

United Nations Economic and Social Commission for Asia and the Pacific

MSME Financing Series No. 7

MSME Access to Finance: The Role of Digital Payments



Copyright © United Nations, 2022. All rights reserved.

The views expressed in this publication are those of the author(s) and do not necessarily reflect the views and policies of the United Nations or other international agencies. Mention of any firm does not imply endorsement by the United Nations.

Links contained in the present publication are provided for the convenience of the reader and are correct at the time of issue. The United Nations takes no responsibility for the continued accuracy of that information or for the content of any external website.

Reproduction and dissemination of material in this publication for education or other non-commercial purposes are authorized without prior written permission from the copyright holders, provided the source is fully acknowledged.

Enquiries on this report can be sent to:

Director
Macroeconomic Policy and Financing for Development Division
United Nations Economic and Social Commission for Asia and the Pacific
United Nations Building, Rajadamnern Nok Avenue
Bangkok 10200, Thailand
Escap-mpdd@un.org

How to cite this report:

United Nations, Economic and Social Commission for Asia and the Pacific, *MSME Access to Finance: The Role of Digital Payments*, MSME Financing Series No.7 (Bangkok: United Nations, 2022), available at <https://www.unescap.org/kp/2022/msme-financing-series-role-digital-payments>

Photo credit: iStock-1069554654

About this series

Micro, small and medium-sized enterprises (MSME) make a significant contribution to economic growth and job creation across Asia and the Pacific. However, they often encounter difficulties in accessing finance. Women-headed MSME's are particularly underserved by financial institutions due to economic, regulatory and socio-cultural factors. In recent decades, governments and related agencies have set up mechanisms to facilitate the flow of finance. The result has been an increase in financial inclusion but the extent to which the financing gap has been reduced is not well known.

To gain more understanding about this issue, key questions need to be addressed, including the following: Is finance still a constraint, including for certain classes of enterprises, such as medium-sized ones? What mechanisms, such as credit guarantees, collateral support, and directed credit, have been the most beneficial in closing the gap? Is there gender disparity in access to finance? And are there public and/or private sector measures to overcome any existing regulatory, normative and contextual barriers to women entrepreneurs' equal access to finance? How have demand-side programmes, such as financial literacy, aided MSMEs? And how have FinTech and digital finance helped to increase access to finance?

To seek answers to these and other important questions, the Economic and Social Commission for Asia and the Pacific (ESCAP) developed *A Framework for Country Studies on MSMEs Access to Finance in Asia and the Pacific*. The Framework provided direction for the preparation of detailed national studies on MSMEs' access to finance in selected countries of Asia and the Pacific. The studies were prepared by researchers and specialized consultants under the guidance of a lead country agency with policy responsibilities in MSME financing. In some of the studies, an advisory committee composed of representatives from departments, agencies, financial institutions, and organizations involved in MSME promotion and financing provided direction and support to the authors.

This series presents the Framework along with national studies that were prepared following its guidelines. Each national study is expected to contribute, through policy analyses and recommendations, to policy discussions on how to improve access to finance by MSMEs. The preparation of national studies based on a common framework is also expected to facilitate comparisons across countries to share experiences, identify good practices, and understand common challenges.

Some of the studies contributed to ESCAP capacity building projects. The studies for Cambodia and Nepal were funded by the United Nations Regular Programme of Technical Cooperation, and the studies for Bangladesh and Samoa were funded by the Government of Canada, through Global Affairs Canada, in the context of ESCAP's Catalysing Women's Entrepreneurship Programme. The preparation of these four studies benefitted from a partnership between ESCAP and the United Nations Capital Development Fund (UNCDF). The latter contributed financial support for the Nepal study through UNNATI-Access to Finance (A2F) Project funded by the Government of Denmark.

In addition to the country studies, the series includes two thematic studies on ways in which commercial banks and digital technologies can contribute to improving access to finance by MSMEs. These studies were prepared for the Global Initiative Towards the post-Covid-19 Resurgence of the MSME Sector, a joint United Nations Development Account project implemented by multiple agencies.

About this report

This report was commissioned by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), and it was prepared by Douglas Arner, Sijuade Animashaun, Kuzi Charamba, and Yixiao Cai.

The report was funded by a joint project implemented by UNCTAD, UNDESA and the UN regional commissions entitled “Global Initiative Towards the post-Covid-19 Resurgence of the MSME Sector.” The project aimed at building capacities of governments, financial institutions, and micro, small and medium-sized enterprises (MSMEs) to facilitate the latter’s recovery from the Covid-19 pandemic. In the context of this project, ESCAP prepared training materials on various areas related to MSME financing.

