1: Promote a Digital Approach to Financial Inclusion. Promote DFS as a priority to drive the development of inclusive financial systems, including through coordinated, monitored, and evaluated national strategies and action plans.

PRINCIPLE 2: Balance Innovation and Risk to Achieve Digital Financial Inclusion. Balance promoting innovation to achieve digital financial inclusion with identifying, assessing, monitoring, and managing new risks.

PRINCIPLE 3: Provide an Enabling and Proportionate Legal and Regulatory Framework for Digital Financial Inclusion. Provide an enabling and proportionate legal and regulatory framework for digital financial inclusion, taking into account relevant standards and guidance from the G20 and international standard-setting bodies.

PRINCIPLE 4: Expand the Digital Financial Services Infrastructure Ecosystem. Expand the DFS ecosystem—including financial and information and communications technology (ICT) infrastructure—for the safe, reliable, and low-cost provision of DFS to all relevant geographical areas, especially underserved rural areas.

PRINCIPLE 5: Establish Responsible Digital Financial Practices to Protect Consumers. Establish a comprehensive approach to consumer and data protection that focuses on issues of specific relevance to DFS.

PRINCIPLE 6: Strengthen Digital and Financial Literacy and Awareness. Support and evaluate programs that enhance digital and financial literacy in light of the unique characteristics, advantages, and risks of DFS and channels.

PRINCIPLE 7: Facilitate Customer Identification for Digital Financial Services. Facilitate access to digital financial services by developing, or encouraging the development of, customer identity systems, products, and services that are accessible, affordable, and verifiable and accommodate multiple needs and risk levels for a risk-based approach to customer due diligence.

PRINCIPLE 8: Track Digital Financial Inclusion Progress. Track progress on digital financial inclusion through a comprehensive and robust data measurement and evaluation system. This system should leverage new sources of digital data and enable stakeholders to analyze and monitor the supply of—and demand for—digital financial services, as well as assess the impact of key programs and reforms.



Data exchange DPs can enable fast and seamless sharing of information bringing in efficiency and reduction in cost of services.



DPIs AND THEIR ROLE IN THE FINANCIAL SECTOR

DPIs are generally understood as interoperable, open, and accessible infrastructure supported by technology to provide essential, society-wide, public and private services digitally such as identification, payments, and data exchange.⁶ When used responsibly, DPIs help address traditional challenges of financial inclusion, promote public and private innovation responsibly, and lead to productivity gains. Below are three current examples of DPIs:

- **Digital ID:** Digital systems and ecosystems that generate, store, and enable individuals and entities to obtain a digital ID and have it securely verified. These identity systems and ecosystems are often augmented by complementary services, such as electronic signatures, digital authentication, and verifiable credentials. These different use cases can integrate into multiple workflows and facilitate access to and usage of financial services, notably for account-opening and authentication purposes, therefore contributing to financial inclusion. Digital ID systems can be centralized (for example, Japan's MyNumber and India's Aadhaar) or based on federations of public- and/or private-sector ID providers (for

example, the Pan-Canadian Trust Framework and France-Connect), if not even completely decentralized (for example, the European Union's proposed model based on verifiable credentials).

- **Digital payments:** Digital systems that enable individuals, businesses, and governments to transfer money between one another easily and securely. Different types of payment systems could be operating as DPIs—that is, they are accessible and support interoperability across all types and segments of payment service providers, and they are reasonably priced and offer open interfaces for market innovations of various payment methods. FPS in particular operate as DPIs, with easy access and inherent interoperability features. For example, Brazil's Pix, India's UPI, the European Union's TIPS, Türkiye's FAST, and Mexico's SPEI allow individuals, businesses, and public authorities to collect and deliver payments around-the-clock and with immediate availability of funds to the beneficiaries. These features spur wide participation, competition, and innovation in the market, enable novel transaction-initiation approaches, remove frictions, and result in enhanced services and experiences delivered to end users at lower costs, thus fostering financial inclusion.

6. Not all data exchanges would necessarily have all these characteristics and therefore qualify as a data exchange.

**BOX 3****Fast Payment Systems**

FPS are characterized by 24/7/365 transfer services and the immediate availability of funds for the payee. They generally support a wide diversity of use cases, from cross-border remittances to the distribution of social assistance to vulnerable populations during emergencies and crises. Data indicates that fast payments are being embraced by various countries and regions across the globe, from different geographies and income statuses. Currently, more than 100 jurisdictions have implemented FPS, and several others have announced plans to go live in the next few years.⁷ In some countries, such as Brazil and India, adoption has been particularly quick and transformative. Nonetheless, it should be noted that in most jurisdictions, FPS are still in the early stage of their evolution.

Brazil

Brazil's fast payment system Pix was launched by the Central Bank of Brazil in November 2020. It allows fund transfers between all types of transaction accounts in the Brazilian market, creating a payment service ecosystem with low acceptance costs and high levels of usability. Pix aliases, which inform the account data to start a transaction, are as simple as an e-mail address or a mobile phone number. The platform also actively uses QR codes as the access channel. Since its launch, Pix has grown rapidly: By December 2021, approximately 109 million consumers and 7.6 million businesses, mostly MSMEs, were active users of the platform. That includes about 45 million citizens who previously did not have access to DFS. Some of the main drivers behind the adoption rates have been the single name and brand, building recognition and trust in the system; the mandatory participation of big banks, creating network externalities and scale; low transaction costs, compared to other retail payment instruments (transactions are free for end users); an improved and standardized customer experience; and a multiplicity of use cases, including P2P transfers, tax and bill payments, online, and card-present purchases.

European Union

The TARGET Instant Payment Settlement (TIPS) is a fast payment system introduced by the Eurosystem in November 2018. It enables customers of financial institutions to

carry out instant credit transfers (SCT Inst) at any time and at a low cost—TIPS operates on a full cost-recovery and not-for-profit basis. TIPS was developed as an extension of TARGET2, the real-time gross settlement (RTGS) system, and ensures the settlement of transactions in euros in less than 10 seconds, using central bank money. Other non-euro jurisdictions in the region also expressed interest in participating in the TIPS framework, such as Sweden, Denmark, and Norway, and discussions are ongoing to allow TIPS to settle fast payments in other currencies, such as Swedish krona. Depending on the solutions they use, European citizens can make and receive instant credit transfers via the internet, mobile banking, or using other initiation methods, such as QR codes. The uptake of instant credit transfers has been growing slowly in the past few years, with significant differences between countries. In October 2022, the European Commission adopted a legislative proposal on instant payments composed of several measures to harmonize and accelerate the rollout of this service.

India

India's Unified Payments Interface (UPI) is an instant, real-time fast payment network in India that can map payment accounts to a single payment identifier, which can be a virtual payment address (VPA) or as simple as one's mobile number. UPI started with bank accounts, but now payment can be made from wallets and even credit cards. The UPI payment system is built as an interoperable protocol. This allows anyone to build an app providing payments as a service to all customers of participating banks. It supports various payment methods, such as QR code-based payments, UPI Lite, UPI123Pay, UPI credit, and so forth. It facilitates seamless real-time fund routing and merchant payments, and it offers a convenient way to schedule and pay P2P collect payment requests. UPI has been widely adopted, benefitting from a user-friendly interface, open banking features, and private sector participation. The UPI platform has gained significant popularity in India; more than 9.41 billion transactions valuing about Rs 14.89 trillion were transacted in May 2023 alone. For the fiscal year 2022–23, the total value of UPI transaction was nearly 50 percent of India's nominal GDP.

7 World Bank, "Project FASTT," <https://fastpayments.worldbank.org/>.

**BOX 3, continued****Indonesia**

BI Fast is a fast payment infrastructure that refers to a method of transferring funds or making payments that is characterized by its speed and efficiency, 24/7, 365 days for bank and nonbank customers by direct and indirect membership model. It is built by Bank Indonesia (BI) to facilitate near-instantaneous transactions, allowing individuals or businesses to send and receive money quickly. BI Fast methods can include instant bank transfers, mobile payment apps and digital wallets. These systems aim to provide convenient and swift financial transactions, enhancing the speed and convenience of everyday commerce. Since its launch on 21 December 2021, the total number of BI-FAST participants has reached 122 participants as of March 2023, representing 94% of the share of national retail payment system.

Thailand

PromptPay is a fast payment service with real-time clearing and settlement combined with a proxy look-up service that securely maps a national ID number, corporate tax ID, or phone number to a bank account. PromptPay was launched in January 2017 and by mid-2019 had enrolled 70 percent of the population. Banks charge no fees for using the service, and they have deployed an interoperable QR code system that has resulted in a shift from cash transactions to digital. By mid-2019, more than 3.7 million merchants were accepting PromptPay QR payments,

compared to 140,000 merchants accepting cards with 480,000 traditional point-of-sale (POS) devices.

Türkiye

The Instant and Continuous Transfer of Funds System (FAST), developed in-house and operated by the Central Bank of the Republic of Türkiye (CBRT), was launched in January 2021. Originating from a demand from end users and banks, this new infrastructure paves the way for the reduction of cash usage and significant improvements in the payment ecosystem in the country. FAST offers continuous availability, enhanced speed, and a diversity of use cases and access channels. In addition, a range of overlay services, such as QR codes and aliases (a service called *Easy Addressing*), aim to enrich the user experience. There are plans to complement these features in the near future with other functionalities, such as request to pay. These overlay services are created and operated by the Interbank Card Center (BKM), which is jointly owned by the CBRT and major commercial banks and has proven experience in the development of customer-facing solutions. Nonbank payment service providers are eligible to become direct participants in the system, even though none is participating for the time being. Since its launch, FAST has seen a rapid uptake, reaching an average of 8.8 million daily transactions in June 2023.

Source: This box includes contributions by India, Indonesia, and Türkiye.

- **Data exchange:** Digital systems that enable the seamless and secure sharing of data based on consent, as required, between entities—for example, businesses or governments—and across systems.⁸ For example, data-exchange DPIs can enable providers to obtain more easily the information they need to provide financial products and services or also to fulfill regulatory requests, such as risk management

processes. When this data exchange involves personal data, DPIs can help enable the securing of the consent of the person to whom that data pertains, in addition to establishing other data protection and trusted data sharing safeguards. Examples of data exchange DPIs include India's Data Empowerment and Protection Architecture (DEPA) and Account Aggregators, Estonia's X-Road, and Singapore's MyInfo and APEX. In the financial sector, open finance initiatives that build on previous open banking efforts are now motivating discussions on open data—which is another framing for data exchange. The open banking regime pursuant to the European Union's revised Payment Services Directive (PSD2) is an example of an efficient and secure data exchange framework that does not involve centralized infrastructure.

8. Consent is typically required only for the disclosure of personally identifiable data to third parties. There are instances where obtaining user consent for data sharing would not be appropriate or necessary. For example, in cases where the data being shared does not include personal data (such as when the data is anonymized), then consent is not necessary. Furthermore, obtaining consent would not be appropriate when sharing data with authorities for the purposes of monitoring AML/CFT or fraudulent behavior (often required by law) or when using public datasets to assess social assistance eligibility.

**BOX 4****Open Finance and Open Banking Arrangements****Brazil**

The Open Finance framework in Brazil allows the following products and services to be offered: (i) data on products and services, such as branch location, access points that customers can use, terms and conditions, and fees; (ii) customer data, including information about deposit accounts and credit; and (iii) payment services, such as payment initiation and payment for products and services.

The Brazilian open finance ecosystem is coordinated by the private sector in compliance with rules established by the central bank and is supported by a centralized platform that covers several functions. These include a service desk through which technical support is provided to participants, a compliance test suite where participant compliance with functional and security requirements can be tested, an intelligence threat platform, where information related to cybersecurity incidents is shared, and a dispute-resolution module, where end users can raise disputes and follow up on such disputes.

Hong Kong, SAR China

In 2018, the Hong Kong Monetary Authority (HKMA) launched the Open API Framework for the Hong Kong banking sector. The framework is to be implemented in a phased approach consisting of the following four stages: (i) product information (deposit rates, credit card offerings, service charges, and other public information), (ii) customer acquisition (new applications for credit cards, loans, and other products), (iii) account information (account balance, credit card outstanding balance, transaction records, credit limit change, and others), and (iv) transactions (payment and transfers).

The HKMA leaves the strategy of adoption of Open API to banks but mandates that those that chose to move forward should ensure that a commensurate level of protections and suitable governance arrangements for third-party providers are in place, with appropriate, clear contracts to define responsibility, liability, control, and customer protection.

India

India's Account Aggregator (AA) Framework aims to strengthen India's data infrastructure, enabling consumers and enterprises to share their data only with their consent through an electronic consent framework. Acting as consent managers for the consumers, AAs enable the sharing of digital financial data from the existing financial institutions of the consumers where they already have an account to prospective financial institutions where they have applied for a new financial product. This ecosystem, regulated by the Reserve Bank of India (RBI), involves four key participants: the AAs, the financial information provider (FIP), the financial information user (FIU), and the citizens. The AA network ensures the security of data and grants customers complete control over their information. It allows the consumers to link their multiple financial accounts to the Account Aggregator handle and give their consent to share their data simultaneously from the multiple linked accounts, either for their own use or with prospective financial institutions for availing a loan, insurance, pension, or a wealth management service. By acting as a consented, digital, single channel access for all financial account statements of a consumer, it allows an aggregated picture of the consumer's finances to be presented, making it particularly beneficial for those seeking loans, as it facilitates access to authentic data and provides a comprehensive profile for loan providers to be able to sanction a loan. Currently, a total of 1.13 billion cumulative accounts are enabled for data sharing through Account Aggregators with customer consent. The cumulative number of consents raised through Account Aggregators has reached 13.46 million in June 2023, registering a monthly growth rate of 28 percent. The number of new consents successfully fulfilled in June was 2.9 million, which translates into 97,000 consents per day. As of June 30, 2023, the total number of entities that were live on AA was 248, with 75 FIPs, 231 FIUs, and 11 AAs with NBFC-AA licenses from RBI.

**BOX 4, continued****Philippines**

In 2021, the Central Bank of Philippines, Bangko Sentral ng Pilipinas (BSP), published its strategy to develop an open finance framework. For such purposes, BSP established a roadmap to deploy the framework.

The deployment strategy includes a pilot, to be conducted in the second half of 2023, in which financial institutions can participate on a voluntary basis. Selection of use cases to be tested during the pilot will be done before the start of the pilot and can cover the following categories or tiers: public information, subscription and account opening, account information, payment initiation services, and others.

Source: This box includes contributions from India and UAE.

United Arab Emirates (UAE)

The UAE's "DIFC Open Finance Lab Initiative" which provides opportunities to demonstrate the positive impact of open finance on businesses, customers, and the economy. It allows for collaboration among banks, fintech companies, regulators, and the industry to explore new data-driven innovations and business models.

The lab also provides avenues for knowledge sharing, technical guidance, and engagement through workshops, forums, and events such as Open Finance Week, to support banks, regulators, and industry and further public policy objectives, including financial inclusion and economic opportunities (DIFC 2022).

DPIs are similar to other digital and financial infrastructure, but depending on country context, differences could arise on account of DPIs being foundational and cross-cutting, and modular, and oriented towards achieving key public policy objectives, and them supporting various digital services. Below are some of their features:^{9,10}

- **Foundational and cross-cutting:** DPIs can provide essential services that often have applicability across multiple sectors at society scale. For example, identity verification and payments are at the core of different types of transactions across many sectors. DPIs, being foundational infrastructure, allow multiple sectors and applications to reuse them, thus avoiding each sector from having to reinvent the wheel. This is an important distinction between financial infrastructures that support only transactions within the financial sector and DPIs.
- **Modular:** DPIs are designed to be interoperable, allowing them to be integrated into workflows so that customizable new offerings can be rapidly deployed. Market participants can leverage these DPI features to streamline operations and encourage innovation while fostering a competitive

market. For example, in Singapore, citizens can use their digital ID to consent to the sharing of their personal data from official and private-sector sources to apply for loan, freeing the FSPs from having to develop digital authentication services separately.

- **Public benefit:** DPIs are labeled "public," as they have been designed to allow equal, nondiscriminatory access in accordance with specified governance rules. The "public" in DPI also indicates their focus in advancing public policy objectives, such as economic welfare, financial inclusion, enhanced competition, and innovation.
- **Digital services:** DPIs support the adoption and usage of digital services and help advance the digitalization of the economy. DPIs services are designed to be provided to end users through digital access channels, such as mobile devices. Furthermore, DPIs' services can be used in access channels that provide non-digitalized financial services. For example, agent networks that provide cash-in and cash-out transactions can also leverage DPIs to offer instant payments.

DPIs have the potential to advance financial inclusion by building on existing relevant financial infrastructures.

Where DPIs are built in a manner that is compatible with a jurisdiction's existing financial system, they can help integrate existing financial infrastructure into seamless digital workflows. For instance, centralized and federated open banking

9. Desai et al. (2023)

10. Natarajan (2023) defines financial infrastructures as the institutions, information, technologies, rules, and standards that provide the underlying foundation for the financial system and enable financial intermediation.

and open finance platforms enable the execution of processes from third-party payment initiation to authentication of end users to the access or validation of data. The data sources that can be accessed include financial infrastructures (such as collateral and credit registries); government and private databases, such as authentication, know-your-customer (KYC), or anti-money-laundering/countering the financing of terrorism (AML/CFT) databases or even databases of utility service providers; data held with other FSPs; and fraud and cybersecurity information-exchange arrangements with authorities.

However, DPIs are not without their risks and challenges.

For instance, building an effective DPI is not always easy or feasible to achieve. Additionally, country contexts may differ a lot; therefore, a given DPI model might not be replicable in a different context. DPIs may also introduce new risks or new manifestations of existing risks in the financial system. These include operational, legal and regulatory, insolvency, and exclusion risks, as well as new manifestations of consumer risks (including data risks) and risks for competition and obsolescence, which are discussed in section 4.2 of this report.



Use of DPLs for productivity gains, taking everyone along.



HOW DPIs CAN EFFECTIVELY ADVANCE FINANCIAL INCLUSION AND PRODUCTIVITY GAINS

3.1 The Role of DPIs in Advancing Financial Inclusion

Global progress toward financial inclusion has been significant. In 2021, 71 percent of adults in developing economies had a bank account, up from only 56 percent a decade earlier. The pandemic, coupled with the increased availability of digital solutions, served as a catalyst for an increase in digital payments worldwide. (Fifty-seven percent of adults in developing economies used them.) And for the first time in a decade, the gender gap in financial inclusion declined.

Despite this progress, challenges persist to the continued advancement of financial inclusion. Although there has been promising growth in account ownership, 1.4 billion adults, most of them women, are still financially excluded, and there are significant gaps in usage. The lack of financial resilience—which may be attributed to the slower pace of usage of financial services despite account ownership—is also a concern. For example, only about 55 percent of adults in developing countries were able to access emergency money without difficulty within 30 days of being faced with an unexpected expense. Borrowing has increased but at a pace that remains uneven between high-income and developing economies. MSMEs, especially in developing countries, face significant challenges in accessing credit, with a financing gap of \$5 trillion.¹¹ This gap has increased over the years, highlighting the need for targeted interventions to support MSMEs—with the COVID-19 pandemic having further increased their vulnerabilities.¹² In 2021, 53 percent of adults worldwide reported having borrowed money

from regulated financial institutions in the previous 12 months, including by using a credit card. However, this varied greatly between high-income economies (56 percent) and developing economies (23 percent).

The lack of financial and digital literacy also exacerbates vulnerabilities among underserved groups. For instance, 64 percent of unbanked adults in developing economies declared being insecure about managing an account without help in 2021. Women are five percentage points more likely than men to need help using their mobile money account. This lack of digital and financial literacy may exacerbate vulnerabilities among underserved groups and new users of financial services.

A combination of demand- and supply-side constraints perpetuates the existing gaps.¹³ The following barriers exist in varying degrees across countries:

- **Demand-side constraints**, such as volatile and small incomes, geographical barriers, a lack of digital and financial literacy, and a lack of trust in the financial sector, as well as informality and lack of documentation
- **Supply-side constraints** include high operating costs and legacy business models, as well as limited competition and innovation

DFS models, such as mobile money, already solve, to some extent, most of these constraints. Many models introduce a different pricing model that allows operating costs to drop; they leverage agents as a new business model that does not

11. IFC (2017).

12. IFC (Forthcoming).

13. World Bank. (2020c) discusses these constraints in detail, as well as how DFS can address them.

rely on brick-and-mortar access points¹⁴ and thus allows for greater geographical reach; and they create a new type of provider, thus introducing competition to the market. In addition, DFS also offer digital solutions for simplified customer due diligence (CDD), user authentication, and transaction initiation. Finally, the platform ecosystem DFS model—that is, bigtech platforms—has also been leveraging digital transaction data and alternative sources in several countries to compensate for information asymmetries to expand access to credit, insurance, and savings, albeit with challenges, such as vendor lock-in and limited competition. However, the lack of digital and financial literacy, coupled with a lack of trust in the financial system, can continue to be barriers to greater adoption of DFS.

However, in some jurisdictions, these models alone may not be enough to bring DFS to the next stage of usage, and DPLs can play an important role in reducing persistent constraints and positively disrupting the DFS market. DPLs, under the right conditions, not only can expand the potential offerings that mobile money operators provide but also can improve existing services by introducing more competition and bolstering usage. DPLs, such as data exchange platforms and FPS, support the interoperability of mobile money solutions. This interoperability allows new entrants to calibrate investments in agent models, as their clients would have the ability to use agent and merchant networks of other providers as well.¹⁵ This lower investment has the potential to foster a higher and faster rate of new entrants to the market, effectively promoting competition. It also allows new entrants to focus on developing innovative products and services that better cater to the unmet market needs, thus creating new value propositions for the excluded.

DPLs can promote the availability of consumer data, allowing multiple FPSs to offer personalized and innovative financial products, thereby increasing competition. The availability of such data relevant for determining consumer creditworthiness can enable alternative credit scoring and empower individuals to access tailored credit products. For example, India's DEPA empowers individuals by giving them ownership over their data (rather than being controlled by the service providers who collect this data) and allowing them to share it across providers to enable access to tailored products and services. This means that new entrants do not need a high initial investment—in this case, in the form of pre-existing client

relationships—to be able to compete for and offer innovative products. DPLs can level the playing field and, in doing so, significantly reduce incumbent advantages, pushing all providers to offer better services to retain customer loyalty.

One aspect that makes DPLs unique, and that can further reduce existing constraints, is their ability to complement each other or be integrated in end-to-end workflows. Systems using application programming interfaces (APIs) can be configured with appropriate channels and products to reach the poor when the APIs are underpinned by a digital ID system and facilitate interactions between governments, businesses, and citizens. One such service that is enabled by the interaction of open APIs and digital ID systems is the e-KYC or remote authentication services. For example, in India, the Aadhaar biometric identification system, which covers over one billion people and supports APIs, enables remote identification and authentication. FPSs can thus authenticate an individual's identity remotely, even by using selfie-based mechanisms to substitute for in-person CDD verification requirements.

3.2 The Role of DPLs in Enabling Productivity Gains

Digitalization in the financial sector brings in many advantages in the form of productivity gains and economic growth. To quantify these, the McKinsey Global Institute (2016) estimated that delivering financial services via mobile phones could benefit billions of people by spurring inclusive growth that adds \$3.6 trillion to the GDPs of EMDEs within a decade.¹⁶ The GPFI adopted the HLPs in 2016, recognizing the potential of digital technologies, and especially DFS, in accelerating financial inclusion.

However, DFS could also introduce several disadvantages, specifically in the form of augmenting inequalities for those who have been unable to participate in the digital economy due to demand-side barriers. For example, promoting DFS without dealing with persistent gaps in digital and financial literacy could become counterproductive. Well-designed DPLs strengthened by a calibrated policy framework can effectively address these inequalities and accelerate and deepen the adoption of DFS in accordance with the HLPs, especially HLP 4. Box 5 provides examples of how DPLs can add value to the private sector.

14. Physical locations may still be considered relevant and important in many cases, including for customer relationship management and building greater trust in the financial system through direct, in-person customer interface.

15. For example, the Aadhaar Enabled Payment System allows individuals to use Aadhaar as their identity to access a bank account and perform such transactions as deposits and fund transfers through an agent.

16. McKinsey Global Institute (2016).



BOX 5

DPIs' Potential Added Value for the Private Sector

Private-sector entities, including FSPs and MSMEs, could benefit from DPIs through (i) increased opportunities for innovation, (ii) higher efficiencies and productivity gains, (iii) improved access to credit, and (iv) better access to markets for existing and new products, where the extent of these benefits would depend on country-specific conditions.

1. OPPORTUNITIES FOR INNOVATION: The use of DPIs in the financial sector can enable emerging technology and other digital tools to be harnessed effectively to create inclusive and innovative financial solutions. For instance, the Singapore Financial Data Exchange (SGFinDex) has enabled a multinational bank, DBS, to build the AI-powered DBS NAV Planner, which offers financial and retirement planning solutions to all Singaporean residents, including low-income segments.

2. HIGHER EFFICIENCY: DPIs can enhance efficiency for private organizations through reductions in the complexity, cost, and time spent on business operations. For some nonbank financial companies (NBFCs) in India, the AA ecosystem enabled an 8 percent higher conversion rate in SME lending, a 65 percent savings in depreciation costs, and a 66 percent reduction in costs related to fraud detection.¹⁷ According to industry estimates, banks' costs of onboarding customers in India decreased from \$23 to \$0.1 with the use of DPI.¹⁸

3. ACCESS TO NEW MARKETS: Cross-border interoperability of payment DPIs can open international markets for ecosystem participants. For instance, Thailand's PromptPay has established cross-border payments with six countries—Cambodia, Indonesia, Japan, Malaysia, Singapore, and Vietnam. The platform is leveraged to develop a digital trade platform for exporters and importers to send and receive electronic documents for international trade.¹⁹

4. ENABLING ACCESS TO CREDIT: DPIs can help address the credit gap faced by MSMEs and enable access to loans by individuals. Acquisition costs for lenders are reduced through the seamless sharing of financial and nonfinancial data. For instance, through open APIs, India's Open Credit Enablement Network (OCEN) enables MSMEs participating in digital markets to secure credit by using information about their business history, rather than pledging physical assets as collateral.²⁰ Fintech and e-commerce providers developed a methodology for determining the credit risk of a consumer by using multiple consumer data inputs related to creditworthiness, shared by consent of the consumer, and accordingly provide a small short-term loan to enable online purchases on credit for the first time.

Source: This box was contributed by India.

17. Sahamati (2022, November). Expected Evolution of Account Aggregator Ecosystem 2023-2027 (based on Industry stakeholder interview). Retrieved February 10, 2024 from <https://sahamati.org.in/expected-evolution-of-account-aggregator-ecosystem-2023-2027/>

18. Alonso et al. (2023)

19. Ping (2023). <https://www.theasianbanker.com/updates-and-articles/thailands-national-itmx-promptpay-could-have-the-most-real-time-cross-border-linkages-in-the-world>

20. Kotak (2022). <https://www.kotaksecurities.com/pdf/indiadaily/india-daily06062022hl.pdf>

DPIs can enable productivity gains for furthering financial inclusion. This report defines productivity gains as increases in output that result from a more efficient use of inputs and technology to deliver, access, and use financial services.²¹ Financial inclusion itself, in turn, facilitates further productivity gains. Figure 1 illustrates the two transmission mechanisms for this purpose.

First, the integration of one or more DPIs with the financial ecosystem can enable seamless end-to-end digital processes, thereby reducing frictions and inefficiencies in the provision of financial services. This goes beyond the mere automation of existing processes to a complete reconfiguration of the process workflows, improving the reliability of information, lowering costs, and increasing the speed of transactions. DPIs address the supply-side barriers (as identified in annex 3) of high operating costs, legacy business models, and limited competition and innovation. By making it easy for

21. Digitalization of the economy also creates productivity gains, but its impact has proved to be uneven. See OECD (2019) and Anderton, Botelho, and Reimers (2023) for further details on this issue.

new users to open accounts and use payment services, DPls enable access to other financial services, such as savings, credit, and insurance. These result in productivity gains in the form of increased efficiencies for the government as well as for FSPs. For example, research from the Inter-American Development Bank shows that digitalization allows speed of delivery to increase in about 74 percent of public services, and such services are 95 percent cheaper than equivalents.²² Of course, it is also possible to consider additional effects on productivity down the chain, assuming the government can potentially use the increased efficiencies to make further investments for further productivity gains. Another example of increased efficiency due to digitalization is the lower cost of international remittances when sent digitally. For instance, in Q4 2022, the global average cost of digital remittances was recorded at 4.71 percent (of the send amount, \$200), while the global average cost of non-digital remittances was 6.91 percent.²³ Thus, sending \$200 digitally is \$4 cheaper on average. Any reduction in the cost of sending remittances directly increases disposable incomes of remittance families, and cost reduction is one of the UN Sustainable Development Goals (SDG 10.c).

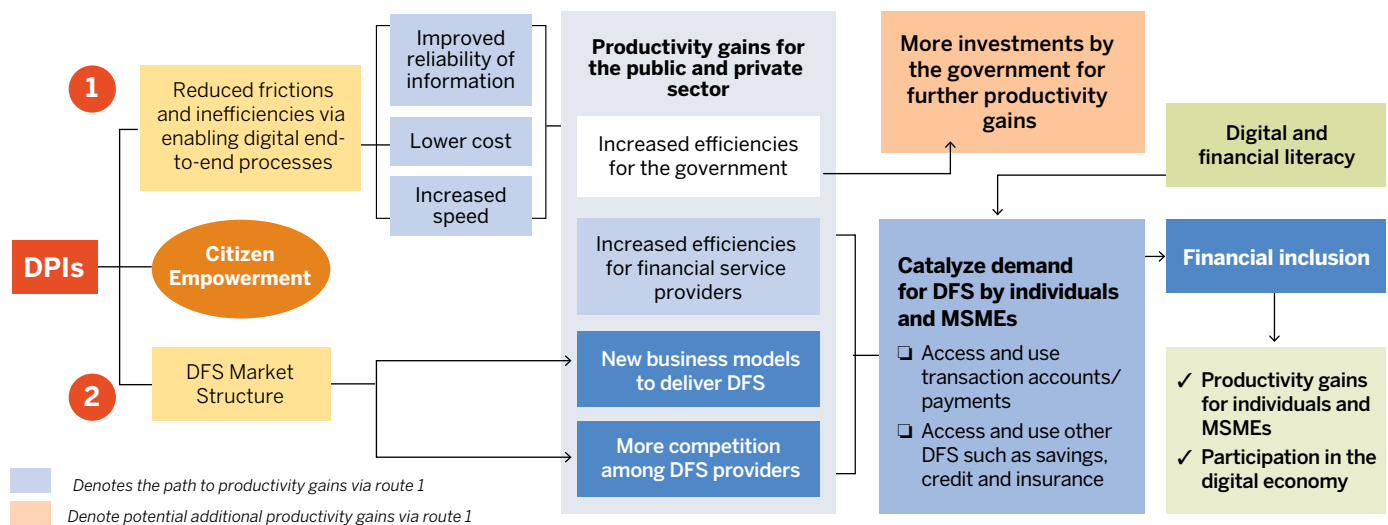
Second, DPls can create conditions for improved competition and, hence, bring about shifts in the market structure, providing a level playing field and promoting innovation.²⁴ In doing so, they may enable new business models and encourage providers to continuously innovate and offer new and better services to their customers, improving their user experience. By enhancing competition and encouraging new and innovative business models, DPls can improve productivity gains.

DPls for consented sharing of data can empower users to access financial products tailored to their needs. Figure 1 also shows the importance of citizen empowerment through the use of DPls that reinforces and amplifies the effect of DPls in facilitating the flow of reliable information and driving innovations for financial product development.

These advances can allow financially included individuals and MSMEs to more easily access the tools they need to increase their productivity and participate in the digital economy, bringing additional productivity gains. Various

FIGURE 1: DPls Can Enable Productivity Gains for and through Financial Inclusion

Productivity gains: those increases in output which result from a more efficient use of inputs and technology to deliver, access and use financial services



Source: Authors' own elaborations.

22. IDB (2022)

23. World Bank, Remittance Prices Worldwide Database, Quarterly Report, Q2 2022. A digital remittance must be sent via a payment instrument in an online or self-assisted manner and received into a transaction account—that is, a bank account, a transaction account maintained at a nonbank deposit-taking institution (say, a post office), or a mobile money or e-money account.

24. While the narrative in this section and figure 1 focuses on the effects of DPls on the DFS market structure, DPls will also affect the market structure in the financial services overall.

studies have shown a positive relationship between digital financial inclusion and economic growth while also stressing the importance of individual country circumstances in determining policy priorities.²⁵ DPIs lower costs and dependence on legacy models of suppliers by using generic hardware and software components to build adaptable digital infrastructure. On the demand side, this helps remove adoption challenges to first-time users and increase availability of public knowledge about usage of DFS—for example, by amplifying word-of-mouth effects.

Recent country experiences in rapidly addressing gaps in financial inclusion have highlighted the critical role played by DPIs. Box 6 provides examples of how countries have leveraged DPIs to advance financial inclusion and increase productivity gains.

BOX 6

Nusuk Hajj:²⁶ An Exceptional Example of Application in the Nonfinancial Sector from Saudi Arabia

In the realm of digital transformation, the Nusuk Hajj platform stands out as an excellent example of how a DPI can address unique challenges, particularly those associated with managing large-scale annual events or public services. Instituted by the Saudi government, Nusuk Hajj has redefined the nuances of the Hajj pilgrimage, one of the world's largest annual gatherings, during which millions of Muslims from around the globe are welcomed to the holy city of Mecca.

Nusuk Hajj's infrastructure operates with two primary goals: enhancing the spiritual journey for pilgrims and ensuring their safety. By leveraging this platform, pilgrims can invest their time in spiritual pursuits by minimizing wait times and streamlining the completion of necessary rituals. The platform's efficiency contributes significantly to enriching the overall experience of the pilgrims.

Importantly, the platform also equips authorities with the capability to monitor the movements of the pilgrims in real time. This feature helps prevent overcrowding and ensures the safety and wellness of the pilgrims, demonstrating the clever application of smart technologies to manage such a large-scale event.

Introduced as a part of Vision 2030, the Nusuk Hajj platform reflects the Saudi government's commitment to

fostering digital infrastructure for economic and social development. The platform effectively eliminates the need for pilgrims to approach third-party agencies, offering a unified portal to purchase service packages and procure visas.

Global pilgrims are provided with an extensive array of more than 120 services, ranging from flight arrangements and accommodations in Mecca and Medina to transportation and catering. Additionally, the platform gives access to tour guides and continuous support throughout Hajj, peace of mind with secure payment methods, and assistance in validating documents required for visa issuance.

In conclusion, the Nusuk Hajj platform is a shining example of a DPI that employs technological advancements to address seemingly insurmountable challenges. It lends a new dimension to public services management and reinforces the potential of digital infrastructure to enhance not only national but also global social experiences. Not only does it streamline the organizational aspects of Hajj, but it also enriches the spiritual journey of millions of global Muslims, ensuring that they navigate their pilgrimage with ease and tranquility.

Source: This box was contributed by Saudi Arabia.

26. Ministry of Hajj and Umrah, "Nusuk Hajj," <https://hajj.nusuk.sa/>.

25. See, for example, Khera et al. (2021); Ozili, Ademiju, and Semia (2022); and Azimi (2022).

BOX 7

Examples of DPIs in Singapore and the United Arab Emirates (UAE)

Singapore

The Government of Singapore introduced Singpass in 2003 to enable Singaporeans to access various government services online. In 2017, Singpass evolved to be part of Singapore's national digital ID service stack built on public key infrastructure cryptographic security techniques. Services include authentication, digital signing, and biometric verification. Singaporean residents and businesses can use Singpass to transact digitally with both the government and the private sector in a convenient and secure manner.

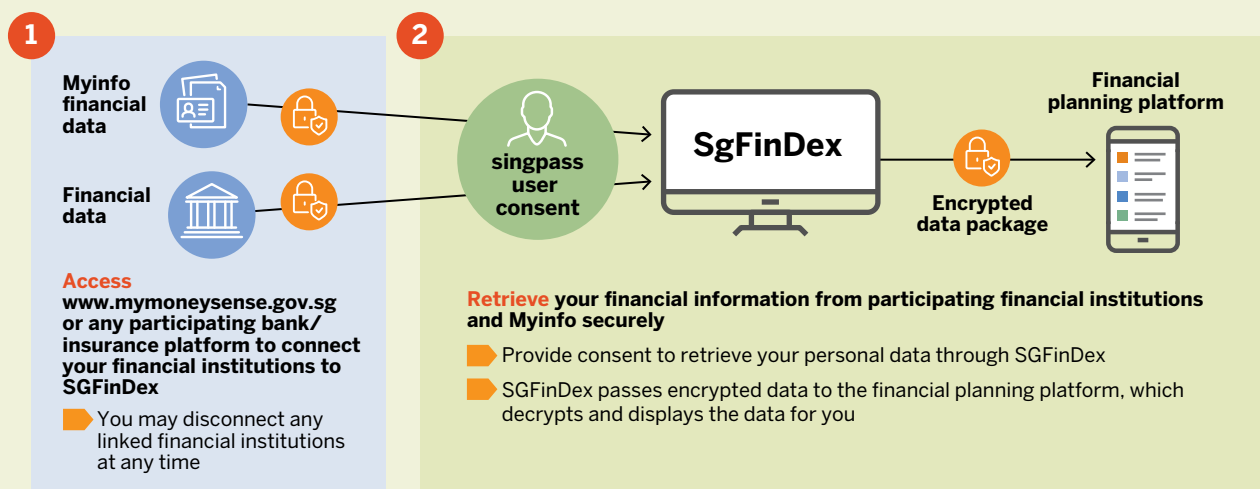
The Singapore Financial Data Exchange (SGFinDex) is a DPI that uses Singpass and a centrally managed online consent system to enable individuals to understand their overall financial health better and plan their finances holistically. With SGFinDex, individuals can provide consent and retrieve and view their financial information held across different government agencies and financial institutions (that is, banks, insurers, central depository) on a single application of their choice. The government has also developed a free digital financial-planning service named MyMoneySense, allowing citizens to improve their understanding of their finances via SGFinDex and take action to improve their financial well-being across different life stages.²⁷

UAE

UAE-PASS was launched in 2018 through a collaboration between Digital Dubai, the Telecommunications and Digital Government Regulatory Authority (TDRA), and the Abu Dhabi Digital Authority as the national digital ID and signature solution. UAE-PASS enables citizens, residents, and visitors to create a secure digital ID that provides seamless access to public and private digital services in the country. UAE-PASS enhances digital transformation, eliminates paper transactions, and creates a seamless and secure digital ID system across government and private-sector entities.

The UAE-PASS allows for streamlining of online services by providing a trusted digital ID through users' smartphones and eliminating the need for multiple usernames and passwords. It enhances convenience for users and reduces administrative burdens for service providers. The integration of UAE-PASS into the private sector expanded its reach and usability, promoting a unified digital ecosystem.²⁸

Source: Contributions from Singapore and UAE



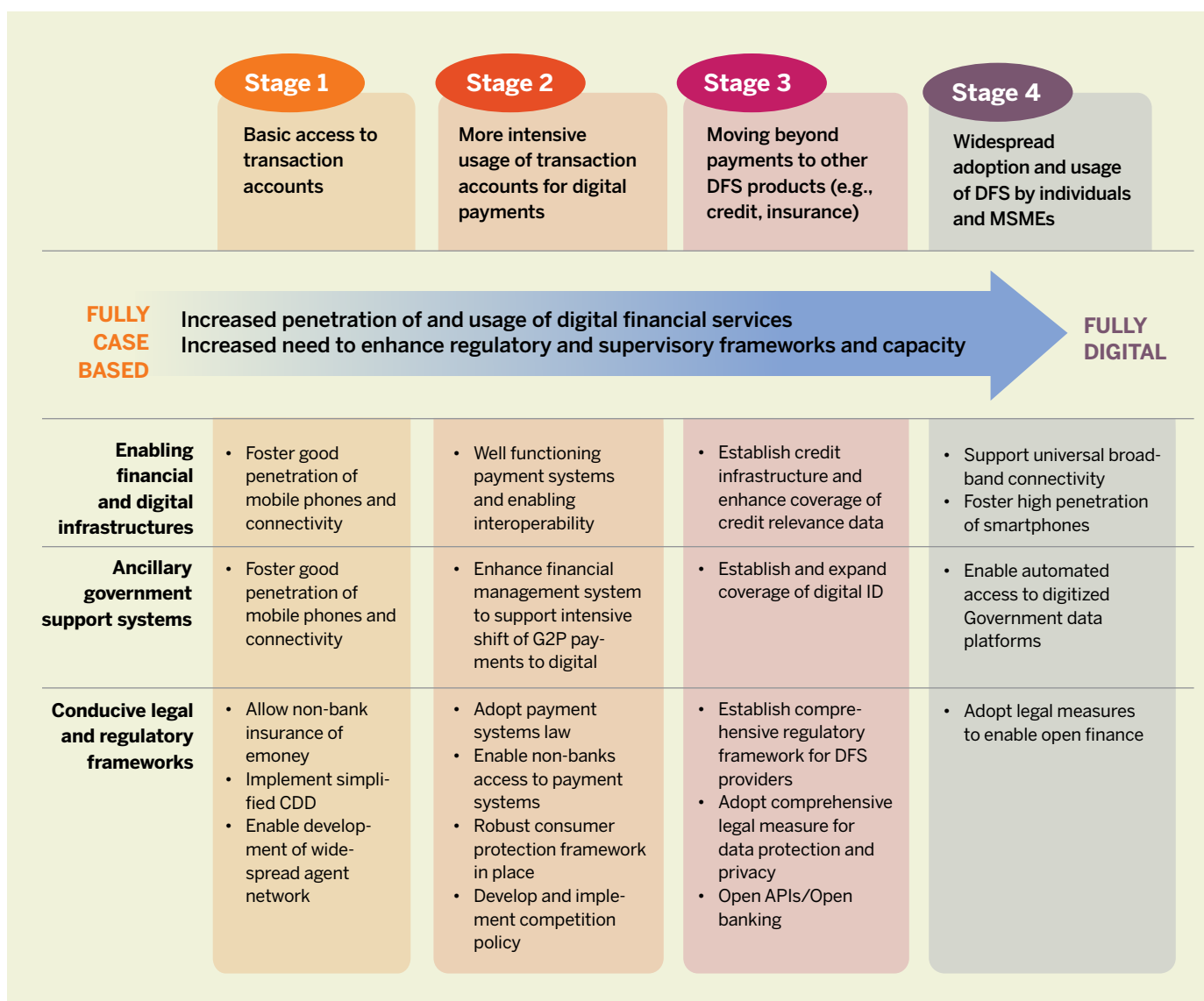
27. Government of Singapore, "MyMoneySense," <https://www.mymoneysense.gov.sg/>.

28. United Arab Emirates, "The UAE Pass App," <https://u.ae/en/about-the-uae/digital-uae/digital-transformation/platforms-and-apps/the-uae-pass-app>.

Properly designed and implemented, DPs can support countries reach the next stage of DFS usage. The evolution of DFS in an economy could be stylistically seen as progressing through four stages (see figure 2), though not necessarily in a sequence and not necessarily for all individuals and MSMEs. The binding constraints to transitioning from one stage to the other are different, and as such, countries can sequence their reforms accordingly. DPs can be particularly effective in moving from stage 1, where there is widespread access to accounts, to stage 2, where usage of payment services is picking up, usually on the back of DFS offered by a few innovative

providers. For example, in India, the implementation of various DPs is considered to have played a critical role in the increase in account ownership from just one-fourth of adults in 2008 to almost 80 percent a decade later—a journey that it is estimated would have taken up to 47 years without DPs.²⁹ Similarly, in Brazil, the introduction of Pix has accelerated the usage of digital payments beyond any trends observed earlier. Fifty million individuals made transfers through Pix when they had not made any account-to-account transfers in the 12 months prior to its launch.³⁰

FIGURE 2: Phased Approach to Development of DFS



Source: Adapted from World Bank (2020c).

29. D'Silva et al. (2019)

30. Duarte et al. (2022)

However, for DPIs to be effective, individuals and MSMEs should have sufficient digital and financial literacy. While DPIs can help expand the offering and reach of innovative DFS products and services that are better targeted at the currently financially excluded segments of the population, individuals and MSMEs must be adequately empowered to take advantage of them. Until potential users feel confident and empowered to use DFS, their interaction with the financial system will be limited.

3.3 DPI Use Cases

In this section, four financial sector use cases are analyzed to illustrate how DPIs can play a role in advancing financial inclusion and productivity gains. Each use case includes a short description of the service, the processes involved, and the specific way in which DPIs can be leveraged.

3.3.1 Account Opening

Context

Account opening is a prerequisite to using regulated financial services; making it easy for citizens to open new accounts significantly expands financial inclusion. Hundreds of millions of adults worldwide have opened an account in the past decade. The global account ownership rate grew from 51 percent of adults in 2011 to 76 percent in 2021.³¹ During account opening, prospective customers are required to provide credentials to establish their identity, so that the FSP can carry out KYC procedures.³² This allows the provider to use information gathered from other documents and sources (such as credit bureaus) to validate the credentials provided, and to evaluate the suitability of the applicant for the product or service. Once complete, the customer is issued an identifier to access the account, and the credentials collected can be used for authentication in future transactions or to access other services.

Beyond the objective of identifying and enrolling customers, account-opening procedures also originate from AML/CFT requirements. In some cases, these requirements are adapted, depending on the risk profiles of end users.³³ The depth and rigor of the account-opening procedures vary by the type of features offered; more advanced features (for example, higher transaction limits and cross-border transactions) require additional steps beyond just validating identity—for example, validating sources of funds and requiring the provision of additional documents.

Leveraging DPIs

Account opening can be done remotely through digital means (for example, using a mobile phone) to simplify access to basic transaction accounts for individuals and MSMEs and constitute an entry point to DFS at large. In the last few years, a pivotal aspect of financial inclusion strategies in many jurisdictions has been the introduction of basic transaction accounts—offered by either banks or nonbanks—with simplified CDD procedures for account opening (including simplified ID requirements), coupled with strict limits on the number and value of transactions. In several countries, these measures have been underpinned by a digital ID and a data sharing framework. These DPIs can make in-person account opening in branches and agents significantly quicker, or they can even enable a fully remote end-to-end digital account opening. Bangladesh and India have used digital ID to increase account ownership rapidly (box 8).

By leveraging digital technologies and the extensive availability of mobile devices, DPIs can be used to give end users an easy and integrated way to prove their identity when opening an account. This can be very beneficial to migrants, refugees, rural populations, and other vulnerable groups that have insufficient documentation. This can also improve the ability of MSMEs to access DFS, by leveraging identifiers such as business registration numbers and fetching data available in public registries through the implementation of e-CDD. Data exchange DPIs make it possible to gather

31. Demirguc-Kunt et al. (2022).

32. GPFI (2018)

33. For regulatory and audit purposes, but also to allow other subsequent verification use cases, such as multifactor authentication, data collected throughout the account-opening process, such as credentials and biometrics, is sometimes stored in a—generally centralized—digital ID database (for example, a KYC registry). Moreover, the information collected during account opening (for example, address, contact details, and employment status) can evolve over time and thus occasionally requires revalidation.

**BOX 8****Digital ID in India and Bangladesh****India**

India's financial inclusion strategy relies on the JAM trinity of Jan-Dhan, Aadhaar, and mobile and integrates digital ID for more efficient account-opening and payment applications for access to financial services. E-KYC uses Aadhaar ID system to verify the identity of end users quickly, allowing FSPs to enroll customers easily and directly activate new services, such as mobile connections and bank accounts. E-KYC is paperless, private, and instantaneous, with reliable data shared in real time. Micro-ATMs use Aadhaar authentication for branchless banking, reducing paperwork and enabling electronic record keeping. Similarly, the India Stack has digitized and simplified KYC procedures, lowering costs; banks that use e-KYC lowered their cost of compliance from \$0.12 to \$0.06. The decrease in costs made lower-income clients more attractive to service and generated profits to develop new products.³⁴

34. Alonso et al. (2023).

Bangladesh

In Bangladesh between 2017 and 2019, Bangladesh Bank carried out a nationwide pilot with 18 banks and one nonbank financial institution to test e-KYC. This initiative involved utilizing various technologies (including biometrics) for customer onboarding and account opening. The National Identification (NID) card issued by the National Identity Registration Wing (NIDW) of the Election Commission (EC) of Bangladesh was used to verify the identity of end users. The technologies employed in the project encompassed fingerprint- and facial-matching devices, as well as AI and optical character recognition in both English and Bangla. In this study, Bangladesh Bank concluded that e-KYC would reduce the total time to onboard and open an account for a customer from four or five days to five minutes.

data from a variety of sources, improving overall reliability and confidence in e-CDD processes and in turn enabling access to more advanced services. In addition, payment systems can be leveraged to validate account ownership and reduce fraudulent misuse of customer information by sending a (small) random amount of money as credit and asking the person to state the amount received. With FPS, this can be done in a matter of seconds and at a low cost. Electronic sharing of additional data required for account opening through a data exchange DPI can simplify KYC and CDD processes and

address such barriers to financial inclusion as high costs, distance, and the time taken to open an account. Data exchange DPIs can even assist in analyzing trends in fraudulent transactions by collating information about past frauds. Digital IDs could further financial inclusion, especially in low- and middle-income countries, where insufficient documentation is often a barrier to account ownership. In addition, inclusive access rules by digital ID systems and reasonable costs for both public and private entities would enable broad adoption of these solutions by different types of providers.



BOX 9

France's Approach to Digital ID

In France, the foundational ID system has historically relied on the civil registry, which identifies people according to the same characteristics (for example, birth name, first name, and date and place of birth) and on official identity documents (for example, the national ID card or passport). FranceConnect was launched in 2016, operating as a federation of various public and private identity providers and allowing individuals to use existing credentials to authenticate their identity securely when accessing online services. FranceConnect acts as a trusted intermediary between users and service providers, ensuring the reliability and privacy of personal information and promoting the exchange and transmission of data between administrations that support the OpenID Connect protocol.

Based on single sign-on (SSO) principles, it allows citizens to log in to different online services—mostly public ones at present—using their existing credentials from certified identity providers, such as *impots.gouv.fr* (tax office services), La Poste (post office services), or AMELI and MSA (social security). Currently, FranceConnect supports more than 40 million people and allows access to over 1,400 services. Two versions of the platform exist, covering different levels of assurance: FranceConnect+ allows for multifactor authentication to meet more stringent security requirements for more sensitive use cases, while FranceConnect is compliant with the European regulation on electronic identification and trust services

for electronic transactions in the internal market (eIDAS Regulation).

Additionally, in April 2022, the French government unveiled an ambitious project for digital ID in the country—the *Service de garantie de l'identité numérique* (SGIN), or “Digital Identity Guarantee Service.” Based on the electronic national ID cards (CNle) issued since August 2021, the SGIN will operate in conjunction with FranceConnect and will be a means of digital identification and authentication, achieving a high level of assurance for French citizens. The project has a strong focus on ensuring user-centricity—for instance, it should not allow the card holder’s biometrics to be accessed, and its use will not be compulsory.

Furthermore, French public authorities have a dedicated focus on digital governance, including through the development of key DPI capabilities required to support the evolving needs of its digital economy. Among other measures, the French government adopted an action plan on free software and digital commons in November 2021. This plan aims to promote the use of free and open-source software and digital commons in the administration, to develop and support the release and publication of its source codes, and to use free software to strengthen the attractiveness of the state as an employer of digital talent.

3.3.2 Government-to-Person Payments

Context

Globally, government-to-person (G2P) payments have increased significantly in scale. In 2021, over a quarter of adults were receiving payments from the government, an increase of 400 million individuals from just four years earlier.³⁵

On average in the past decade, across a sample of 46 developing countries with available data, 1.5 percent of GDP was allocated to social assistance payments, 3.6 percent to pensions, and 7.3 percent to public wages.³⁶ In 2020, in response to the COVID-19 crisis, spending on social-protection programs increased even further, to at least \$80 billion across developing countries.³⁷

35. According to Global Findex 2021, 28 percent of adults worldwide were receiving payments from the government. This percentage has likely increased, since social assistance scaled up in response to the COVID-19 crisis.

36. World Bank (2022c).

37. Gentilini et al. (2020).

The increasing scale of G2P payment programs offers a huge opportunity to advance financial inclusion, contribute to women's economic empowerment, and promote the development of the digital ecosystem. Digitalizing G2P payments—in particular, for social assistance programs that target base-of-the-pyramid beneficiaries—can be an effective way to advance financial inclusion. Indeed, according to the 2021 Global Findex, 865 million account owners in developing economies opened their first financial account for the purpose of receiving government transfers.

Improved efficiencies in how G2P payments are distributed can also offer significant benefits to the government and to the society at large. Many governments have increasingly been transitioning away from cash or other paper-based payment methods to digital payments, which, under some conditions, have proven to reduce total overhead costs for governments and substantially improve controls. This includes reducing leakage and eliminating other forms of misbehavior/corruption. Moreover, when the COVID-19 pandemic left many seeking help from the government, countries with DPIs were able to reach the poorest in a faster, more targeted, and transparent manner.³⁸

Leveraging DPIs

DPIs can enable digitalizing G2P payments in an efficient, inclusive, and adaptive way in the following key areas: (i) beneficiary account opening, (ii) account registration with the government program, (iii) generating payment instruction (for the executing financial institution or the national treasury), (iv) transfer of funds to beneficiary accounts, (v) reconciliation, and (vi) payment cash-out or digital use. Jurisdictions that had in place DPIs such as digital ID, digital payment systems, and infrastructure for data sharing were also able to reach more beneficiaries and generally respond in a faster, more targeted, and transparent manner during the COVID-19 pandemic.³⁹

DPIs enable G2P architectures that can operate digitally from end to end.⁴⁰ For this purpose, DPIs need to be interoperable and accessible by both public- and private sector entities through shared rails that can be used by different G2P payment streams.⁴¹ This not only advances financial inclusion but also improves productivity gains through cost savings for the government and ultimately increases convenience for beneficiaries. At the same time, other enablers, such as effective access

to technology by these beneficiaries and digital and financial literacy, would still be necessary for the benefits to materialize.

Trusted digital ID systems can facilitate the digitalization of G2P payments and contribute to their efficiency. To enable digital G2P payments, it is essential to have trusted ID systems or ecosystems with wide coverage. Beyond ensuring that all beneficiaries have a unique and valid form of ID, digital ID systems in particular can provide an ID verification service to public and private sector entities that supports efficient and timely account opening, including remotely.⁴² The ID system also needs to be interoperable with the country's social registry and social protection management information system (MIS). This will help support the identification and onboarding of potential beneficiaries into social assistance programs and support the matching of beneficiaries with their corresponding account.

Interoperable payment systems with the broad participation of payment service providers and a government payment gateway or interface can support digital G2P payment delivery. A payment system should be leveraged to deliver G2P payments to beneficiaries' accounts. For this, the social protection MIS (where beneficiary lists and the amounts payable are prepared) should be capable of interfacing with either (i) a payment service provider that is connected to the payment system or (ii) the national treasury, which, in turn, would interface with the payment system to execute the payment instructions directly.⁴³ In order for beneficiaries to be able to use the payment service provider of their choice, an interoperable retail payment system with the broad participation of bank and non-bank payment service providers is needed. This will increase convenience, strengthen pathways to financial inclusion, and also contribute to market development.

Lastly, features such as aliases used in FPS and through data exchange DPIs recipients are able to switch providers easily and new programs can be launched faster. A database or platform supporting the matching of beneficiary unique IDs and their account numbers, sometimes called an account directory, allows beneficiaries to select and update the account where they want to receive any government payments without having to update different programs or agencies.⁴⁴

38. Marin and Palacios (2022).

39. Marin and Palacios (2022).

40. A recent paper on the role of digital during COVID-19 showed that among 85 countries, those that were able to use digital databases and trusted data sharing reached on average three times more beneficiaries than those that could not rely on these DPIs and had to collect information practically from scratch. For additional details, see Marin and Palacios (2022).

41. World Bank (2022c)

42. Several jurisdictions have implemented special regulations to enable individuals to open an account with minimal documentation, although these accounts usually have some balance or transfer limits.

43. As long as the national treasury is a direct participant in this payment system.

44. More broadly, pairing a unique ID system that is integrated across government databases and also linked to accounts is an option that countries such as Chile, India, and Peru have adopted (with varying approaches) to achieve this mapping.



BOX 10

G2P Payments: Country Examples

In the last decade, India has built one of the world's largest digital G2P architectures leveraging DPI. This approach has supported transfers amounting to about \$361 billion⁴⁵ directly to beneficiaries from 53 central government ministries through 312 key schemes. As of March 2022, this had resulted in a total savings of \$33 billion,⁴⁶ equivalent to nearly 1.14 percent of GDP.

In Türkiye, the Integrated Social Assistance System (ISAS), which leverages digital payment and ID systems, has transformed social assistance processes by digitizing applications, investigations, payments, monitoring, accounting, and auditing. With integration across 28 public institutions and the e-Government Gateway, ISAS serves 57.5 million individuals (17.7 million households). Applicants need only their national ID for eligibility determination, reducing the number of documents required from 17 to just one. Application time has decreased from days to minutes, while processing and benefit delivery time has been cut from months to days.⁴⁷

In Peru, the digital ID system proved invaluable during the COVID-19 social assistance response to identify potential beneficiaries swiftly. Authorities were able to use the ID number to cross-check social insurance and other administrative datasets, ensuring that support reached those most in need. Peruvians could check eligibility online

using their national ID number and open a bank account remotely (Cuenta DNI) to receive government transfers. This system facilitated efficient eligibility verification and provided convenient access to financial assistance during the crisis.⁴⁸

In Brazil, the government launched Auxílio Emergencial as a social assistance program in response to COVID-19. Close to 70 million beneficiaries received aid through the program, for which the government set up a digital savings account with digital access channels to use the funds. It is estimated that 40 percent of beneficiaries did not have an account before the pandemic.⁴⁹ The Caixa TEM app through which beneficiaries could open and operate their savings accounts includes functionalities such as digital cards, QR payments, and payments through Pix, the fast payment system launched by the Central Bank of Brazil in November 2020. Pix enables P2P transfers and merchant payments in real time on a 24/7 basis. The introduction of Pix, in addition to incentives by the program to use funds digitally, likely contributed to the high digital use of the cash transfers.⁵⁰ Of the total funds transferred by the program, 75 percent was used digitally, and only 25 percent was cashed out.⁵¹

45. Government of India, "Direct Benefit Transfer," <https://dbtbharat.gov.in/>.

46. Government of India, "Estimated Gains," <https://dbtbharat.gov.in/static-page-content/spagecont?id=18>.

47. Ortakaya et al. (2022)

48. World Bank (2020)

49. CAIXA. Relatório da Administração 4T20. https://www.caixa.gov.br/Downloads/caixa-governanca/Relatorio_da_Administracao_4T20.pdf

50. There were explicit efforts from the Auxílio Emergencial program to increase the use of funds digitally, including not allowing beneficiaries to cash out immediately after the payment; rather, there was a period of 10 to 53 days in which funds could be used only to make transfers or digital payments. For more information, see World Bank (2021).

51. World Bank. (2021)

3.3.3 Remittances

Context

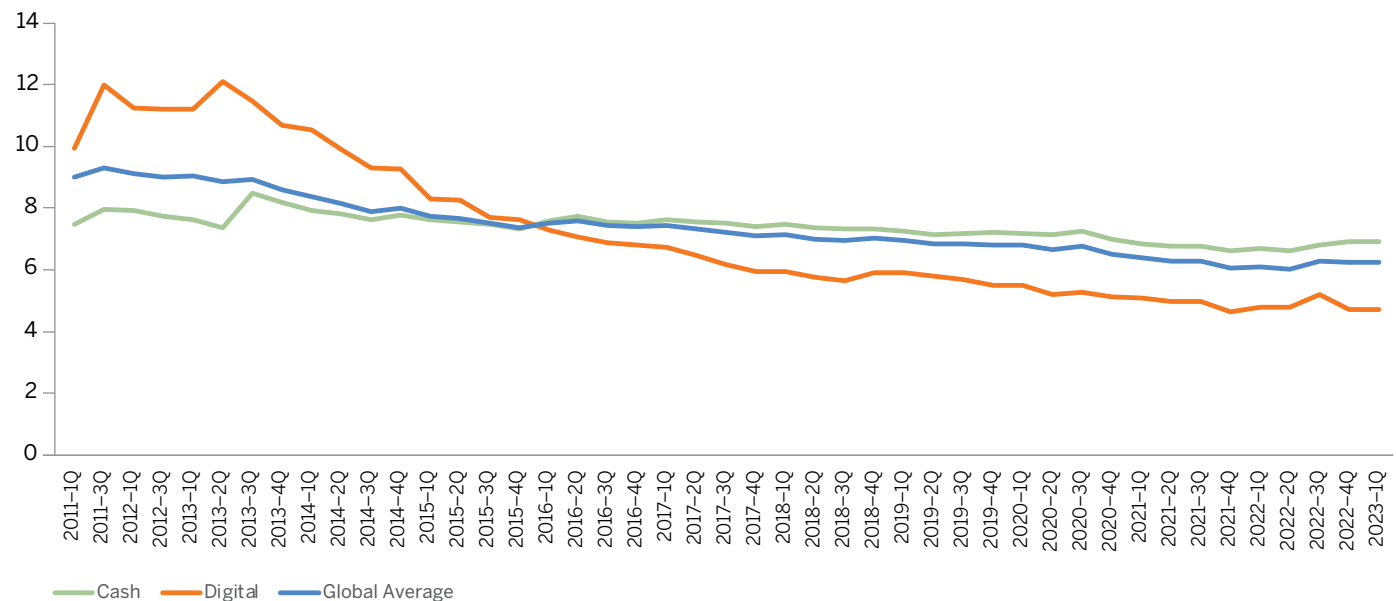
According to the latest World Bank data, remittance flows to low- and middle-income countries reached \$656 billion in 2022.⁵² Digitalization of remittances—that is, sending remittances between transaction accounts—is an opportunity to increase access to and usage of these accounts more generally.⁵³ Migrants and their families at home are most often unbanked, and a remittance transaction is usually the first time they are exposed to the regulated financial sector.

While the costs of remittances have been declining, they remain high. In Q1 2023, the average cost of sending \$200 was 6.25 percent—3.25 ppts above the target of 3 percent established in the UN SDG 10.c. However, in Q1 2023, the global average for digital remittances was recorded at 4.72 percent, while the global average for non-digital remittances was 6.92 percent (figure 3).⁵⁴

Cash-based remittances remain prevalent around the world. A 2022 survey of 14,000 users across 10 countries showed that only 53 percent of remittance users were leveraging digital means to send remittances.⁵⁵ According to a study by the Financial Stability Institute and the World Bank, the prevalence of cash-based remittances could be due to a variety of structural factors in the financial system, including:⁵⁶

- Lack of access to transaction accounts provided by regulated payment service providers
- Lack of options for receiving transfers using digital channels and more generally a lack of innovation and/or of an enabling ecosystem for digital payments
- Lack of financial and digital literacy
- Challenges in complying with extant exchange controls in certain markets that can push consumers to use unregulated services

FIGURE 3: Trends in the Global Cost of Sending \$200



Source: Remittances Prices Worldwide, Q1 2023, World Bank.

52. World Bank (2022d)

53. Ardic et al. (2022b)

54. World Bank, Remittance Prices Worldwide database.

55. Visa (2023)

56. Ardic et al. (2022a)

Leveraging DPs

DPIs can support the digitalization of remittances and reduce associated transaction costs.⁵⁷ As described earlier, digital ID systems can facilitate the remote onboarding of excluded users, diminishing costs related to account opening. Moreover, in account-to-account remittances, digital ID secures the accuracy and reliability of the identity-verification process during onboarding, reducing the cost of duly observing AML/CFT requirements. When it comes to payment systems, validations can be implemented in these before the execution of transactions to ascertain the integrity of the transaction and the counterparts involved, which also facilitates compliance with AML/CFT procedures. In addition, interlinking of payment systems through cross-border arrangements can reduce the number of intermediaries required, potentially increasing speed and reducing the cost of remittances. In the case of remittances, these infrastructures can extract, exchange, and aggregate data from other

DPIs and other financial infrastructures and make it available (aggregated and duly organized) to end users for improved decision-making on price, speed, and other features.

3.3.4 MSME Finance

Context

MSMEs are a critical component of most economies, accounting for a significant portion of employment and economic activity. However, MSMEs often face challenges in accessing finance, particularly in developing countries, where financial systems may be less developed. About half of formal MSMEs do not have access to formal credit and instead rely on internal funds or cash from friends and family to launch and initially run their business. In emerging markets, approximately 41 percent of formal MSMEs have unmet financing needs.⁵⁸ The finance gap for formal MSMEs in developing economies is estimated at \$5 trillion.⁵⁹ Women-owned busi-

BOX 11

How DPIs Can Support Remittances in Practice

The UPI-PayNow interlinking was operationalized in February 2023. This is a fast payment system interlinking between India and Singapore to facilitate cross-border payments and remittances. The UPI-PayNow linkage is the product of extensive collaboration between the Reserve Bank of India (RBI), Monetary Authority of Singapore (MAS), and payment system operators of both countries—that is, NPCI International Payments Limited (NIPL) and Banking Computer Services Pte Ltd. (BCS), and participating banks/nonbank financial institutions. This interlinking aligns with the G20's financial inclusion priorities of driving faster, cheaper, and more transparent cross-border payments and will be a significant milestone in the development of infrastructure for cross-border payments between India and Singapore. The UPI-PayNow linkage enables users of the two FPS in either country to make convenient, safe, instant, and cost-effective cross-border transfers of funds using their mobile apps. Funds held in bank accounts or e-wallets can be transferred to/from India using just the UPI-ID, mobile number, or virtual payment address (VPA). When

making a transaction, the system dynamically calculates and displays the amount in both currencies for the convenience of the user.

Beyond bilateral interlinking, the Bank for International Settlement's (BIS) Project Nexus aims to establish standardized multilateral interoperability between existing FPS for cross-border payments. The rationale is to allow payment system operators to implement a single connection to the Nexus platform, which acts as a technical hub, rather than going through the lengthy and costly process of building numerous bilateral linkages between existing infrastructures. In March 2023, the BIS Innovation Hub Singapore Centre announced the successful connection of the test versions of three established FPS in the Eurosystem (TIPS), Malaysia (RPP), and Singapore (FAST). This experiment paves the way for additional work on the practical applications of a distributed multilateral network to interlink existing domestic payment infrastructures.

57. World Bank (2022b)

58. IFC (2017 and forthcoming).

59. Ibid.

nesses comprise 23 percent of MSMEs and account for 32 percent of the MSME finance gap.⁶⁰ DPIs can help to address some of these challenges by providing SMEs with access to financial services and information through digital channels.

Leveraging DPIs

Digital payment systems allow MSMEs to accept payments from customers electronically, reducing the need for cash transactions and making it easier for SMEs to track their revenue and expenses. Digital payment systems can also help SMEs to build a credit history, which can be important for accessing formal sources of finance, such as bank loans. Digital payment solutions for commerce generate rich data on cash flows and business performance of active MSMEs, which can then be used by credit providers to assess the relative creditworthiness. An example of such an initiative is Kopo Kopo, a fintech firm that offers digital payment access to merchants in Kenya through Safaricom's M-PESA. Kopo Kopo analyzes merchant payment transaction data to offer SMEs a range of value-added services, such as unsecured short-term loans.⁶¹

Data exchange DPIs can enable fast and seamless sharing of information from traditional sources as credit infrastructure. Credit reporting systems allow lenders to access information about a borrower's credit history, making it easier for MSMEs to demonstrate their creditworthiness and access formal sources of finance. Digital credit reporting systems can be particularly useful for MSMEs in developing countries, where traditional credit reporting systems may be less developed. For example, the Kenyan government has developed a digital credit infrastructure that enables SMEs to access credit through mobile phones. This infrastructure includes credit scoring algorithms that use alternative data sources, such as mobile phone usage patterns, to assess creditworthiness. Additionally, the digitization of collateral registries and other credit infrastructure will increase the efficiencies of the security interest registration process. It will also lead to efficiency gains by increasing the ease of access and reducing information asymmetries.

60. Ibid.

61. GPF1 (2020a).

Data exchange can also facilitate the use of alternative data sources and big-data analytics to provide additional information sources to the credit risk-assessment process for MSMEs. Data exchange can also leverage alternative sources of data, such as mobile phone call records, utility and bill payments, digital payment transactions, social media, and industry data, for this purpose. Some examples of the use of alternative data include: (i) LenddoEFL, a Singapore-based fintech company, uses psychometric tests as part of the credit-scoring model in EMDEs, using more than 10,000 different data points of new customers; (ii) MYBank in China uses an AI-powered risk-management system, comprising over 100 predictive models, 3,000 risk profiles, and more than 100,000 metrics, to calculate a line of credit for MSMEs; and (iii) Become—a US-based online platform for small businesses—uses big data analytics to help small businesses by matching them with lenders. The risks associated with use of alternative data and big data analytics—for example, data protection and privacy, and perpetuation of biases—need to be effectively addressed.

Data exchange and digital payments, when used together, can also provide alternate sources of collateral for MSMEs.

For instance, they can facilitate merchant receivables financing by using the digital record of an MSME retailer's payment receipts as collateral. For example, Banco Davivienda in Colombia has provided loans to MSMEs by taking security interests in the credit card receivables generated by their own point-of-sale systems to finance small restaurants and retail enterprises. Additionally, reverse factoring platforms, including the Nacional Financiera (NAFIN) system in Mexico and the Trade Receivables Discounting System (TReDS) in India, allow FSPs other than the buyer's bank to discount the buyer's receivables.

And finally, DPIs can also support MSME access to finance by providing information and education about financial products and services.

For example, digital platforms can be used to provide SMEs with information about different types of loans, interest rates, and repayment terms. Digital platforms can also be used to provide training and education on financial management, improving MSMEs' understanding of their financial needs and helping them make informed decisions about borrowing.



The existence of enabling institutional and market conditions, including appropriate coordination mechanisms and a dynamic business environment, is key to kick-starting cross-sectoral endeavors such as DPIs and is crucial for their success.



AN ENABLING ECOSYSTEM TO FOSTER THE IMPACT OF DPIs ON FINANCIAL INCLUSION AND PRODUCTIVITY GAINS

4.1 Digital Financial Ecosystem Enablers That Support Financial Inclusion and Productivity Gains through DPIs

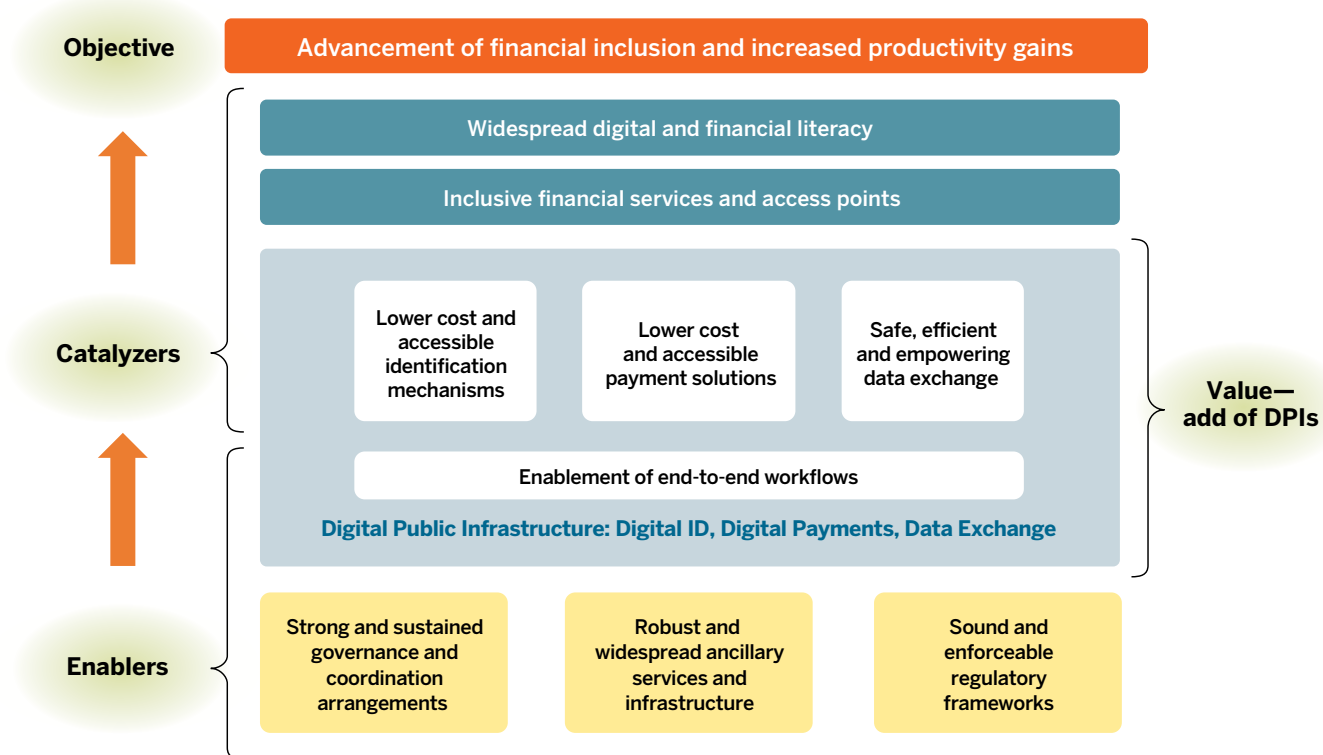
When DPIs are used for the provision of financial products and services, they will be directly interacting with various elements of a jurisdiction's DFE. These can be grouped under the following three categories:

- Strong and sustained governance and coordination arrangements
- Robust and widespread ancillary services and digital infrastructure
- Sound and enforceable regulatory frameworks

Each of these aspects *directly* affect features of DPIs and the policies and regulations that apply to them.

This section focuses on those DFE enablers that are external to DPIs and can affect their ability to advance financial

inclusion and productivity gains successfully. While these DFE foundations, together with the indicative, voluntary, and nonbinding policy recommendations in this report, can enable DPIs to facilitate financial inclusion and productivity gains, additional catalyzers in a DFE, beyond the use of DPIs, may be required in order to achieve the ultimate objectives. These DFE catalyzers include digital and financial literacy, inclusive financial products, and a network of widely available access points. Resilient, open, and efficient DPIs, as enablers themselves, would contribute to these DFE catalyzers by providing an accessible digital ID mechanism, safe and efficient data exchange, and enablement of end-to-end workflows. DPIs can lower transaction costs, catalyze innovation, foster competition and interoperability, enhance individual user experiences and choice, and, through their design, can provide new avenues to address many of the risks inherent to DFS. These effects translate into faster progress in financial inclusion and enhance productivity gains over and above that which can be achieved by DFS provided by FSPs operating without such shared infrastructure. This is illustrated in figure 4.

FIGURE 4: The Role of DPI in the Digital Financial Ecosystem

Source: Authors' elaboration

The existence of enabling institutional and market conditions, including appropriate coordination mechanisms and a dynamic business environment, is key to kick-starting cross-sectoral endeavors such as DPIs and crucial for their success. Having a stable institutional landscape with a clear allocation of responsibilities between different public-sector bodies and agencies and a mechanism by which their design and operations can be coordinated is fundamental to the successful development of DPIs. The establishment of public-private sectoral cooperation fora in the financial sector (such as a national payment council (NPC)) or a coordination committee for financial inclusion (commonly established in the context of national financial inclusion strategies) can play the role of a catalyst in developing and implementing long-term policies relating to DPIs. Furthermore, a dynamic business environment, adequate investment in the development of digital capabilities by FSPs, as well as competitive and innovative market conditions can support the development of user-friendly financial products and services leveraging DPIs. From this perspective, the availability of a national talent pool in the field of digital technologies and the ability to attract them should be considered as a key factor.

The availability and penetration of ancillary services and infrastructures—such as connectivity, mobile phone ownership, and supporting financial market infrastructures—will determine the nature of the potential offerings and the adoption of DPI-enabled services and products. Inclusive access to electricity, mobile network coverage, and medium-to high-speed internet are critical for DFS penetration and to ensure that DPI-enabled services are accessible society-wide. Several financial services and products also require affordable access to mobile phones—ideally smartphones⁶² with internet access.⁶³ Globally, while mobile phone access has been steadily increasing across developing countries, 32 percent of the population still does not have access to a mobile phone.⁶⁴ In addition, the availability of other financial infrastructures that can feed into or play an important role in the processes supported by DPIs can impact their efficiency and effectiveness. For exam-

62. Note that some financial services can be delivered on basic mobile phones that are not smartphones.

63. Affordable access to mobile phones and data is an important consideration for digitalization in general and for penetration and uptake of DFS in particular. For example, see Ndulu, Joseph, and Tryphone (2021) on the effects of taxation on digital transformation in Africa.

64. GSMA (2023)

ple, most FPS around the world settle directly in the national or regional real-time gross settlement (RTGS) systems, and credit reporting systems and collateral registries are essential for credit decisions.⁶⁵ These financial infrastructures clearly require efficient and resilient IT and telecommunications infrastructures. Financial sector players will also need to implement certain technical prerequisites, such as robust and efficient core banking systems.

Sound and enforceable legal and regulatory frameworks (or policies) that enable widespread use of DPs to increase financial inclusion and productivity gains

include those relating to access to financial infrastructure, regulation of nonbank service providers, and data protection, among others. Laws and regulations that are not directly applicable to the design or operation of DPs can still affect how DPs interact with the DFE and facilitate financial inclusion. These can be specific to the financial sector—for example, granting licenses to nonbank providers or rules relating to access payment systems—or more general, such as national cybersecurity and data-protection regulations, or policies on the inclusion of disadvantaged populations, such as the disabled and elderly.⁶⁷

BOX 12

Examples of Digitalization Incentives: Italy and UAE

Italy

In the wake of the COVID-19 pandemic, Italy introduced a series of digitalization incentives for both citizens and businesses. The following are planned for 2023:

- *Voucher Internet*, aimed at enabling MSMEs to subscribe to an ultra-fast internet network with an operator
- *Piano Transizione 4.0*, consisting of a series of facilities, in the form of tax credits, to support Italian companies in investments in capital goods, research and development, technological innovation, design and aesthetic conceptualization, and 4.0 training
- *Bonus Export Digitale* for manufacturing SMEs, a nonrepayable grant of €4,000 for the purchase of at least €5,000 in digital solutions useful for internationalization
- *Bonus Internet*, directed to families in financial difficulty, so that they can benefit from an internet connection at a subsidized rate; includes the purchase of a laptop at a discounted price and in installments

UAE

Public-private partnerships can play a key role in building infrastructure to improve financial inclusion. The UAE's Smart Dubai initiative⁶⁶ was launched in 2017 with the aim of transforming Dubai into a Smart City by focusing on four pillars: seamless services, efficient resource utilization, safety and security, and personalized experiences, by enabling full ICT integration of critical infrastructure. The objective of the initiative was to increase customer happiness for residents and visitors, enhance efficiency through optimized resource utilization, and improve resilience of resources and infrastructure for a sustainable city. Smart Dubai also aimed to leverage technology and innovation to create a more efficient and sustainable city while promoting economic growth and enhancing the quality of life for residents and visitors.

Sources: Contributions from Italy and the UAE

66. United Arab Emirates, "Smart Dubai 2021 Strategy," <https://u.ae/en/about-the-uae/strategies-initiatives-and-awards/strategies-plans-and-visions/strategies-plans-and-visions-until-2021/smart-dubai-2021-strategy>.

65. For instance, this is the case in Thailand, where PromptPay—one of the most successful FPS to date in terms of adoption per capita—settles twice a day in BAHTNET, the RTGS system operated by Bank of Thailand.

67. Specific laws and regulations on the role of ICT providers and the authority of telecom regulators are usually also relevant for the provision of financial services in most jurisdictions.

4.2 Risks and Challenges for DPIs in Achieving Financial Inclusion and Productivity Gains

Even when DPIs are leveraged in the provision of DFS, some challenges and risks to the provision of DFS remain. Well-designed DPIs can help mitigate the risks of, and address many of the supply-side challenges to, DFS provision and usage.⁶⁸ While overcoming or reducing demand-side challenges by leveraging DPIs is possible to a certain extent—for example, a lack of documentation or the distance to access points as a challenge can be eliminated—overcoming other barriers, such as the lack of trust in financial institutions or the lack of digital literacy and financial capability, may take longer and will require more than just leveraging DPIs for financial inclusion.⁶⁹

However, well-designed DPIs can help minimize some of the following risks associated with DFS:

- **Exclusion risks:** DPIs can help reduce DFS exclusion risks, provided that there is a basic level of digital readiness and willingness to adopt DFS among the general population. By offering functions and solutions that are channel-agnostic and that can be built upon, DPIs have the potential to support the development of DFS to reach segments of the population that are traditionally excluded or underserved. DPIs need to be inclusive by design, which would also imply that all relevant providers can leverage DPIs. While DPIs do not necessarily vitiate the need for brick-and-mortar or physical establishments, they can greatly reduce the reliance on such physical establishments for the regular and continued use of financial services.
- **Anticompetitive practices:** DPIs can mitigate anticompetitive practices in the DFE by providing access to foundational services for a wide range of FSPs at a low and proportionate cost, enabling productivity gains. This has several positive impacts: first, it can shift resources to investments in new technologies, innovative business models, and product and service enhancements that in turn can spur an increasingly competitive environment. It can also allow smaller financial-sector players to reach profitability and sustainability, which also creates positive competitive pressure.

- **Financial-integrity risks:** DPIs can help reduce financial-integrity risks, such as money laundering and the financing of terrorism. Digital ID systems, by having an open architecture and allowing open access to FSPs and other DPIs, can improve compliance mechanisms. Moreover, trusted data-exchange DPIs may allow data to be cross-referenced, further contributing to the effectiveness of these mechanisms. However, the security of a DPI is key to ensuring financial integrity.
- **Macro-financial risks:** DPIs can help overcome the accumulation of financial risks that could become a threat to macro financial stability. DPIs can support the collection, analysis, and use of data that can help regulators understand the causes of overindebtedness among individuals and MSMEs and adopt suitable measures to prevent it. Open architecture and open access to DPIs encourage broad participation by FSPs, which in turn enhances the amount and quality of information available across DPIs to evaluate the creditworthiness of individuals and MSMEs.
- **Financial consumer protection risks:** DPIs have the potential to improve transparency and therefore mitigate several financial consumer protection risks. For instance, when coupled with sound data-governance practices, DPIs can empower individuals and entities to have greater control over their own data. Data owners can then decide how their data can be used and by whom, preventing unauthorized profiling for marketing financial products. However, if data governance is not well managed, financial consumer protection risks may instead be amplified due to the use of DPIs for the provision of DFS. Lastly, it is possible to leverage DPIs to improve market-conduct supervision through tailored suptech solutions, institute more effective and efficient redressal mechanisms, ensure certain standards in the provision of DFS, and so on. Mitigating financial consumer protection risks can also increase overall trust in financial institutions and lead to greater financial inclusion.

Some DFS risks could be exacerbated, or new manifestations of existing risks could be introduced, if they are not considered in the design of DPIs or if proper safeguards are not put in place. Some examples of these risks, including how DPIs can minimize them, are outlined below:

- **Operational risks:** Given the intensive dependence of DPIs on technological and operational components, operational risks of digitalization need to be addressed. These include anything that disrupts the technological and operational infrastructure, such as operational disruptions, fraud, cybersecurity risks, and risks on account of connected third parties. These risks can be amplified in the context of DPIs, given

68. Governance arrangements for a DPI support the management of its day-to-day operations as well as future planning. They are essential to support the safety, efficiency, reliability, and sustainability of a DPI. They include a clear definition of the mission of the DPI and rules for stakeholders' access to and representation in the governance structure. All these arrangements are critical to support the long-term priorities of a DPI, including that it continues to serve the public interest on an ongoing basis.

69. In the context of digital ID, for example, Gelb and Diofasi Metz (2018) provide a perspective on the benefits and risks.

that they are deeply interlinked among themselves and with other infrastructures in the financial system. Since DPIs are foundational in nature, any disruption in their operations could have spillover effects on the financial sector and the other sectors of the economy. For example, disruptions in DPI operations could cause delays or, in extreme cases, loss of data or funds. Therefore, DPIs need to have a highly reliable and effective operational risk management framework that can then cascade across the DFE and enforce robust risk management practices across the whole ecosystem.

- **Legal and regulatory risks:** Legal and regulatory risks are challenging to address in multi-sectoral structures like DPIs. Coordinated efforts must be made to prevent regulatory gaps or arbitrage. Regulators for each DPI may be different, and in some cases, especially for data exchange infrastructures, there may be no single regulatory agency. This may create legal uncertainty and loopholes, which can be exacerbated when DPIs interlink. Furthermore, new products and services enabled by DPIs, as well as new technologies adopted by DPIs, may also make existing legal frameworks obsolete.
- **Insolvency risk:** The DFE at large can be endangered if some of its critical components, including entities that manage DPIs, were to become financially unsustainable. DPIs can have various operating models, and this risk is heightened where a DPI is managed by one or few central entities. Insolvency risks are particularly relevant in models where such entities have limited access to funds to maintain their operations or need to generate revenue and/or profits to achieve sustainability. Therefore, the financial solvency of entities managing DPIs needs to be ensured. DPIs require up-front investments and incur continuous maintenance costs to update infrastructures and technologies to keep up with market developments. Moreover, DPIs need to be well resourced and able to upgrade their technological and operational capacity constantly, particularly as population and digitalization continues to grow and markets expand. Hence, a financially sustainable business model for DPIs would be key.
- **Exclusion risk:** If DPIs are not designed following good principles and global standards, it can lead to risks of exclusion. For example, there might be segments of the population for which biometric information may be difficult or impossible to collect; digital ID systems that use this technology must therefore adopt relevant exception measures to avoid excluding people as a result.⁷⁰ In the case of MSMEs' access to credit, insufficient information gathered or provided through a data exchange DPI can lead to algorithmic bias and discrimination, which tend to exclude especially those

owned by vulnerable segments, such as women. Furthermore, building and operating each DPI with high-quality standards will ensure that the services they provide are reliable. For example, if the quality of the credentials offered by a digital ID are low (for instance, poor screening), then this could compromise not only individual account-opening processes but the integrity of the whole DFE.

- **Financial consumer protection risks:** Consumer risks can be heightened by the misuse of DPIs or by the adoption of exploitative and unscrupulous practices by DPI operators or by FSPs that build or distribute their services using DPIs. One of the major risks is unauthorized retention, use, or sharing of personal data obtained or shared using DPIs (such as digital ID or data exchange). Even in cases where consumer consent might have been taken, such consent might not be informed consent and present additional risks to vulnerable populations. These risks are heightened among populations with lower digital and financial literacy. Additionally, the use of digital technologies, especially by vulnerable populations, can increase the risk of cyberattacks, phishing, and other forms of data breaches. FSPs might also misuse information obtained through DPIs to exploit customers' behavioral biases to provide financial products that are unsuitable or inappropriate for these population segments, leading to greater consumer risks. One such risk is the risk of over indebtedness among populations that are not prepared to handle credit products. Furthermore, where there is a lack of appropriate data-governance measures, consumer risks may be amplified due to the use of DPIs.

In addition to the risks above, it is important to note that DPIs, like other infrastructures, may create a natural monopoly or lead to monopolistic or oligopolistic structures, due to efficiency considerations.⁷¹ The resulting lack of competitive pressure may not necessarily be a disadvantage in the case of DPIs, due to the minimalism and the culture of innovation embedded in DPIs. As DPIs are designed with a minimal core function, enabling services and functionalities to be layered on top in addition to the premise of innovation, a lack of competitive pressure would not inhibit innovation or render a DPI obsolete, provided that the DPIs are well-governed and adequately regulated.

70. Such difficulty, for example, can be linked to skin or eye diseases, can be motivated by religious reasons, or can be due to the refusal of a certain population to provide biometric data (for example, undocumented migrants, populations with unclear migration status, or people who distrust the storage of personal information in centralized registries). For additional details, see GPFI (2018).

71. In the financial sector, for examples on discussion on competition at the level of infrastructure, see Bergman (2003) and Feyen et al. (2021) for payment infrastructure, Herkenhoff and Raveendranathan (2021) in the case of credit card industry.



Balancing risks and creating conducive environment for furthering financial inclusion.



POLICY RECOMMENDATIONS

The policy recommendations in this section are indicative, voluntary, and nonbinding and directed to public authorities⁷² and could have relevance for other relevant stakeholders, as they seek to advance financial inclusion and productivity gains through DPIs rapidly. For furthering financial inclusion and productivity gains, how to develop an ecosystem for leveraging DPIs is the central theme of the policy recommendations.⁷³ The following five points describe the scope and intent of these indicative, voluntary, and nonbinding policy recommendations:

- They reflect good practices from different countries, and in line with G20 practices, their adoption is voluntary and non-binding. They should be read in conjunction with the G20 HLPs for Digital Financial Inclusion, which call for a holistic approach to foster digital financial inclusion, as well as with the established standards and good practices for the individual DPI types as established by standard-setting bodies (SSBs). They are intended to complement, and not replace, existing standards issued by SSBs and other international bodies.
- Their focus is on leveraging DPIs in the context of advancing financial inclusion and productivity gains while keeping in mind their usage across other sectors. However, some aspects of these might have relevance for other sectoral applications of DPIs as well.

72. Public authorities include all relevant arms of the government, regulatory agencies—including but not limited to financial-sector authorities, such as central banks/monetary authorities—and other bodies whose powers and actions may affect the role of DPIs when used in the financial sector. The policy recommendations refer to public authorities as a group and not individual institutions or entities.

73. While the high-level policy recommendations and key considerations are included in this chapter, further explanation related to policy recommendations are provided in annex C.

- They have been drafted based on the three current examples of DPIs—digital payments, digital ID, and data-exchange DPIs—which apply to each separately and in combination.
- They apply to private as well as publicly owned/operated DPIs. The allocation of responsibilities and powers across different public authorities could vary by jurisdiction and by DPI.
- The development of financial infrastructures and overall digitalization in the financial sector remain relevant for effective use of DPIs. However, as these are covered in existing guidance, they are not expressly included here.

POLICY RECOMMENDATION 1: Enable and foster the responsible use of DPIs to accelerate financial inclusion and productivity gains. Public authorities could leverage DPIs across public sector programs and national strategies, as well as harness private sector capabilities through collaborative approaches, for rapidly advancing financial inclusion-led growth.

- **Key consideration 1.1.** Public authorities could consider developing and harnessing DPIs in their national strategies and roadmaps on financial inclusion, digital economy, and related areas.
- **Key consideration 1.2.** Public authorities may lead by example through fostering use of DPIs in public programs, such as benefit transfers, social protection programs, and development finance programs, as well as in their internal operations and processes, including in interactions between individuals and businesses and the government.
- **Key consideration 1.3.** Public and private sector coordination and collaboration can be helpful for the effective devel-

opment and operation of DPIs, and could be considered actively promoted across the DPI lifecycle.

- **Key consideration 1.4.** Encourage the private sector to leverage DPIs to innovate across the whole DFE to foster competition and scale up the use of DPIs to drive financial inclusion.
- **Key consideration 1.5.** Encourage public authorities to collaborate with private institutions to support the skill development of relevant stakeholders and to ensure the continuous development and improvement of DPIs toward advancing financial inclusion and increasing productivity gains.

POLICY RECOMMENDATION 2. Develop well-designed DPIs and the broader enabling environment through a widely accepted set of good practices. While leveraging DPIs for advancing financial inclusion and productivity gains public authorities should consider a set of design and operational principles to ensure efficiency, inclusivity, resiliency, privacy, and security.

- **Key consideration 2.1. Interoperability:** All systems and processes (including sub-systems, modules, and components) should be capable of interoperating, both with each other, as well as with the systems of private and public entities that are connected to it through open and publicly accessible application programming interfaces to promote more inclusive use of DPIs.
- **Key consideration 2.2. Minimalism:** The technological and operational design should build a minimal core function. Ecosystem participants can layer other services and functionalities on top of the core function. This would allow for the flexibility of deployment of DPIs across different contexts.
- **Key consideration 2.3. Adaptability:** The technological and operational design of DPIs should be adaptable and extensible to serve multiple use cases under different contexts and meet the evolving needs of the ecosystem they are intended to support.
- **Key consideration 2.4. Enable diverse innovation:** Support public or private institutions to easily build diverse solutions and services using the digital infrastructure, such as by reducing transaction costs for ecosystem players, offering open APIs, and making available high trust data in machine-readable and digitally signed forms.
- **Key consideration 2.5. Privacy, security, and resilience:** The overall system (as well as each sub-system, module, and component) should consider appropriate individual privacy enhancing technologies and be secure from intrusion and resilient against attack or system failure.

- **Key consideration 2.6. Risk management framework:** Implementing a robust risk management framework and sound risk management practices for DPIs is important to maintaining trust in the DPI ecosystem.
- **Key consideration 2.7. Continuity of operations:** Have arrangements in place to maintain continuity of operations of the DPI ecosystem.
- **Key consideration 2.8. Culture of innovation:** Promote a culture of innovation through DPIs, both internally and across the whole DFE.
- **Key consideration 2.9. Financial Sustainability:** Integrate a viable business and financing plan at the design phase to sustain ongoing operations and future development plans.⁷⁴

POLICY RECOMMENDATION 3: Encourage appropriate risk-based regulation, supervision, and oversight arrangements for financial sector use of DPIs. The regulation, supervision, and oversight of DPIs should consider effective regulation, supervision, and oversight by relevant public authorities. Where needed, authorities should consider adapting the regulatory framework to enable the use of DPIs by the financial sector and apply an appropriate regulatory, supervisory, and oversight framework to new entrants and business models in the financial sector that DPIs will bring about.

- **Key consideration 3.1.** Establish appropriate regulatory, supervisory, and oversight frameworks for DPIs to be principles-based, flexible, and proportionate to the coverage of the DPIs and the risks posed by them.
- **Key consideration 3.2.** Through enabling regulation and supervision, facilitate the appropriate use of DPI services and capabilities by financial sector players, and foster the entry of new players and intermediaries.
- **Key consideration 3.3.** Promote and facilitate cooperation among various financial sector authorities as well as with other relevant authorities to support the seamless use and integration of DPI services into the DFS ecosystem.

POLICY RECOMMENDATION 4: Promote sound internal governance arrangements. Such internal governance arrangements could include an objective to act in the public interest, rules for the access and representation of stakeholders in, the governance structure, risk management framework, and arrangements to preserve its ability to function.

74. Regarding key considerations 2.7 and 2.9, active monitoring of DPIs to continue operations and services as a going concern is a potential consideration.

- **Key consideration 4.1.** Require a clear and robust decision-making process to ensure that DPs operate and function efficiently.
- **Key consideration 4.2.** Put in place measures to ensure transparency and accountability in the operation of DPs, to ensure that actions that impact the public are taken in a fair, transparent, and timely manner.
- **Key consideration 4.3.** Engage DPs in monitoring, evaluation, and continuous improvement processes to ensure that they are helping in achieving the public interest considerations and objectives, for example, for monitoring of progress towards financial inclusion for vulnerable groups, including women, the elderly, youth, micro and small enterprises, and rural populations, and therefore remain relevant for the society.

POLICY RECOMMENDATION 5: Enable DPs to offer products and services using DPs in a way that no one is left behind and the interests of the consumer are safeguarded.⁷⁵ Given that DPs will support the inclusion of individuals that were traditionally excluded from the financial sector, several risks might arise and need to be addressed, including exclusion risks, data governance and data privacy risks, new consumer risks, and fraud leading to loss of funds. In addition to design features,

DPs can institute specific services and features that could be used by the financial sector players to improve customer redressal, provide tools to customers to protect themselves, and foster greater financial and digital literacy.

- **Key consideration 5.1.** Encourage DPs to implement features and services that enable FSPs to serve a wide range of customer segments, including by incorporating a human-centered design approach to provide suitable and appropriate financial products and services that are tailored for the needs of vulnerable groups, such as women, the elderly, youth, micro and small enterprises, and rural populations. In doing so, it is necessary to mitigate new consumer risks and risks to financial well-being, such as the risk of over indebtedness among vulnerable segments.
- **Key consideration 5.2.** Support DPs in introducing features and services that enable FSPs to better protect their customers from a range of risks inherent to DFS and help increase trust in the financial system.
- **Key consideration 5.3.** DPs may be designed to have sound data governance measures, and also safeguard personal data and privacy via technical and operational measures to complement legal measures.
- **Key consideration 5.4.** Encourage DPs to support FSPs to enhance the digital and financial literacy and awareness of their customers and support their financial well-being.

75. See also OECD (2022) and (2020).



Encouraging and fostering knowledge sharing on the design, development, and operations of DPLs, and the transformative impact of DPLs. . . . will help motivate and accelerate the adoption of DPLs more widely across the world and lead to further improvement and refinement of DPLs in countries that have already implemented them.



POTENTIAL AREAS FOR FURTHER EXPLORATION

This document presents a broad overview of the potential of DPLs and what public authorities can do to successfully harness their potential to advance financial inclusion and productivity gains. Future collaboration could be considered on three fronts to accelerate the adoption of DPLs globally.

First, encouraging and fostering knowledge sharing on the design, development, and operations of DPLs, and the transformative impact of DPLs. Such initiatives will help motivate and accelerate the adoption of DPLs more widely across the world and lead to further improvement and refinement of DPLs in countries that have already implemented them. Moreover, such knowledge sharing will also demonstrate how countries with varied contexts and starting points have incorporated and adapted DPLs into their respective contexts.

Second, capacity building: Successful adoption of DPLs and their continuous improvement will require developing

expertise on a range of topics in a country across stakeholders. Some of these are standardized skills, such as project management, technology development, and policy making. Over and beyond this, getting the orientation and mindset right is important, and this requires specific attention to capacity building efforts.

Third, cross-border linkage of DPLs: This paper discusses some of the financial inclusion and productivity gains that can arise from leveraging cross-border links of DPLs. There are some early efforts in this area in bilateral and regional contexts. The learnings and experiences from these could inform further efforts. SSBs are also considering the legal, regulatory, technical, and operational factors associated with interlinking DPLs.

The G20 and, more specifically, the GPFI can play an important role in advancing on all these three fronts.



While leveraging DPLs for advancing financial inclusion and productivity gains, public authorities should consider a set of design and operational principles to ensure efficiency, inclusivity, resiliency, privacy, and security.



COUNTRY CASE STUDIES

7.1 Digital ID, Digital Payments, and Data Exchange Infrastructure in Action: Country Case Studies

7.1.1 Argentina⁷⁶

Payments by Transfer

The Central Bank of Argentina launched the Payments by Transfer (PCTs) initiative by the end of 2020 to promote open and universal digital payments and achieve greater inclusion of those sectors that use no financial services. PCTs is a method which involves making payments on purchases of goods and services by way of instant transfers and operates mainly through (i) bank or payment service provider wallets by reading a QR code, and (ii) debit and prepaid cards at POS terminals (fixed and mobile POS solutions). The implementation of the PCTs scheme was completed in November 2021. This means that users may make QR code payments from a single (bank or electronic) wallet at different stores, and merchants can be paid from different wallets with a single QR code. Both types of wallets are linked to a bank account or a payment account, which allows funds to be transferred from users to merchants immediately and irrevocably. For a merchant, the benefits of PCTs over other electronic means of payments include instant crediting of funds for a fee not exceeding 8 per thousand (which could be over 6 percent outside this scheme). The high rate of smartphone users, the significant rate of bank and payment account holding among adults (which mostly involves having an electronic wallet), and the high penetration rate of QR code acquiring at a national level have paved the way for the development of this type of payment method. In 2022, each adult made an average of 3.5 monthly payments through PCTs, registering

an increase of 123 percent, compared to the previous year and representing two of every 10 payments by electronic means.

Digital Identity

On October 30, 2019, the virtual credential of the National Identity Document for smart mobile devices was introduced in Argentina by Decree No. 744/2019. It is a centralized platform controlled by the National Registry of Persons (RENAPER in Spanish). It is a 360-degree tridimensional representation of the physical ID card (an exact replica). It is optional and free for all citizens and permanent residents over the age of 14. To obtain it, a person must visit one of RENAPER's offices or the office of another authorized public entity and identify himself/herself. He/she will receive a code by e-mail to activate the digital ID in the *Mi Argentina* app ("My Argentina" in Spanish, a government app) on one mobile device. (It cannot be activated on two, or it will be blocked.) The digital ID will be downloaded on the device and will be accessible offline. Digital ID is just a part of a broader government digitalization agenda that seeks that all citizens can access government services digitally (such as driver's licenses, social security numbers, even vaccination certificates) through this app. Also, this public policy acts as a pillar to promote access to and use of DFS, such as the remote opening of bank and nonbank accounts for natural and legal persons.

7.1.2 Bangladesh⁷⁷

In 2008, the Government of Bangladesh laid out the Digital Bangladesh Vision 2021, in line with the nation's target to become a middle-income country. As part of this vision, a2i was established in the Prime Minister's Office to foster a culture of innovation within the government, complemented by effective strategies and operational elements.

76. Case study provided by Argentina.

77. Case study provided by the Better Than Cash Alliance with inputs from the World Bank.

Bangladesh's DPI strategy is based on a "Citizen's Choice Architecture" that enables beneficiary-citizens to choose how they access public services, including how and where they receive and make government payments. The main aim of this approach is to reduce the time and cost of accessing public services, and lessen the frequency of interactions, for citizens and businesses. Additionally, it seeks to minimize the time and expense required to introduce and update services.

With a dedicated focus on promoting open (stacked/layered/modular) architecture, including implementing open source when possible, a combination of all three layers of DPI—that is, ID, payments, and data exchange—is in operation in Bangladesh today.⁷⁸

- **Digital identity:** The national ID covers over 95 percent of the adult population.⁷⁹ Along with birth registration for children, this means there is a unique ID that can be used by anyone to access education, health, marriage, agriculture, and all social protection schemes. The Bangladesh Bank also issued e-KYC regulations to enable swift account opening.
- **Digital payments:** Tied to the near-ubiquitous NID infrastructure *Porichoy* (meaning "Identity") and e-KYC regulation, all G2P payments—covering 30 million beneficiaries⁸⁰)—and a substantial number of P2G payments (integrated with the one-stop virtual shop "MyGov," featuring more than 1,600 public services) are facilitated through interconnected platforms, such as *EkPay* ("One Pay") and *Binimoy* (an interoperable payment platform), which are connected to all banks and mobile financial services operators.
- **Data exchange:** Mapping, correlation, and triangulation of massive amounts of data across various ministries as well as public and private agencies, including mobile phone databases, government employee databases, pensions databases, and savings certificates databases, among others, significantly improved targeting by helping weed out individuals undeserving of social safety net payments.

Role and Impact on Financial Inclusion

By 2015, Bangladesh had begun to experiment with digitizing G2P payments. Several social safety net programs among the more than 100 in place, accounting for nearly 13 percent of the annual budget, were experimenting with various digital pay-

ment approaches—often through a customized arrangement with a single vendor or provider.

a2i saw an opportunity to establish a system-wide approach to channeling multiple, if not all, government payment flows. a2i began to articulate the vision for a "Citizen's Choice Architecture" by emphasizing that citizens could make choices on how and where to receive payments from, and make payments to, the government.⁸¹ The vision simultaneously linked to a wider aspiration for digital finance: that government payments ought to reinforce wider goals of interoperability, competition among providers, and more inclusive open systems.

Working closely with the Cabinet Office and the government's ICT ministry, a2i brought together various stakeholders, including the finance ministry, all line ministries, the central bank, and other relevant regulators, such as those for telecommunications, microfinance, insurance, the election commission, state-owned banks, private sector banks, mobile FSPs, insurance companies, and development partners, to implement a unified, system-wide approach to developing a DPI that supports the nation's aspiration for greater financial inclusion. This implementation of DPI, comprising ID, payments, and data-exchange layers, moving toward the achievement of Digital Bangladesh,⁸² was further accelerated by the onset of the COVID-19 pandemic.⁸³ For instance, the deployment of DPIs during the pandemic allowed rapid social protection services to be extended to five million "new poor" households. Similarly, wage payments were distributed to an additional four million garment workers. Such DPI-enabled responses not only effectively addressed the immediate socioeconomic challenges presented by the pandemic but also made significant contributions to the broader financial inclusion efforts of the government.

The Government of Bangladesh's next steps include plans to ensure comprehensive access to financial services for every individual, including through full-service, personalized banking accounts for all citizens by 2030. The government also seeks to enhance the effectiveness and efficiency of social safety net schemes, by leveraging the power of AI to target beneficiaries and ensure that benefits reach those who need them the most. Lastly, the government is also focused on improving the provision of anticipatory financial interventions for emergency situations.

78. Bangladesh's DPI is the product of "Digital Bangladesh Vision 2021"—a clear and unwavering political commitment in line with the 2030 Agenda for Sustainable Development. It was a strategy that invested in building blocks of digital and societal innovation that delivered frugal solutions, at scale, to the masses and help bridge the digital divide. Since 2022, Bangladesh has renewed this commitment through the proclamation of "Smart Bangladesh Vision 2041."

79. Bangladesh Election Commission, National Identity Registration Wing, <http://www.nidw.gov.bd/index.php>.

80. World Bank (2019).

81. It is important to note that choice of providers by beneficiaries is not yet implemented and is currently under discussion.

82. Milestones for Smart Bangladesh 2041: 100 percent cashless economy, personalized DFS, and products that cater to the needs of specific marginalized groups (such as the elderly, persons with disabilities, street vendors, indigenous populations, and so forth).

83. Hasan (2021).

Overall, the government has taken a long-term approach to building DPI, continuously scanning for emerging trends, adapting global best practices to suit local contexts, and ensuring a forward-thinking and adaptable strategy for achieving digital equity enabled by DPI at scale.

7.1.3 Colombia⁸⁴

Colombia has adopted a comprehensive “whole-of-government” digital strategy encompassing components of DPI. The strategy was developed through coordination among several agencies: The Ministry of ICT (MinTIC) had primary responsibility for the formulation of the Gobierno Digital (“Digital Government”) policy (2018); the National Registry was responsible for the development of the digital ID (2020); and the central bank (Banco de la República) led the development of the upcoming interoperable faster payments platform, set to be launched in 2024. Details on the development of the components of the DPI have been included in the National Development Plans, which coordinate public policies across government.

- **Digital ID:** The National Registry launched the *Cédula Digital* in 2020, enabling residents to create a digital version of their national ID card on their smartphone by downloading an app from the National Registry of Civil Status, scanning a QR code, and authenticating their identity using facial recognition. By 2022, over **half a million digital** IDs had been issued, and citizens possessing the digital ID could use the document as a passport to travel to several countries in the Andean region of South America.
- **Data exchange:** The eGovernment Strategy was introduced to improve procedures and digital public services for both firms and households. One of the key initiatives under this strategy includes the *Servicios Ciudadanos Digitales* (“Digital Citizen Services”) initiative, which facilitates and simplifies the process of filing and accessing key documents by citizens, such as birth certificates and medical records. The reliability and security are ensured by an electronic authentication system, along with the *carpeta ciudadana* data exchange, which is an implementation of X-Road. This initiative seeks to ensure secure and seamless data exchange between different public entities and to enable the verification of citizen information. The eGovernment strategy also includes the Open Data (*Datos Abiertos*) initiative, which makes government data publicly available and encourages the development of apps that use the data.
- **Digital payments:** For the design and development of the interoperable payments layer of DPI that is currently underway, the government drew inspiration from Pix from Brazil,

the New Payments Platform (NPP) in Australia, FAST in Singapore, and UPI in India, among others. Based on recommendations from the 2021 Financial Sector Assessment Program, the central bank is currently steering the development of the faster payment system SPI. The design process is being carried out in collaboration with the private sector, emphasizing co-creation and in adherence with the principles of interoperability, efficiency, and inclusion. To ensure full interoperability within the ecosystem, the SPI-BR will also be interconnected with private players, offering the same use cases, such as P2B and P2B-transactions, already operating in the digital payment ecosystem.

Additionally, to facilitate discussions among stakeholders from the wider ecosystem, the central bank also created a Payment Systems Forum, which invited financial regulators, such as the Superintendency of Banks and the Financial Regulation Unit, as well as representatives from the financial sector: banks, fintech companies, and e-money issuers. The Better Than Cash Alliance funded the technical assistance to foster discussion among stakeholders participating in the forum and facilitated knowledge exchanges between regulators and faster payment operators in Ghana, Jordan, and the Philippines. The discussions in the forum were organized into four working groups working on key areas relating to clearance and settlement mechanisms, the operative model, and technical requirements.

Based on the forum’s discussions, which spanned from August to December 2022, participants agreed that driving adoption of the payment architecture would require a new clearinghouse that would guarantee universal access, ensure full interoperability, and support multiple use cases. In particular, the SPI will have a centralized directory and a settlement model that provides 24/7 gross settlement in real time, administered by the Banco de la República, to ensure the security and efficiency of the system’s architecture. Additionally, standard QR codes for all cases and the adoption of a common brand will be implemented to ensure a seamless user experience. The immediate payment system will allow the operation of more than 30 million digital wallets and purses in Colombia to be interoperable in real time.

Role and Impact on Financial Inclusion

The Government of Colombia accelerated its digital G2P payments journey during COVID-19 through their innovative *Ingreso Solidario* program. The government leveraged its newly enacted regulatory modernization, which supported the delivery of cash transfer payments into bank accounts and mobile wallets. Through an ambitious partnership with multiple payment service providers, the program was able to identify and

84. Case study provided by the Better Than Cash Alliance with inputs from the World Bank.

deliver payments to over 1.2 million beneficiaries through existing accounts, and to facilitate the account opening with choice for the remaining 1.7 million unbanked beneficiaries.

The Government of Colombia anticipates that once the interoperable payments layer is fully implemented, over a span of 15 years, which is the typical timeframe for such systems to reach maturity, use of cash in Colombia will decline. The government's next steps beyond the decision to promote an immediate payment system will be followed by an analysis to expand cross-border payment offerings.

Overall, Colombia's comprehensive and highly consultative approach towards building and implementing DPI demonstrates a strong commitment to ensuring that the country's digital economy enhances public services and supports its key development priorities for years to come.

7.1.4 Ghana⁸⁵

The Government of Ghana is committed to developing a digital-based economy to foster efficiency, transparency, and accountability in the delivery of services to citizens. This commitment includes investing in developing DPI aimed at combating corruption, bringing more Ghanaians into the formal sector, and driving domestic revenue mobilization. The government identified three key foundational elements to address some of the root causes of exclusion for ordinary citizens: (i) a unique national ID, (ii) a digital residential and business address, and (iii) the interoperability of all financial channels.

Digital Identity

Prior to launching the biometric unique national ID in 2017, there were nine separate identity databases across various public sector entities.⁸⁶ The National Identification Authority (NIA) was assigned to collect and bear custody of citizens' biometric traits, replacing the numerous databases that existed before. The new Ghanaian card was designed with technologies that enabled universal access for all citizens. The NIA has also enabled the registration of children from 0 to 5 years old to rationalize birth registration and ensure social inclusion from birth.⁸⁷ The rollout of the Ghanaian card is currently ongoing; more than 80 percent of new registrations were issued with their IDs by March 2023.⁸⁸

Interoperable Payments

Ghana is among the first countries to launch an integrated interoperability system across banks, mobile money wallets,

and other channels through the national switch. The 2016 Ghana diagnostic by the Better Than Cash Alliance recommended accelerating full interoperability for the government to realize the full benefits of the digitization of payments. Dubbed the "Financial Inclusion Triangle" by the Ghana Inter-bank Payment and Settlement Systems (GhIPSS), the interoperable system connects three independently interoperable platforms into a single window. The platform facilitates the movement of funds to and from e-zwich cards, bank accounts, and mobile wallets. This effort commenced in 2008 with the launch of e-zwich cards, facilitating interoperability at bank branch and retail levels. In 2012, GhIPSS enabled the interoperability of bank terminals and in 2018 launched the Mobile Money Interoperability Platform (MMI). The MMI rides on an instant inter-network switching and processing system which interconnects mobile money systems of mobile money operators. It connects the MMI with the e-zwich System/gh-link platform, and it also leverages the instant pay service of the gh-link platform.⁸⁹

Role and Impact on Financial Inclusion

The Government of Ghana is also committed to leveraging its digitalization efforts to increase financial inclusion and improve payment efficiency while eliminating policy, regulatory, and infrastructure barriers impeding the development of an inclusive DFS ecosystem. The launch of the National Financial Inclusion and Development Strategy, the Digital Finance Policy, and the Cashlite Roadmap, launched in 2020 with support from the Better Than Cash Alliance, further strengthened the government's commitment to deepen DFS in the country.⁹⁰

For instance, the adoption of the digital ID issued by NIA has enabled other stakeholders to run their applications, providing a significant opportunity to drive responsible digital financial inclusion and eliminate fraudulent transactions that had previously existed due to the multi-ID system. Similarly, the adoption of a national switch as the foundation for payment interoperability eliminated the need for expensive and inefficient bilateral integrations. As a streamlined approach, it also simplified scheme management, as all participants align on various aspects, benefiting consumers who are spared off-net expenses. Furthermore, new entrants can connect to the switch effortlessly, offering consumers more options without incurring high or additional costs. In 2022, interoperable mobile money transactions reached 138 million, valued at over \$2 billion.⁹¹

85. Case study provided by the Better Than Cash Alliance with inputs from the World Bank.

86. Amoah et al. (2017).

87. Republic of Ghana (2017).

88. NIA (National Identification Authority), "Statistics," <https://nia.gov.gh/statistics/>.

89. Hesse (2019).

90. Republic of Ghana (2020).

91. GhIPSS (2022).

In 2021, the government launched the Ghana.gov platform, a one-stop shop for accessing and paying for all government services—building on previously launched platforms and leveraging foundational elements of unique IDs, addresses, and interoperability. The Ghana.gov platform is available to citizens, residents, and foreigners, making it an inclusive platform for central government and subnational government services. In the coming years, the government hopes to drive traffic to the platform through onboarding more government services, thereby fostering greater transparency and accountability in service delivery.

Overall, while it is still early to measure the impact of the platform, Ghana seems to have addressed the core fundamentals required for a successful digital government platform—that is, a national ID, an interoperable payment platform, and good network coverage for easy connection to the platform.

7.1.5 Indonesia⁹²

Over the last decade, the Government of Indonesia has introduced several initiatives aimed at strengthening its digital economy and ensuring equitable access to its benefits for all segments of the population. In particular, the government remains keen on leveraging the improved internet access among its population to bridge gaps in access to services and economic opportunities. As per the National Socioeconomic Survey (Susenas), from 2015 to 2021 the percentage of households accessing the internet nearly doubled, from 42 percent to 82 percent.

Moreover, given that Indonesia faces acute climate risks, including a high exposure to climate-related flooding—the government is also focused on deploying DPI capabilities, such as for identity verification, e-KYC, and data exchange, to ensure continuity of services and delivery of assistance during emergency situations. Delays and challenges associated with the rollout of the Kartu Prakerja cash transfer scheme during the COVID-19 crisis further strengthened the government's resolve to strengthen its DPI capabilities for improving service delivery and, consequently, citizens' trust in the digital economy.

Digital Identity

Indonesia has made significant progress in developing its foundational ID systems—that is, its population registration (PR) and civil registration (CR) systems which are managed by the General Directorate for Population and Civil Registration (*Ditjen Dukcapil*) in the Ministry of Home Affairs (MoHA). In 2010–11, Ditjen Dukcapil digitalized the PR/CR systems, replacing

the resident ID card (KTP) with the electronic resident ID card (e-KTP) and incorporating biometrics for deduplication and identity verification. In terms of coverage, the 2021 Susenas survey shows that 97 percent of the population had a national identity number, and 88.4 percent aged 17 and below had a birth certificate. The 2021 ID4D-Findex Survey also found that 97 percent of eligible adults possessed an e-KTP or a KTP (pre-2011 version).

Given significant coverage, the Government of Indonesia is now committed to improving the utilization and data security of its ID system, with a concerted focus on building capabilities that allow for secure, remote, and real-time verification of identity necessary for access to both public and private services. To this end, with [support from the World Bank Group](#), the government has implemented the ID for Inclusive Service Delivery and Digital Transformation Project for strengthening and increasing usage of the digital ID systems.

Data Exchange

To support the delivery of targeted social protection assistance, to discover exclusion errors in government programs, and to monitor all the benefits being received by a particular household, the Government of Indonesia is also committed to building consent-based data sharing capabilities.

Digital Payments

Bank Indonesia has implemented the [National Open API Payment Standard](#), abbreviated to SNAP, with the objective of fostering a competitive and innovative payment system industry while promoting integration, interconnectivity, and interoperability of the infrastructure. SNAP was developed by Bank Indonesia in cooperation with payment system industry representatives covering both technical and security standards, data standards, and technical specifications as well as necessary governance guidelines required for open API payments.

Additionally, to facilitate cashless payments, Bank Indonesia and the Indonesian Payment System Association also developed the [Quick Response Code Indonesia Standard](#) (QRIS).

Role and Impact on Financial Inclusion

In 2016, the Government of Indonesia announced the National Strategy for Financial Inclusion 2014–19, including a commitment to digitize social assistance payments from 2017 onward. Since 2017, cash transfers from the Program Keluarga Harapan (PKH) have been distributed via state-owned banks, where beneficiaries have the option to access social protection assistance either by coming to the bank's branches or bank agents using their social welfare ID cards (KKS/ATM).

92. Case study prepared by the World Bank.

The Government of Indonesia's ongoing efforts to expand its biometric-based e-KYC capabilities as part of its comprehensive financial inclusion strategy holds tremendous promise in addressing gender and regional disparities in account ownership and is likely to play a key role in realizing a more inclusive financial landscape.

7.1.6 Philippines⁹³

The Government of the Philippines has implemented a comprehensive digital strategy to support the development of its economy, including through the establishment of laws and policies for digital government. In 2016, the Department of Information and Communication Technologies (DICT) was established as the Philippines' first cabinet-level agency dedicated to promoting digitalization. In particular, the government has also leveraged its national digital ID PhilSys and digital payment capabilities that constitute its DPI to increase efficiency and transparency in service delivery.

Digital Identity

The Philippine Statistics Authority (PSA) launched PhilSys as the country's foundational digital ID system with the objectives of transforming how services are delivered and accessed in the Philippines, to accelerate the transition to a digital economy by enabling remote and seamless online identity verification. The core identity system used in the implementation of PhilSys is the Modular Open-Source Identification Platform (MOSIP). Modular in architecture and banks on open source, MOSIP provides flexibility in the implementation and configuration of systems and helps avoid vendor lock-in dependence.

Built on privacy-by-design principles, PhilSys adopts PSN tokenization⁹⁴ to ensure data privacy and protection within the digital ecosystem and prioritizes citizen ownership and ability to manage the use of their credentials as key features of the system. As of April 21, 2023, more than 78.2 million⁹⁵ Filipinos had successfully registered with PhilSys.

Since its implementation, the Central Bank of Philippines (*Bangko Sentral ng Pilipinas*, or BSP), has been one of the strongest drivers in creating an enabling regulatory environment for its supervised entities to leverage PhilSys authentication and verification services.

Digital Payments

PhilPaSS^{plus} is the Philippines' highly automated RTGS system, which was upgraded in 2020. It is the lone Philippine peso RTGS system that is owned and operated by the BSP through the BSP Payments and Settlements Department and serves as a prime example of DPI. It enables efficient and low-risk settlement of large-value transfers between financial institutions. Additionally, settling retail payments via PhilPaSS^{plus} ensures that individuals, businesses, and the government can send and receive money through several channels—check, ATM, InstaPay, and PESONet—and serves as the foundation for the interoperability of digital payments in the Philippines.

Role and Impact on Financial Inclusion:

The financial inclusion landscape of the Philippines, measured by account ownership, has changed drastically due to heightened needs for use of accounts for payments. In particular, the implementation of PhilSys, the national digital ID system, along with the use of e-KYC (as per guidance⁹⁶ issued by the BSP) in the customer onboarding process for supervised financial institutions, played a key role in accelerating digital financial inclusion by overcoming the obstacle of inadequate identity documentation. A total of 8.4 million PhilSys registrants have opened a bank account for the first time through the colocation strategy of the registration centers with the Landbank of the Philippines.⁹⁷

The value proposition of account ownership as a convenient payment tool has also been bolstered by payment interoperability. This addresses a common barrier, of not having a need for an account, which has consistently been cited as a top reason for not owning one. The share of accountholders who use their account for payment-related transactions—such as fund transfers and bill payments—rose to 78 percent in 2021 from 47 percent in 2019. Overall, account ownership has increased significantly, to 56 percent in 2021 from 29 percent in 2019.

The National QR Code Standard, dubbed “QR Ph” (BSP Circular No. 1055), launched in November 2019, which leverages the efficiency, safety, and affordability of the QR technology using the InstaPay channel, has also been instrumental in driving the overall growth of digital payments. In particular, it has enabled micro and small merchants, many of whom are women, to accept digital payments. The adoption of faster, more affordable, and convenient interoperable payment channels such as QR Ph, which is essential for driving merchant payments, is a key use case for the overall growth of digital payments in the

93. Case study provided by the Better Than Cash Alliance with inputs from the World Bank.

94. PSA (2021).

95. Per the Philippines Statistics Authority.

96. BSP Circular No. 1170, dated March 30, 2023.

97. PSA (2023). d

country and aligns with the BSP's target to digitalize 50 percent of all retail payments (by volume) by 2023.

The two newest digital payment facilities,—Bills Pay PH and PESONet Multiple Batch Settlement (MBS), were both prioritized as a result of models developed together with the Better Than Cash Alliance. With Bills Pay Ph, users have expanded access to billers beyond their own provider, eliminating the need for multiple accounts just to pay various service providers. MBS supports P2B payments through faster clearing and settlement of PESONet transfers, thereby allowing receipt of funds before the end of the banking day.

Through these investments in DPIs, the Philippines has seen remarkable growth in retail payments (by volume) digitized, from 1 percent in 2013 to more than 30 percent in 2021.⁹⁸ In the years to come, the government of the Philippines remains committed to furthering the DPI approach, to speed up the country's digital transformation and enable government services to become smarter and more citizen-centric.

7.1.7 Rwanda⁹⁹

The Government of Rwanda maintains a strong commitment to establishing a seamless delivery of public services by leveraging DPI and has made significant progress on this front. Over the past 30 years, the government has achieved over 96 percent 4G coverage, an indication of its commitment to realizing an inclusive and competitive digital economy.¹⁰⁰ Rwanda's journey toward digitizing government services has taken place over three phases: The first (NICI-III, 2005–15) saw the digitization of an initial set of enabler registries (NIDA, NPPA, RRA, RDB, Land, MoH, MIFOTRA) to a rate of 15 percent. The second phase saw the launch of a single portal platform, IremboGov, which undertook the digitization of highly impactful citizen-centric services to a rate of about 58 percent. The third phase looks to digitize the remaining 800 manual and semidigital services by leveraging the power of private technical companies and the launch of a "low-code, no-code" platform by 2024.

Irembo¹⁰¹ is a citizen e-service platform set up through a public-private partnership (PPP) arrangement between the Government of Rwanda and Rwanda-Online in 2014. The platform facilitates easy access to government services, enabling applicants to pay digitally for government services. With more than nine million subscribers accessing the services digitally, thousands without connection rely on Irembo agents across

the country to access the online services (World Bank 2020b). As of September 2022, Rwanda offered 300 digital services and intends to digitize the remaining 600 services within the next two years.

Rwanda's flagship Vision 2020 Umurenge Program (VUP), which provides social assistance payments to nearly two million individuals (approximately 500,000 households), is scaling up efforts to digitize payments to recipients into accounts of their choice. The underlying infrastructure to support identification, trusted data exchange, and payment interoperability will be integral to attaining end-to-end digitization of VUP payments and more broadly strengthening the ecosystem for digital payments across the country.

Digital Identity

The Government of Rwanda considers digital identity to be a foundational requirement, critical for ensuring that citizens are able to participate productively in regional and global economic activity. Ninety-nine percent of all eligible citizens have an ID, making Rwanda's national ID system one of the strongest in Africa.¹⁰²

The National Identity Agency (NIDA) is entrusted with maintaining the national population register (NPR), an electronic database centrally located at the NIDA facility. NIDA is also responsible for issuing national biometric ID card to persons 16 years of age and older. Additionally, NIDA purports to provide real-time in-person authentication services,¹⁰³ enabling access to both public and private agencies, which has helped in streamlining identity verification for service delivery across various sectors. In 2014, Rwanda joined Uganda and Kenya to facilitate cross-border movement using their national ID systems in lieu of passports, based on a reciprocal agreement under the Northern Corridor Integration Projects and East African Community.

Starting in 2023, the government plans to modernize its ID ecosystem by leveraging financing from the World Bank and Asian Infrastructure Investment Bank. NIDA will be introducing a Single Digital ID (SDID) as an inclusive and trusted digital ID and authentication framework, featuring the development of a new data and digital authentication layer that leverages the existing NPR, civil registration and vital statistics, foreigner registration systems, and other authoritative data sources. These upgrades are envisioned to bring Rwanda's ID ecosystem in alignment with the Principles on Identification for Sustainable Develop-

98. Sivalingam and Bhandari (2023).

99. Case study prepared by the Better Than Cash Alliance and the World Bank.

100. DPGA (2022).

101. IremboGov, https://irembo.gov.rw/home/citizen/all_services.

102. Mukesha (2019).

103. ID4D (2016).

ment and the new Personal Data Protection and Privacy Law (2021). Activities financed will include the introduction of new ID credentials, promotion of emerging approaches to digital ID, and support for the adoption of new ways to verify identity in the context of in-person and fully remote service delivery in key sectors. Digitalization of select civil records will facilitate SDID preregistration and improve the government's ability to offer seamless e-services that require proof of vital events.

Digital Payments

The Government of Rwanda and the National Bank of Rwanda have emphasized their commitment to encourage the use of e-payment systems that enable interoperability through the Rwanda National Payment System Framework and Strategy 2018–24¹⁰⁴ The Rwanda National Digital Payments System¹⁰⁵ business plan approved in 2018 also provides a roadmap to full interoperability.

RSwitch aims to serve as the national e-payment switch that facilitates interoperability of transactions across banks, mobile network operators, and other FSPs. In 2022, RSwitch launched eKash (Phase I), aimed at interoperability between the two mobile money providers in Rwanda that are now fully onboarded. Under this arrangement, users are able to transfer funds across mobile network operators at no additional cost.¹⁰⁶ Phase II of the project focuses on onboarding banks and other FSPs, which will be essential to expanding the usage of P2P transactions and introducing new interoperable use cases, including G2P, P2G, P2B, B2P, B2B, and cash-in, cash-out—essentially focusing on establishing a comprehensive interoperable ecosystem for payments. The Government of Rwanda is also working with the digital public good (Mojaloop) for its ongoing work on enabling interoperable payment systems.

Impact on Financial Inclusion

The Government of Rwanda has set a target of achieving universal financial inclusion by 2024, recognizing that interoperability of payment systems would be crucial to realizing this goal. It will also be integral to bridging the gap between having access to formal financial services and using them, where everyone, for example, can progress from having access to an account to also using an account or making digital payments with confidence.

The government's efforts under VUP to move from cash-based payments through savings and credit cooperative organizations (SACCOs) to digital payments into an account of the beneficiary's choice will be key not only to closing the remaining gaps in financial inclusion but also contributing to building a stronger digital payment ecosystem. In 2021, the program piloted digital payments to VUP recipients using mobile money in six districts. Under an assessment using focus group discussions and key informant interviews to understand the pilot's impact, most beneficiaries reported that receiving their VUP payments digitally made their lives easier. In particular, beneficiaries noted that digital payments enhanced decision making and privacy, reduced travel costs and time, and increased flexibility.

Rwanda has indeed made great strides in advancing financial inclusion. According to the 2020 FinScope survey, 93 percent of Rwandans (about seven million adults) are financially included in terms of accessing and using both formal and informal financial products. Additionally, approximately 77 percent use formal financial products offered by banks and formal nonbank financial institutions, such as telcos, microfinance institutions and SACCOs, insurance companies, and others. The Government of Rwanda's Budget Framework Paper (fiscal years 2021–24), which now includes policy commitments on digital government payments at scale, will be critical to sustaining this progress and ensuring ongoing usage of formal financial services.

7.1.8 Saudi Arabia¹⁰⁷

The Kingdom of Saudi Arabia has implemented its reform plan, Vision 2030, for sustainable development and growth. Vision 2030 aims to create a vibrant society with a strong foundation for economic prosperity, a thriving economy providing economic opportunities for all, and an ambitious nation with an effective and transparent government. Saudi Arabia has made significant investments in its digital infrastructure, including high-speed broadband, expanding its coverage and capacity within and around cities, and improving its quality.

DPIs play a transformative role in achieving a sustainable future in Saudi Arabia, enabling the country to progress toward attaining SDGs.

- **Digital identity:** Saudi Arabia has created a digital ID management platform that allows citizens and residents to obtain and manage their digital identities similarly to their physical ones. The platform provides centralized access to all government services in one place; over 6,000 e-government services are currently available through the portal.

104. https://www.bnr.rw/payment-systems/policies/?tx_bnrdocumentmanager_frontend%5Bdocument%5D=209&tx_bnrdocumentmanager_frontend%5Baction%5D=download&tx_bnrdocumentmanager_frontend%5Bcontroller%5D=Document&cHash=99f1bb2e-46865242a30cbe8df8127020

105. National Bank of Rwanda, "Policies," <https://www.bnr.rw/payment-systems/policies/>.

106. RSwitch, <https://rswitch.co.rw/#>.

107. Case study provided by Saudi Arabia.

- **Digital payment:** Mada is an innovative e-payment network launched in Saudi Arabia in 2015 to promote growth in ATMs and POS services.
 - i. **Mada** connects all ATMs and POS terminals offered by local banks in Saudi Arabia to a central payment switch, enabling the secure and efficient transfer of financial transactions between a merchant's bank and the card issuer bank.
 - ii. **Naqd:** This service allows customers to request a cash amount of up to SR1s 400 right at point-of-sale terminals compatible with Mada standards. There is no need to visit the ATM, as the cash amount will be deducted directly from the customer's personal bank account along with the purchase amount. All Mada debit cards support this feature.
 - iii. **SARIE**, the Saudi Arabian Riyal Interbank Express, is a state-of-the-art payment and settlement system that operates on the concept of RTGS. It has revolutionized the electronic banking and commerce industry since its inception. SARIE IPS offers an efficient platform for financial transactions between local banks, offering customers instant money transfers accessible 24/7, regardless of conventional banking hours and restrictions.
- **Data exchange:** The Saudi National Information Center provides a secure and reliable infrastructure for government entities to exchange data and communicate seamlessly. The center is responsible for developing, hosting, and operating the National Data Bank, which plays a crucial role in managing government data and providing access to reliable information for decision-making purposes.

Role and Impact on Financial Inclusion

Digital ID is a crucial component in establishing an ecosystem for financial inclusion. It enables individuals to access financial services and conduct transactions digitally. The establishment of Nafath, the digital management platform in Saudi Arabia, has eased the use of digital ID and provides access to financial services and all government services through a single portal.

The establishment of electronic payment networks such as Mada, Naqd, and SARIE has fueled financial inclusion and productivity in Saudi Arabia. These networks provide seamless and secure financial transactions across local banks, offering a range of payment options, including NFC technology and RTGS. Their implementation not only has contributed significantly to the realization of the SDGs in the country but has also facilitated the development of a robust and inclusive financial system through the establishment of DPI. By reducing the cost of financial transactions, these networks have improved

access to financial services for individuals, small businesses, and government sectors. This has enhanced overall financial inclusion, contributing to the country's overall development and progress. Moreover, these organizations hold the utmost importance in advancing Saudi Arabia's digital transformation agenda. They are a vital component in achieving SDGs. By leveraging its digital infrastructure ecosystem, the Kingdom can strengthen its competitiveness, foster the creation of new job opportunities, and ultimately enhance the quality of life for its citizens and residents.

7.2 Case Studies on Programs/Initiatives to Advance Financial Inclusion

7.2.1 Jan Dhan for Advancing Financial Inclusion¹⁰⁸

Jan Dhan

Over the last decade, the Government of India has successfully leveraged its robust DPI to support key development priorities, such as financial inclusion and women's economic empowerment.

In particular, the digital ID (Aadhaar)-enabled e-KYC process simplified the opening of accounts under the Pradhan Mantri Jan Dhan Yojana (PMJDY), or "National Mission for Financial Inclusion."¹⁰⁹

This initiative of the Government of India, implemented in 2014 to ensure affordable access to financial services, brought millions into the formal banking sector. Moreover, the JAM pipeline, created through the consent-based linking of beneficiaries' Jan Dhan bank accounts with their Aadhaar and mobile numbers, facilitated instant Direct Benefit Transfers (DBT) to those eligible government welfare schemes. Since its launch, the number of PMJDY accounts opened tripled from 147.2 million in March 2015 to 462 million by June 2022; women own 56 percent of these accounts, more than 260 million.

Jan Dhan Plus for Advancing Financial Inclusion of Women

To enhance the adoption and usage of this DPI-enabled initiative, particularly among low-income rural women, Bank of Baroda, the third largest public sector bank in India in collaboration with Women's World banking (WWB), launched an innovative savings solution—the Jan Dhan Plus program—Jan Dhan Plus rests on the following four design principles:

108. Case study provided by WWB (2022).

109. Government of India, "Pradhan Mantri Jan Dhan Yojana (PMJDY)," <https://pmjdy.gov.in/>.

- Encourage low-income women to start saving amounts as small as \$5 a month.
- Make savings rewarding for women by highlighting how savings behaviour can lead to opportunities for accessing microcredit, microinsurance, and pension benefits.
- Build digital financial capability of business correspondents or bank agents, making them more gender intentional and relationship oriented in their approach.
- Conduct information education communication campaigns for the end customers (primarily low-income women), including through marketing activities. For the same, the program leveraged community-level business correspondent sakhis¹¹⁰ (or women bank agents) of the government's National Rural Livelihoods Mission (NRLM)¹¹¹ program to reach remote areas in rural India.

The following are some of key insights gathered from the Jan Dhan Plus intervention so far:

- Savings-driven engagement is highly compelling and relevant for women. Encouraging small savings and highlighting how their savings history could lead to micro-credit/overdraft loan facility, offering simple micro-insurance and pension products and channel skilling, and leveraging agents' channels proved to be the key drivers for encouraging women.
- Community camps have proven to be effective outreach tools for communicating benefits and increasing product uptake. It was observed that over 52 percent of people who attended camps were able to recall the scheme even after a month, indicating the effectiveness of agent-led camps in fostering community awareness.
- Liaising with public-sector banks is vital for expanding a customer base and achieving the scale necessary for evaluating impact. Facilitating capacity building and mentorship, for improving the digital financial capability, of bank agents is essential to make them more relationship oriented and gender responsive. It was observed that 75 percent of bank agents can be made productive through differentiated support and supervision, leading to quality conversations by agents that deepened customer engagement, particularly among rural women.
- Training and mentorship play a key role in accelerating the capacities of bank/business correspondent sakhis as

agents. It was observed that women who received training or mentorship were able to outperform other agents, in terms of their business volumes and incomes.

The pilots on JanDhan Plus were successful with Bank of Baroda in both urban and rural contexts, leading to its subsequent adoption by two more public-sector banks in India—Indian Bank and Union Bank of India (UBI). The program has reached over 12 million women customers so far (as of April 2023). Further, the savings-engaged women customers are more valuable for the bank, as they reported over a 50 percent increase in the average balances in just five months, as against the entire portfolio in the same time period. Additionally, there was a twofold increase in the number of bank or business correspondent agents cross-selling micro-insurance and pension schemes, leading to double the enrollments during the five-month pilot period. The JanDhan Plus program highlights the importance of savings-led engagement as a powerful tool to build financial resilience among low-income women and their households. According to a report by Women's World Banking and Bank of Baroda, it is estimated that by engaging 100 million low-income women in savings activities, public sector banks in India can attract approximately Rs 25,000 crore (\$3.1 billion) in deposits.

Overall, Jan Dhan Plus was instrumental in identifying challenges specific to women, thereby creating numerous opportunities for innovation, and gaining on-ground insights on product performance. As a result, there was a deepening focus on designing a program from a gender perspective, including by building the digital financial capability of women agents who played a critical role in bridging the gap between the usage and adoption of India's DPI among underserved and financially excluded segments of the population.

7.2.2 Designing Digital Remittance Solutions for Domestic Workers in Indonesia¹¹²

Indonesia is among the fastest growing digital economies in Southeast Asia, with a multistakeholder approach uniting the government, regulators, associations, the private sector, and societies in the provision of innovative solutions that support the country's development goals.

The Government of Indonesia has implemented concrete initiatives equipped with policy frameworks in recent years, streamlining service delivery by advancing its DPI agenda, including

110. Business correspondent sakhis are community-based banking agents under the government's National Rural Livelihoods Mission. Under this national program, states are encouraged to identify one woman per village from existing self-help groups to become a business correspondent sakhi.

111. Government of India, "National Rural Livelihoods Mission Bank Linkage," <https://daynrlmbl.aajeevika.gov.in/HomePage.aspx>.

112. Case study provided by Ang, Panggabean, and Thao (2022).

through the provision of identity verification and e-KYC services, as well as a data-exchange platform to facilitate the seamless and secure sharing of information across the government. Over the past few years, the government has also been focused on revamping its G2P architecture for the delivery of social protection and other government payments, cementing financial inclusion.

At the household level, remittance transfers play a key role in furthering financial inclusion. However, many domestic workers who rely on remittance support for their households often choose informal channels that are typically riskier. Bear in mind that almost half of the Indonesian adult population remains unbanked, as reported by the World Bank.

To develop a safe digital remittance solution for domestic workers to send money to their families and to increase their engagement with formal financial services, WWB partnered with DANA¹¹³ Indonesia, one of Indonesia's largest digital wallet providers, on a five-month pilot.

As a part of this effort, in-depth qualitative interactions were conducted to learn about the needs, barriers, and challenges of domestic workers in using DFS to send money back home. For the design of a digital remittance solution for the target group, WWB found that the workers believed an ideal remittance service would be fast, easy to use, reliable, and accessible (for both the sender and the receiver)—features that a digital wallet service providers like DANA Indonesia provide. However, the workers also identified barriers to usage and adoption of the service—namely, a complex sign-up process, low access to the internet, a complex app interface, a lack of trust in e-money or digital cash, and fear of making errors due to the workers' lack of understanding of DFS.

Based on the above challenges, a five-part solution for e-wallet services was designed for DANA Indonesia users to build their trust and confidence in DANA as a remittance service. Efforts were made to drive adoption through tutorials to support workers with limited digital financial literacy and through (i) program pitch and onboarding, (ii) transaction tutorials, (iii) key-customer marketing and messaging, (iv) timely notifications and reminders, and (v) incentives.

The solution was piloted throughout Indonesia for DANA's users in three phases lasting one to two months each. The first and second phases showed positive results in facilitating access to and use of DANA as a remittance service by domestic

workers. The third phase showed a substantial increase in its engagement and usage.

The intervention pilot yielded the following key learnings:

- Program awareness and targeted messaging efforts effectively communicated the benefits and convenience of using DANA.
- While employers offered limited support to facilitate the signup/onboarding of domestic workers, a segment of tech-savvy workers sought tutorials and videos independently, and other workers learned with the support of family members and peers.

Overall, DANA was perceived as a fast, easy, and secure method for transactions, instilling confidence in its use for remittance transfers. The program was successful, as it taught domestic workers to use DANA for remittance transfers. Customers who participated in the program also started using DANA for bill payments (electricity tokens and water bills), top-ups, and online shopping. Further, they started using a feature for setting short-term savings goals called DANA Goals. This is a testament to how a financial technology can provide a people-centered solution for helping financial inclusion.

The success of the intervention can be attributed to the design of the solution, which helped build the digital financial capabilities of workers through a learn-by-doing approach coupled with technological support of reminders, messages, and built-in incentives to drive usage. Thus, a simple, innovative intervention that effectively addresses the needs and challenges of many low-income domestic workers in Indonesia highlights the critical role that private-sector innovation plays in realizing an inclusive digital economy.

The success of collaboration was also highlighted at the GPFI in the margins of Indonesia's G20 Presidency in October 2022. With solutions that embedded seamless access to finance and converted the unbanked to bankable, DANA has proven its capability to achieve truly inclusive financial services.

7.2.3 Improving Digital Literacy in the United Arab Emirates¹¹⁴

The United Arab Emirates places great emphasis on the empowerment of youth to increase financial inclusion. Considering the importance of digital literacy for individuals to access and use DFS confidently and effectively, the country has undertaken several initiatives.

113. DANA, <https://www.dana.id/en>.

114. Case study provided by the United Arab Emirates.

The UAE's One Million Arab Coders (OMAC) program,¹¹⁵ led by the Dubai Future Foundation, is one such initiative. OMAC was launched in 2017 with the goal of developing digital literacy in Arab youth and preparing them for the future by providing online programming courses. The program ultimately aims to bridge the digital literacy gap, empower Arab youth with coding skills, and raise the next generation of technology experts. OMAC equips Arab youth with digital skills that enhance their employability in the job market. The initiative provides online training and certifications and offers scholarships for advanced sources such as nanotechnology, thereby empowering youth and fostering tech innovation in communities and tech economies.

115. Dubai Future Foundation, "One Million Arab Coders," <https://www.dubaifuture.ae/initiatives/capacity-building/one-million-arab-coders>.

The UAE's Jahiz initiative¹¹⁶ is another incentive that focuses on enhancing digital skills. Jahiz was launched in 2022 by the UAE Government to enhance the digital-skills readiness of the government workforce. The initiative aims to equip government employees with 20 major future skills within a year. It does so through an interactive platform developed in partnership with 15 leading government entities and global companies. The main objective of Jahiz is to ensure that government talents possess the necessary skills in an ever-changing world and understand the emerging trends that will shape the future. The initiative focuses on four key groups of skills: digital skills, 10X skills, data and AI skills, and new economy skills. These areas cover a wide range of topics, including cybersecurity, digital transformation, blockchain, AI, net-zero and climate change, and the digital economy, among others.

116. United Arab Emirates, "Jahiz," <https://jahiz.gov.ae/?lang=en>.



ANNEX A

WORK DEVELOPED BY THE GPFI TO SUPPORT FINANCIAL INCLUSION

G20 Financial Inclusion Action Plan 2020

The 2020 G20 Financial Inclusion Action Plan (FIAP)¹¹⁷ came at a time of crisis, as the COVID-19 pandemic represented an extraordinary global challenge. Following the leaders' mandate in the Buenos Aires Declaration for the GPFI to streamline its work program and structure, the GPFI decided to prioritize its work under the 2020 G20 FIAP on digital financial inclusion and SME finance. As a result, the 2020 FIAP covers three components: (i) the GPFI's overarching objectives; (ii) action areas under the agreed prioritized topics; and (iii) a set of cross-cutting issues and topics to be considered across the work of the GPFI.

Applicable G20 Principles and Work Done under Previous Presidencies

Under the Italian G20 Presidency, the GPFI took stock of countries' strategies to tackle the challenges and seize the opportunities for financial inclusion posed by the pandemic. Building upon the far-reaching work done during past G20 Presidencies,¹¹⁸ the GPFI implementing partners produced four reports,¹¹⁹ which present policy responses and innovative approaches that have proved effective in mitigating the impact

of the crisis and could guide policy makers in designing the recovery phase.

The 2010 G20 Principles for Innovative Financial Inclusion spurred initial efforts and policy actions. The G20 Principles for Innovative Financial Inclusion consist of nine core principles for promoting financial inclusion, based on experience and good practice, that form the basis of the G20's Financial Inclusion Action Plan. A report published by the Alliance for Financial Inclusion in its capacity as implementing partner of the GPFI describes how 11 countries¹²⁰ in five continents successfully applied the principles and the lessons they learned in doing so.

In 2016, the G20 further published the HLPs for Digital Financial Inclusion to build on that success by providing a basis for country action plans reflecting country contexts and national circumstances to leverage the huge potential offered by digital technologies. These eight HLPs are based on the rich experience reflected in G20 and non-G20 country experiences, and on international standard-setting bodies' standards and guidance.

The G20 HLPs for Digital Financial Inclusion are a catalyst for action for the G20 to drive the adoption of digital approaches to achieve financial inclusion goals, as well as the related G20 goals of inclusive growth and increasing women's economic participation. The HLPs recognize the urgency of providing the financially excluded and underserved with high-quality and appropriate financial products and services. The HLPs also recognize the need to use digi-

117. GPFI (2020b).

118. Specifically, OECD (2022) and (2020).

119. IFC and SME Finance Forum 2021; OECD 2021a; OECD 2021b; World Bank Group 2021.

120. Brazil, Indonesia, Kenya, Republic of Korea, Mexico, Nigeria, Peru, Philippines, Russia, Türkiye, United Kingdom.

tal technologies to achieve this goal, where possible. Underserved groups—which typically include poor people, women, youth, and people living in remote rural areas—require special attention. Vulnerable groups, such as migrants, elderly people, and people with disabilities, may also need a particular focus. Moreover, some excluded and vulnerable groups may not have access to DFS or may be reluctant to adopt them, and this risk needs to be managed and addressed proactively.

Further work was undertaken under previous G20 Presidencies to facilitate these objectives. For instance, the 2017 G20/GPFI report *Digital Financial Inclusion: Emerging Policy Approaches* under the German Presidency discusses emerging country strategies and policy approaches to increase the use of DFS, with a focus on the roles of policy makers and regulators with respect to HLPs 1–4. The 2020 report *G20 High-Level Policy Guidelines on Digital Financial Inclusion for Youth, Women and SMEs* under the Saudi Arabian Presidency further provides sets of featured policy options targeting financial inclusion

gaps for youth (subject to child-protection frameworks where relevant), women, and SMEs through DFS to reach conditions in which all people can live, work, and thrive, as well as utilize and share the benefits of innovations and digitization.

An effective way to implement the HLPs is through applicable national strategies and related country action plans or other country-level actions, which consider country contexts and national circumstances. In 2022, under the Indonesian Presidency, the GPFI published an implementation guide for the HLPs. This implementation guide focuses on HLPs 1–6 and dedicates a chapter to each HLP, emphasizing practical “how-to” approaches and replicable examples of good practices. The implementation guide also features country case studies and examples of good practices followed by G20 and non-G20 member countries in implementing the HLPs.

In addition, box A.1 details policy options contained in existing G20/GPFI guidance that are relevant to digitalization.

BOX A.1

Existing G20/GPFI Guidance and Policy Options

1. G20/GPFI: Menu of Policy Options for Digital Financial Literacy and Financial Consumer and MSME Protection (2021)

- Favor “protection by design”—that is, the design of new digital financial products and services that are oriented more to the needs of the financial consumer, help prevent aggressive and unfair market practices, and ensure the legitimate use of customer data.
- Address risks of online fraud and scams and mismanagement of personal data.
- Strengthen effective redress mechanisms to protect consumers.
- Deploy data collection and enhance market monitoring to improve financial services.
- Use behavioral insights to improve financial consumer protection and financial education.

2. G20 High-Level Policy Guidelines on Digital Financial Inclusion for Youth, Women and SMEs (2020)

- Consider the needs, risks, and vulnerabilities of women, youth, and SMEs in the digital environment in the context of (i) the financial consumer (price, terms, clear language) and (ii) data-protection approaches (security, privacy and responsible use of alternative data, and cybersecurity).
- Support comprehensive consumer protections that address women’s needs, including requirements to disclose product prices and terms in clear language, and appropriate measures to ensure data privacy and security.
- Minimize the risks associated with the digitization of SMEs, particularly by ensuring data-protection and privacy rights and adequately managing cybersecurity risks.
- Ensure the responsible use of alternative data consistent with applicable laws and good practices related to consumer protection, and remain vigilant to potential financial stability risks.

**BOX A.1, continued****3. Advancing the Digital Financial Inclusion of Youth (2020)**

- The document highlights that almost half of the world's young people aged 15–24 remain unbanked. It examines factors contributing to the financial inclusion of youth and the role of DFS in meeting their financial needs. Also, it explores opportunities and challenges related to advancing youth digital financial inclusion.
- The document offers policy options to policy makers, based on data, research, and country approaches, to ensure the appropriate and safe digital financial inclusion of young people.

4. Advancing Women's Digital Financial Inclusion (2020)

- The document outlines 10 policy options to enable G20 members and other governments to work rapidly toward digital financial inclusion of all women.
- These policy options will drive women's greater economic participation and speed up economic recovery.

5. Promoting Digital and Innovative SME Financing (2020)

- The document provides an overview of how digital technologies are helping to address the main barriers/frictions to close the financing gap for SMEs and takes stock of private, public, and private-public partnerships to advance responsible DFS for SMEs.
- The solutions come with challenges and risks, and the document presents regulators and policy makers with policy options and potential actions for consideration.

6. G20 Fukuoka Policy Priorities on Aging and Financial Inclusion (2019)

- "Protect," tackle financial abuse and fraud, and "customize," address the diverse needs of older people.
- Encourage stakeholder engagement—a multisectoral approach.

7. G20 Policy Guide: Digitisation and Informality (2018)

- Adapt oversight arrangements and capability for financial consumer protection, and improve disclosure and transparency.

ANNEX B

INTERLINKAGES BETWEEN DPIS AND IMPLEMENTATION OF THE HLPS ON DIGITAL FINANCIAL INCLUSION

High-Level Principles for Digital Financial Inclusion	Implications for DPIs
PRINCIPLE 1: Promote a Digital Approach to Financial Inclusion	- Digital financial inclusion involves the deployment of the cost-saving digital means to reach populations that are currently financially excluded and underserved with a range of formal financial services suited to their needs that are responsibly delivered at a cost affordable to customers and sustainable for providers. DPIs facilitate digital financial inclusion by easing access to financial services by making these ubiquitous through digital means. - DPIs can be inclusive by design, enabling providers to offer digital services and products that cover the needs of all segments of the population, including those of excluded and underserved citizens.
PRINCIPLE 2: Balance Innovation and Risk to Achieve Digital Financial Inclusion	DPIs can give rise to new and innovative business models that can help further digital financial inclusion. However, DPIs and services that leverage these DPIs need to be regulated and overseen by public authorities to ensure that risks are mitigated and they keep overarching public policy objectives in mind.
PRINCIPLE 3: Provide an Enabling and Proportionate Legal and Regulatory Framework for Digital Financial Inclusion	- Legal and regulatory frameworks should be predictable, risk based, and fair, and they should not impose excessive non-risk-based compliance costs. DPIs should be open by design, which entails that these can be leveraged by different types of entities under competitive conditions. - Access and participation requirements then need to be proportional to the risk that each participant or user of the DPI poses to the infrastructure. - Regulation and oversight of DPIs requires authorities to develop comprehensive and robust regulatory and supervisory frameworks.
PRINCIPLE 4: Expand the Digital Financial Services Infrastructure Ecosystem	- The inclusive characteristics of DPIs and their role in servicing various societal needs ensure that basic services and use cases that advance digital financial inclusion are provided or enabled by DPIs. - This means that implementation or the expansion of a DPI becomes a priority for public and private stakeholders, to provide the core infrastructure required for such purposes. - Openness in DPIs also promotes that interoperability between different types of DPIs is enabled to facilitate the provision and execution of end-to-end financial workflows. - By assuming this role, DPIs enable other infrastructures to be built on top of them or as complement to their services.

High-Level Principles for Digital Financial Inclusion	Implications for DPIs
PRINCIPLE 5: Establish Responsible Digital Financial Practices to Protect Consumers	- Effective financial consumer protection is essential to support meaningful digital financial inclusion, particularly given newly emerging risks and the rapid onboarding of previously underserved users. The use of DPIs can give rise to new risks and new manifestations of consumer risks that need to be mitigated by financial-sector authorities. - Effective customer protection tools, alongside effective grievance-redressal and dispute-resolution mechanisms, are vital to empower customers and to help build trust in the usage of DPIs. - The inclusiveness and openness of DPIs, as well as their systemic role, requires regulators and operators to ensure high levels of transparency and the implementation of effective customer protection mechanisms.
PRINCIPLE 6: Strengthen Digital and Financial Literacy and Awareness channels.	- Digital financial literacy is essential in supporting digital financial inclusion. As DFS—enabled by DPI—are rapidly evolving, and new players and products and services are emerging, individuals need to be equipped with the necessary skills to be aware of the characteristics, benefits, and risks of DFS, to be able to use them safely and to know where to obtain information and help in case of need. - In this respect, not only do consumers need financial literacy and digital skills, but they also need the skills at the intersection of these elements, on what is referred to as “digital financial literacy”—that is, a combination of the knowledge, skills, attitudes, and behaviors necessary for individuals to be aware of and safely use DPIs with a view to contributing to their financial well-being. DPIs need to be responsible and transparent, given their systemic role in serving societal needs; hence, their implementation and improvement require that regulators and operators ensure that both providers and end users are able to leverage their services. - This requires public awareness campaigns and initiatives to ensure that the population is aware of the products and services that are being enabled through DPIs. - Furthermore, coordination between public and private stakeholders is required to ensure that the products and services enabled by DPIs are deployed through inclusive user experiences and that knowledge tools are designed and provided to reach different segments of the population.
PRINCIPLE 7: Facilitate Customer Identification for Digital Financial Services	- Digital ID infrastructure is a core DPI that helps advance digital financial inclusion, as it plays a significant role in facilitating effective identification for DFS. - Digital ID assists customers in accessing and using key financial services required by excluded users, particularly account opening and access to credit, savings, and insurance products.
PRINCIPLE 8: Track Digital Financial Inclusion Progress	- Implementation of this HLP should leverage new sources of digital data and enable stakeholders to analyze and monitor the supply of, and demand for, DFS, as well as assess the impact of key programs and reforms, including facilitating improved progress monitoring for vulnerable groups, such as women, the elderly, youth, micro and small enterprises, and rural populations. - The digital nature of DPIs as well as their potential to be interoperable or interlinked with other DPIs allows for gathering information around take-up and usage of financial services and products. - DPIs can facilitate the deployment of monitoring tools that can provide additional insights on the role that DPIs are playing in advancing digital financial inclusion.

ANNEX C

ADDITIONAL EXPLANATIONS FOR VOLUNTARY AND NONBINDING POLICY RECOMMENDATIONS

Public and Private Collaboration

Ensuring all relevant stakeholder voices are considered in the design and ongoing operations of DPIs is critical. Irrespective of the operational models, significant public-private collaboration and coordination is required to develop standards, protocols, and governance mechanisms. In this regard, public authorities could (i) encourage and motivate the private sector to contribute to the development of DPIs; (ii) ensure structured and continuous coordination and collaboration among public authorities and private sector stakeholders, regardless of the ownership and operational model covering DPIs' architecture, design, standards, rollout, ongoing operations, and relevant enablers of the DFE; (iii) ensure coordination between relevant stakeholders to enable seamless interfaces between different DPI components, potentially also on a cross-border basis, via DPIs' institutional arrangements, such as operational rules and risk management frameworks; and (iv) ensure that technical and operational standards for DPIs are developed in close cooperation and coordination among public and private sector stakeholders.

In general, DPIs use in the financial sector can be roughly equated to the role that financial infrastructures play. Some of the DPIs—notably FPS—are considered as financial infrastructure. Accordingly, the existing set of guidance and

best practices on regulating, supervising, and overseeing financial infrastructures could serve as a useful framework.

Regulation, Supervision, and Oversight

Principle-Based and Proportionate Regulatory, Supervisory, and Oversight Framework

Implementation of a regulatory framework that addresses all relevant DPIs and monitoring and mitigation of risks due to the use of DPIs as well as those that the different categories of participants and users bring to the ecosystem is crucial. Regulation, supervision, and oversight should be principles based, flexible, and proportionate to the specificities and risks posed by DPIs. Existing regulatory standards and other good practices issued by the relevant standard setting bodies already provide guidance on these matters.¹²¹ The standard best practices of how and when to regulate apply, and the options range from (a) bringing them into the regulatory framework to (b) regulating indirectly (for example, through construct of outsourcing) or (c) leaving them outside but monitoring them. Some might be completely outside regulatory purview. As indicated earlier, in most jurisdictions, the payment systems (in this case, the FPS), as per legal framework, needs to be licensed/approved and would likely fall in category (a). While digital ID would likely fall outside the direct purview of financial sector regulators, the use of it in the financial sector might need to be monitored by them. The modality of regulating could also change over the lifecycle of a DPI and its intensity of use. The public authorities could consider clearly defining and publicly

121. This includes, for example, CPMI and IOSCO (2012), which address systemically important payment systems, although the same principles or a subset thereof are also typically applied to FPS and other retail payment systems.

disclosing the criteria used to identify the DPLs under the three categories—direct, indirect, and monitoring—for regulation/supervision/oversight, including putting in place sound governance arrangements and risk management framework by DPLs.

Coordination between Relevant Authorities

Different public authorities could have overlapping powers with respect to DPLs. As such, financial sector authorities should cooperate with one another and with other public authorities, both domestically and internationally, to foster efficient communication, consultation, and coordination, as needed. Such cooperation may need to be flexible for both normal circumstances as well as in crisis situations.

Building Inclusive Products and Services

The design and implementation of DPLs need to consider and mitigate the risks of financial exclusion of those without or with limited digital access and skills or who face other exclusion risks. For example, the gender digital divide in access to the internet and mobile phones has been found to go together with the increasing gender gap in account ownership. In this regard, it is important for the public sector authorities to consider the following:

- DPLs enable FSPs to offer essential financial products and services for all sectors and groups of society, including the most vulnerable.
- Adopt a human-centered design approach to ensure that such financial products and services are accessible and suitable to the needs of all groups accessing them, including women, youth, MSMEs, the disabled, and the elderly.
- FSPs using DPLs may periodically assess if their products and services are serving the needs of the segments accessing them. For instance, the appropriate credit products need to be made accessible to vulnerable sections to prevent over indebtedness.
- In the absence of universal broadband and network connectivity, DPLs may develop and enable offline solutions that can provide for the underlying lack of connectivity.
- DPL operators may ensure, jointly with other stakeholders of the DFE, that they do not add new barriers to access to financial services, especially for vulnerable populations.¹²²

- DPLs can facilitate the availability of full and transparent information on the functioning, features, and prices of financial services, in a form and manner¹²³ that is accessible by different types of users.
- DPLs can have requirements to ensure minimum service quality, especially for data services using data exchange.

Protection of Vulnerable and Formerly Excluded Users

Financial Consumer Protection Supervision and Complaint Handling

Financial sector protection supervisors can leverage DPLs to further enhance supervision and enforcement of financial consumer protection laws and regulations, and consumer redress mechanisms.¹²⁴ Examples include but are not limited to the following:

- Using DPLs to provide tools to the industry to support early detection of misuse and fraud and support the industry in addressing them
- Instituting programs and systems for reporting and sharing fraudulent transactions, behaviors, and typologies
- Providing new channels for customers to raise complaints/inquiries, which are channeled through to the relevant entities involved in the transaction chain, and then tracking and enforcing preagreed response times
- Providing tools to FSPs to gather all the information necessary to address customer complaints

Data Privacy

To safeguard personal data and privacy when providing financial services, public authorities could consider working with the DPLs to facilitate the following:

- Implementation of rules and procedures to ensure that financial institutions that access DPLs comply fully with applicable data protection and privacy legislation
- Establishment of measures to protect consumers against data breaches, fraud, and misuse of customer information from the use of DPLs and the data/information stored therein

122. For example, the mandatory use of biometric verification, without alternatives and exception handling, can create new barriers for populations that have damaged or low-quality biometrics, such as the elderly and manual laborers, whose fingerprints are significantly less recognizable than the general population.

123. Including the use of simple language that is not excessively

124. Financial consumer protection measures adopted by national authorities should be in accordance with international good practice, including the G20/OECD HLPs for Financial Consumer Protection.

- DPLs and the FSPs leveraging them employ to the maximum extent possible the principles of “privacy by design,” including (but not limited to) data minimization and proportionality
- DPL operators and their agents have different levels of permissible access to customers’ data for employees, depending on the role they play and the need to access such data

Digital and Financial Literacy

Digital and financial literacy is essential in supporting digital financial inclusion. Improving digital financial skills can help financial consumers understand better the features and risks of DFS so they are better able to protect themselves against attempts of fraud and scams. Digital and financial literacy efforts should consider the specific needs of various population segments based on their demographic characteristics, educational needs, and cultural and financial contexts.

In addition to their own efforts to improve digital and financial literacy, as part of HLP 6, public sector authorities could also consider some of the following measures:

- DPLs introduce features and services that FSPs can use to enhance their own financial and digital literacy initiatives.
- Products and services using DPLs consider the existing digital and financial literacy levels of the population and encourage financial and digital literacy campaigns that inform and educate citizen about the various associated financial consumer risks.
- DPLs work closely with financial sector providers to deploy digital and financial literacy initiatives and programs to cover the needs of different segments of society. In addition, it is also important that implementers assess the impact of such programs and initiatives and improve them accordingly.



REFERENCES

- Alonso, C., T. Bhojwani, E. Hanedar, D. Prihardini, G. Uña, and K. Zhabaska. 2023. *Stacking Up the Benefits: Lessons from India's Digital Journey*. IMF Working Paper 2023/078. Washington, DC: International Monetary Fund.
- Amoah, R., R. Bansal, A. Kasebele, and A. Plaitakis. 2017. *Building an Inclusive Digital Payments Ecosystem: The Way Forward*. Ghana Country Diagnostic Report. Better Than Cash Alliance. https://btca-production-site.s3.amazonaws.com/documents/312/english_attachments/Country_Diagnostic-Ghana_full_report.pdf?1506490992.
- Anderton, R., V. Botelho, and P. Reimers. 2023. "Digitalization Needs to Be Targeted to Boost Productivity—New Research." World Economic Forum, April 25, 2023. <https://www.weforum.org/agenda/2023/04/digitalisation-enhances-productivity-growth-but-only-for-some-firms/>.
- Ang, A., E. Panggabean, and K. Thao. 2022. "How Digital Wallets Are Transforming Remittances as an Entry-Point for Domestic Workers into Formal Financial Services." Women's World Banking Insights Blog, July 13, 2022. <https://www.womensworldbanking.org/insights/how-digital-wallets-are-transforming-remittances-as-an-entry-point-for-domestic-workers-into-formal-financial-services/>.
- Apedo-Amah, M. C., B. Avdiu, X. Cirera, M. Cruz, E. Davies, A. Grover, L. Iacovone, U. Kilinc, D. Medvedev, F. O. Maduko, S. Poupakis, J. Torres, and T. T. Tran. 2020. *Unmasking the Impact of COVID-19 on Businesses: Firm Level Evidence from across the World*. Policy Research Working Paper No. 9434. World Bank, Washington, DC. <http://hdl.handle.net/10986/34626>.
- Ardic, O., H. Baijal, P. Baudino, N. Y. Boakye-Adjei, J. Fishman, and R. A. Maikai. 2022a. "The Journey So Far: Making Cross Border Remittances Work for Financial Inclusion." FSI Insights on Policy Implementation No. 43. Financial Stability Institute, Basel, and World Bank, Washington, DC. <https://documents1.worldbank.org/curated/en/099626506172223111/pdf/IDU0ead444880410d04f070a14401ae78a8d3f74.pdf>.
- Ardic, O., N. Y. B. Adjei, and H. Baijal. 2022b. "The Long and Winding Road: Remittances and Financial Inclusion." Private Sector Development Blog, June 23, 2022. <https://blogs.worldbank.org/psd/long-and-winding-road-remittances-and-financial-inclusion>.
- Awanis, A., et al. 2022. *State of the Industry Report on Mobile Money 2022*. GSM Association.
- Ayyagari, M., A. Demirgüç-Kunt, and V. Maksimovic. 2017. "SME Finance." Policy Research Working Paper No. 8241 (November 13, 2017). World Bank Group.
- Azimi, M. N. 2022. "New Insights into the Impact of Financial Inclusion on Economic Growth: A Global Perspective." *PLoS ONE* 17, no. 11: e0277730. <https://doi.org/10.1371/journal.pone.0277730>.
- Banka, H., et al. 2021. *Fast Payment Systems Preliminary Analysis of Global Developments*. Washington, DC: World Bank.
- Bergman, M. A. 2003. "Payment System Efficiency and Pro-Competitive Regulation." *Economic Review* 4: 25–52. https://archive.riksbank.se/Upload/Dokument_riksbank/Kat_publicerat/Artiklar_PV/er03_4_artikel2.pdf.
- BNR (National Bank of Rwanda) and MINECOFIN (Ministry of Finance and Economic Planning). n.d. *Rwanda Payment System Strategy: Towards a Cashless Rwanda, 2018–2024*. https://www.bnr.rw/payment-systems/policies/?tx_bnrdocumentmanager_frontend%5Bdocument%5D=209&tx_bnrdocumentmanager_frontend%5Baction%5D=download&tx_bnrdocumentmanager_frontend%5Bcontroller%5D=Document&cHash=99f1bb2e-46865242a30cbe8df8127020.
- Caixa. n.d. *Relatório da Administração 4T20*. https://www.caixa.gov.br/Downloads/caixa-governanca/Relatorio_da_Administracao_4T20.pdf.
- Chien, J., et al. 2022. *Enablers of Digital Financial Inclusion—Relationships between Enablers and Take Up and Usage of Digital Financial Services*. Washington, DC: World Bank Group.
- Clark, J., A. Diofasi, and C. Casher. 2023. "850 Million People Globally Don't Have ID—Why This Matters and What We Can Do about It." Digital Development Blog, February 6, 2023. https://blogs.worldbank.org/digital-development/850-million-people-globally-dont-have-id-why-matters-and-what-we-can-do-about?cid=ppp_tt_digitaldev_en_ext.
- Coye-Benson, C., et al. 2016. *The Digital Financial Services Ecosystem*. International Telecommunication Union.

- CPMI (Committee on Payment and Settlement Systems) and IOSCO (International Organization of Securities Commissions). 2012. *Principles for Financial Market Infrastructures*. Bank for International Settlements.
- CPMI (Committee on Payment and Settlement Systems) and World Bank. 2016. *Payment Aspects of Financial Inclusion*. Basel: Bank for International Settlements, and Washington, DC: World Bank.
- Demirgüç-Kunt, A., L. Klapper, D. Singer, and S. Ansar. 2022. *The Global Findex Database 2021: Financial Inclusion, Digital Payments, and Resilience in the Age of COVID-19*. Washington, DC: World Bank. doi:10.1596/978-1-4648-1897-4.
- Desai, V. T., J. Marskell, G. Marin, and M. Varghese. 2023. "How Digital Public Infrastructure Supports Empowerment, Inclusion, and Resilience." Digital Development Blog, March 15, 2023. <https://blogs.worldbank.org/digital-development/how-digital-public-infrastructure-supports-empowerment-inclusion-and-resilience>.
- DIFC (Dubai International Financial Centre). 2022. "DIFC Launches the Region's First Open Finance Lab Reaffirming Its Position as a Top Global Fintech Hub." Press release, June 28, 2022. <https://www.difc.ae/newsroom/news/difc-launches-regions-first-open-finance-lab-reaffirming-its-position-top-global-fintech-hub/>.
- DPGA (Digital Public Goods Alliance). 2022. "Rwanda Ministry of ICT and Innovation Joins the DPGA." Digital Public Goods Alliance Blog, September 1, 2022. <https://digitalpublicgoods.net/blog/rwanda-ministry-of-ict-and-innovation-joins-the-dpga/>.
- D'Silva, D., Z. Filková, F. Packer, and S. Tiwari. 2019. "The Design of Digital Financial Infrastructure: Lessons from India." BIS Papers No. 106. Bank for International Settlements. <https://www.bis.org/publ/bppdf/bispap106.pdf>.
- Duarte, A., J. Frost, L. Gambacorta, P. K. Wilkens, and H. S. Shin. 2022. *Central Banks, the Monetary System and Public Payment Infrastructures: Lessons from Brazil's Pix*. BIS Bulletin No. 52. Basel: Bank for International Settlements. <https://www.bis.org/publ/bisbull52.pdf>.
- Ferrer, M-H., C. Perrin, and L. Jacolin. 2023. "Sub-Saharan Africa: The Financial Gender Gap between Men and Women." All About Finance Blog, February 27, 2023. <https://blogs.worldbank.org/allaboutfinance/sub-saharan-africa-financial-gender-gap-between-men-and-women>.
- Feyen, E., J. Frost, L. Gambacorta, H. Natarajan, and M. Saal. 2021. *Fintech and the Digital Transformation of Financial Services: Implications for Market Structure and Public Policy*. BIS Papers No. 117. Basel: Bank for International Settlement.
- Feyen, E. H. B., H. Natarajan, R. P. Heffernan, M. Saal, and A. Sarkar. 2022. *World Bank Group Global Market Survey: Digital Technology and the Future of Finance*. Washington, DC: World Bank Group. <http://documents.worldbank.org/curated/en/099735404212273637/P1730060bfa4c60010b833091f0f2fe2fc8>.
- G20. 2023. First G20 Finance and Central Bank Deputies Meeting: Issues Note.
- Gelb, A., and A. Diofasi Metz. 2018. "Identification Revolution: Can Digital ID Be Harnessed for Development? A New Book from CGD." CDG Blog, January 16, 2018. Washington, DC: Center for Global Development.
- Gentilini, U., M. Almenfi, I. Orton, and P. Dale. 2020. *Social Protection and Jobs Responses to COVID-19: A Real-Time Review of Country Measures*. World Bank, Washington, DC. <http://hdl.handle.net/10986/33635>.
- GhiPSS (Ghana Interbank Payment and Settlement Systems). 2022. *GhiPSS Update, Volume 14* (October–December 2022). <https://www.ghipss.net/phocadownload/newsletter/External-Newsletter-Vol14.pdf>.
- GPFI (Global Partnership for Financial Inclusion). 2016. *G20 High-Level Principles for Digital Financial Inclusion. Global Partnership for Financial Inclusion*. <https://www.gpfi.org/sites/gpfi/files/G20%20High%20Level%20Principles%20for%20Digital%20Financial%20Inclusion.pdf>.
- GPFI. 2018. *G20 Digital Identity Onboarding*. Washington, DC: World Bank Group. <http://hdl.handle.net/10986/30484>.
- GPFI. 2020a. *Promoting Digital and Innovative SME Financing*. Washington, DC: SME Finance Forum, International Finance Corporation, and World Bank Group. https://www.gpfi.org/sites/gpfi/files/saudi_digitalSME.pdf.
- GPFI. 2020b. *G20 2020 Financial Inclusion Action Plan*. <https://www.gpfi.org/news/g20-2020-financial-inclusion-action-plan-0>.
- Gradstein, H. L., S. Bint Abbas, and O. Tomilova. 2021. *Building a Financial Education Approach: A Starting Point for Financial Sector Authorities*. Technical Note. Washington, DC: World Bank Group. <http://documents.worldbank.org/curated/en/883771629960132032/Building-a-Financial-Education-Approach-A-Starting-Point-for-Financial-Sector-Authorities-Financial-Inclusion-Support-Framework-Technical-Note>.
- GSMA. 2023. *The Mobile Economy 2023*. <https://www.gsma.com/mobileeconomy/wp-content/uploads/2023/03/270223-The-Mobile-Economy-2023.pdf>.
- Hasan, M. 2021. "Mobile Money in the COVID-19 Pandemic." *The Daily Star*, January 17, 2021. <https://www.thedailystar.net/supplements/mobile-financial-services/news/mobile-money-the-covid-19-pandemic-2028889>.
- Herkenhoff, K. F., and G. Raveendranathan. 2021. "Who Bears the Welfare Costs of Monopoly? The Case of the Credit Card Industry." NBER Working Paper No. 26604. Cambridge, MA: National Bureau of Economic Research. https://www.nber.org/system/files/working_papers/w26604/w26604.pdf.
- Hesse, A. 2019. "Financial Inclusion Triangle, Harnessing the Gains." Presentation delivered at ID4Africa Conference, Johannesburg, South Africa, June 19, 2019. https://www.id4africa.com/2019_event/presentations/InF6/1-Archie-Hesse-GhiPSS.pdf.
- IDB (Inter-American Development Bank). 2022. *Digitalizing Public Services: Opportunities for Latin America and the Caribbean*. Washington, DC: Inter-American Development Bank.
- ID4D (Identification for Development). 2016. *ID4D Country Diagnostic: Rwanda*. Washington, DC: World Bank Group. <https://thedocs.worldbank.org/en/doc/573111524689463285-0190022018/original/RwandaID4DDiagnosticWeb040318.pdf>.
- IFC (International Finance Corporation). 2017. *MSME Finance Gap: Assessment of the Shortfalls and Opportunities in Financing Micro, Small, and Medium Enterprises in Emerging Markets*. IFC: Washington, DC. <http://hdl.handle.net/10986/28881>.
- IFC (International Finance Corporation). Forthcoming. *MSME Finance Gap*. IFC: Washington, DC.
- IFC (International Finance Corporation) and SME Finance Forum. 2021. *MSME Digital Finance: Resilience and Innovation during COVID-19*. <https://www.gpfi.org/publications/msme-digital-finance-resilience-and-innovation-during-covid-19>.

- ITU (International Telecommunication Union). 2016. *The Digital Financial Services Ecosystem*. ITU-T Focus Group Digital Financial Services, Technical Report. <https://www.itu.int/hub/publication/t-tut-dfs-2019/>.
- Khera, P., S. Ng, S. Ogawa, and R. Sahay. 2021. "Is Digital Financial Inclusion Unlocking Growth?" IMF Working Paper No. 2021/167. IMF: Washington, DC. <https://www.imf.org/en/Publications/WP/Issues/2021/06/11/Is-Digital-Financial-Inclusion-Unlocking-Growth-460738>.
- Klapper, L., et al. 2019. *Leveraging Digital Financial Solutions to Promote Formal Business Participation*. World Bank.
- Kotak Institutional Equities. 2022. *India Daily*, June 6, 2022. <https://www.kotaksecurities.com/pdf/indiadaily/indiadaily06062022hl.pdf>.
- McKinsey Global Institute. 2016. *Digital Finance for All: Powering Inclusive Growth in Emerging Economies*. McKinsey & Company. <https://www.mckinsey.com/featured-insights/employment-and-growth/how-digital-finance-could-boost-growth-in-emerging-economies>.
- Mukesh, J. 2019. "Rwanda National ID Agency." Presentation delivered at Annual Meeting of ID4Africa Movement, Johannesburg, South Africa, June 2019. https://www.id4africa.com/2019_event/presentations/PS1/5-Josephine-Mukesh-NIDA-Rwanda.pdf.
- Natarajan, H. 2023. "Financial Infrastructure in the FinTech Era and Implications for Policymakers." *Journal of Digital Banking* 7, no. 4: 301-8. <https://www.ingentaconnect.com/content/hsp/jdb001/2023/00000007/00000004>.
- Ndulu, B., C. Joseph, and K. Tryphone. 2021. *Fiscal Regimes and Digital Transformation in Sub-Saharan Africa*. Digital Pathways at Oxford Paper Series No. 11. Oxford, United Kingdom. https://doi.org/10.35489/BSG-DP-WP_2021/01.
- OECD (Organisation for Economic Co-operation and Development). 2019. "Digitalisation and Productivity: A Story of Complementarities" in *OECD Economic Outlook, Volume 2019, Issue 1*. Paris: OECD Publishing. <https://doi.org/10.1787/b2e897b0-en>.
- OECD (Organisation for Economic Co-operation and Development). 2020. *Recommendation of the Council on Financial Literacy*. OECD/LEGAL/0461. Paris: OECD. <https://www.oecd.org/finance/OECD-Recommendation-on-Financial-Literacy.htm>. (OECD 2020)
- OECD (Organisation for Economic Co-operation and Development). 2021a. *G20/OECD-INFE Report on Supporting Financial Resilience and Transformation through Digital Financial Literacy*. www.oecd.org/finance/supporting-financial-resilience-and-transformation-through-digital-financial-literacy.htm.
- OECD (Organisation for Economic Co-operation and Development). 2021b. *Lessons Learnt and Effective Approaches to Protect Consumers and Support Financial Inclusion in the Context of COVID-19*. https://www.gpfi.org/sites/gpfi/files/documents/5_OECD%20Report_FCP%20and%20FPI%20in%20the%20Context%20of%20COVID-19.pdf.
- Ortakaya, A. F.; O.P. Ardıc; M. Varghese, and C. Martin (2022). *Türkiye Case Study : Deep Dive into the Ecosystem for the Delivery of Social Assistance Payments: Türkiye Case Study*. Washington, D.C. : World Bank Group. <https://documents1.worldbank.org/curated/en/099010011072245762/pdf/P17316601c8b-0401b0ab340214079f623b6.pdf>.
- Ozili, P. K., A. Ademiju, and R. Semia. 2022. "Impact of Financial Inclusion on Economic Growth: Review of Existing Literature and Directions for Future Research." *International Journal of Social Economics*, Forthcoming. <https://ssrn.com/abstract=4246157>.
- Pasti, F. 2019. *State of the Industry Report on Mobile Money 2018*. GSM Association.
- Ping, F. B. 2023. "Thailand's National ITMX-PromptPay Could Have the Most Real-Time Cross-Border Payment Linkages in the World." *The Asian Banker*, March 28, 2023. <https://www.theasianbanker.com/updates-and-articles/thailands-national-itmx-promptpay-could-have-the-most-real-time-cross-border-linkages-in-the-world>.
- PSA (Philippines Statistics Authority). 2021. "PSA, DICT Strengthen Data Privacy for PhilSys through PIA." Press Release 2021-412, October 1, 2021. <https://psa.gov.ph/content/psa-dict-strengthen-data-privacy-philsys-through-pia>.
- PSA (Philippines Statistics Authority). 2023. "PSA, LANDBANK Reaches Financial Inclusion Milestone in 2022; Onboards 8.4 Million Unbanked Filipinos." Press Release 2023-86, February 21, 2023. <https://psa.gov.ph/content/psa-landbank-reaches-financial-inclusion-milestone-2022-onboards-84-million-unbanked>.
- Republic of Ghana. 2017. "President Akufo-Addo Receives New 'Ghana Card.'" Latest News, September 15, 2017. <https://presidency.gov.gh/index.php/briefing-room/news-style-2/370-president-akufo-addo-receives-new-ghana-card>.
- Republic of Ghana. 2020. "Government Launches New Policies to Speed Up Financial Inclusion and Digital Payments to Transform the Economy." Press Release, May 18, 2020. <https://mofep.gov.gh/press-release/2020-05-18/government-launches-new-policies-to-speed-up-financial-inclusion-and-digital-payments-to-transform-the-economy>.
- Sahamati. 2022. *Expected Evolution of Account Aggregator Ecosystem: 2023–27*. White Paper, November 25, 2022. <https://sahamati.org.in/expected-evolution-of-account-aggregator-ecosystem-2023-2027/>.
- Sivalingam, I., and V. Bhandari. 2023. *From 1% to 30%: The Key Drivers behind the Philippines' Acceleration towards Responsible Digital Payment Systems*. Case Study. Better Than Cash Alliance. <https://www.betterthancash.org/alliance-reports/from-1-percent-to-30-percent-the-journey-of-the-philippines-toward-responsible-digital-payments>.
- Visa. 2023. *Money Travels: 2023 Digital Remittances Adoption*. <https://usa.visa.com/content/dam/VCOM/regional/na/us/run-your-business/documents/2023-visa-remittance-landscape-study.pdf>.
- World Bank. 2017. *Good Practices for Financial Consumer Protection*. Washington, DC: World Bank.
- World Bank. 2019. "Social Safety Nets in Bangladesh Help Reduce Poverty and Improve Human Capital." Feature Story, April 29, 2019. <https://www.worldbank.org/en/news/feature/2019/04/29/social-safety-nets-in-bangladesh-help-reduce-poverty-and-improve-human-capital#>.
- World Bank. 2020a. *COVID-19 G2P Cash-Transfer Payments—Country Brief: Peru*. Washington, DC: World Bank. <https://thedocs.worldbank.org/en/doc/621251593464570382-0090022020/original/WorldBankG2PxCOVID19PeruBrief.pdf>.
- World Bank. 2020b. "Rwanda Economic Update: Leveraging Digital Transformation for Sustainable Growth." <https://www.worldbank.org/en/country/rwanda/publication/rwanda-economic-update-leveraging-digital-transformation-for-sustainable-growth>.
- World Bank. 2020c. *Digital financial Services*. Washington, DC: World Bank Group. <https://pubdocs.worldbank.org/en/230281588169110691/Digital-Financial-Services.pdf>.

- World Bank. 2021. "O sistema de pagamento utilizado pelo Auxílio Emergencial, a introdução da conta social digital e a bancarização de mais de 100 milhões de pessoas em 9 meses." Washington, DC: World Bank.
- World Bank. 2022b. *A Digital Stack for Transforming Service Delivery ID-Payments and Data Sharing* (English). World Bank: Washington, DC. <http://documents.worldbank.org/curated/en/099755004072288910/P1715920edb5990d60b83e037f756213782>.
- World Bank. 2022c. *Next Generation G2P Payments: Building Blocks of a Modern G2P Architecture*. World Bank, Washington, DC. <http://hdl.handle.net/10986/38193>.
- World Bank. 2022d. "Remittances to Reach \$630 Billion in 2022 with Record Flows into Ukraine." Press Release, May 11, 2022. <https://www.worldbank.org/en/news/press-release/2022/05/11/remittances-to-reach-630-billion-in-2022-with-record-flows-into-ukraine>.
- World Bank. 2022e. *The Role of Digital in the COVID-19 Social Assistance Response*. Washington, DC. <http://hdl.handle.net/10986/38104>.
- World Bank. 2023. *Remittances Remain Resilient but Are Slowing*. Migration and Development Brief No. 38. World Bank: Washington, DC. https://knomad.org/sites/default/files/publication-doc/migration_development_brief_38_june_2023_0.pdf.
- World Bank and IFC (International Finance Corporation). 2022. *Fintech and SME Finance: Expanding Responsible Access*. World Bank, Washington, DC. <http://hdl.handle.net/10986/37355>.
- World Bank Group. 2019. *Knowledge Guide on Secured Transactions, Collateral Registries and Movable Asset-Based Financing*. Washington DC.
- World Bank Group. 2021. "The Impact of COVID-19 on Digital Financial Inclusion." https://www.gpfi.org/sites/gpfi/files/sites/default/files/5_WB%20Report_The%20impact%20of%20COVID-19%20on%20digital%20financial%20inclusion.pdf.
- WWB (Women's World Banking). 2022. "Report: Making Jan Dhan Work for Rural Women." Research & Perspectives, November 15, 2022. <https://www.womensworldbanking.org/insights/report-making-jan-dhan-work-for-rural-women/>.