Contents

About this series.....	i
About this report.....	ii
Abbreviations.....	iv
Glossary.....	vi
1. Introduction.....	1
2. Development of Digital Payments.....	4
A Brief History of Payments.....	5
A Technological Revolution in Payments.....	5
The ABCD's of Financial Technology.....	6
E-commerce and Global Interconnectedness.....	7
FinTech and BigTech: Non-Bank Financial Intermediaries.....	9
3. Enhancing MSME financing through digital payment development.....	10
Market-led projects.....	11
Government-led projects.....	13
4. Digital Payments and the SDGs.....	15
Financial Access --- SDG1: No Poverty, SDG8 Decent Work and Economic Growth.....	15
Digital Identity --- SDG10: Reduced Inequalities, SDG16.9: Legal Identity.....	17
Women-led MSMEs --- SDG5: Gender Equality.....	18
5. Regulation.....	20
Transparency and Cyber Security.....	20
Data Privacy and Consumer Protection.....	22
6. The Next Frontier: Central Bank Digital Currencies.....	23
Free Banking and Digital Currencies.....	23
CBDCs: Prospects and Limitations.....	26
Potential Limitations and the Way Forward.....	28
7. Conclusion.....	29
References.....	30

Abbreviations

ADB	Asian Development Bank
AI	Artificial intelligence
AML	Anti-money laundering
APAC	Asia-Pacific
API	Application programming interface
ATM	Automated teller machine
BIS	Bank for International Settlements
CBDC	Central bank digital currency
CDD	Customer due diligence
CFT	Countering the financing of terrorism
DFTF	Digital financing task force
DLT	Distributed ledger technologies
EFTs	Electronic fund transfers
FSB	Financial stability board
GFC	Global financial crisis
GDPR	General data protection regulation
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GPFI	Global Partnership for Financial Inclusion
GPN	Indonesia's Gerbang Pembayaran Nasional
GST	Goods and services tax
GVC	Global value chain
G-SIFI	Globally significant financial institutions
ICT	Information and communications technology
IFC	International financial corporation
IFEC	Investor and financial education council
ILO	International Labour Organization
IoT	Internet of things
ISO	International Organization for Standardization
KYC	Know your customer
MFI	Micro-finance institution
MNO	Mobile network operator
MSME	Micro-, small- and medium-sized enterprise
NBFI	Non-bank financial institution
NDID	National digital identification
OECD	Organisation for Economic Co-operation and Development
P2P	Peer-to-peer
PAPSS	Pan-African Payment and Settlement System
PSP	Payment service provider

RTGS	Real time gross settlement
SDG	Sustainable Development Goals
SIM	Subscriber identification module
SME	Small- and medium-sized enterprise
TFI	Traditional financial institutions
TFI	Trade finance intermediary
UPI	Unified payments interface
USSD	Unstructured supplementary service data

Glossary

Artificial intelligence	Artificial intelligence applies advanced computer science techniques to carry out tasks traditionally requiring human sophistication to obtain insights from large, disparate data sets (United Nations Secretary-General's Task Force on Digital Financing of the Sustainable Development Goals, 2020).
Big data	Big data refers to large volumes of different types of data, produced with high velocity from many and varied sources (such as the internet of things, sensors, social media, financial markets data, and transactions data), which can be conveniently stored on the cloud and processed, often in real time, by technological tools (e.g., supercomputers, software, and algorithms) (Sivarajah and others, 2017).
BigFinTech	BigFinTech refers to large digital financing platforms that benefit from increasing returns to scale, amass large volumes of personal data, and exhibit cross-sectoral and cross-border spill over effects, including but not limited to the tech giant entering finance (i.e., BigTech) (BIS, 2019a).
Cloud computing	Cloud computing refers to shared pools of hardware comprised of computer networks, servers, data storage, and applications software that can be rapidly mobilized through the Internet. Cloud computing minimizes fixed costs on hardware and other complementary investments (FSB, 2019).
Digital financing	Digital financing is broadly defined as the provision of financial services through digital processes and infrastructure (European Commission, n.d.).
Digitalisation	Digitalisation is the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business (Gartner, n.d.).
Digitalisation of finance	Digitalisation of finance comprises the systemic changes to the financial ecosystem, aided by FinTech, that lead not only to the digitalisation of finance-related activities, as well as the broader associated changes in business models, products, and services, but also to changes in the real economy, monetary systems, governance models, and citizens' relationships with finance and the real economy (UN Inter-agency Task Force on Financing for Development, 2020).

Distributed ledger technology	Distributed ledger technology (DLT) uses independent computers to record, share, and synchronize transactions in their respective electronic ledgers instead of keeping data centralized. Blockchain is a type of distributed ledger, which organizes data into blocks that are chained together in an 'append-only' mode (UN Inter-agency Task Force on Financing for Development, 2020).
FinTech	FinTech is technology-enabled innovation in financial services that could result in new business models, applications, processes, or products with an associated material effect on the provision of financial services (ESCAP, 2019).
Crowdfunding	Crowdfunding is a way of raising money to finance projects and businesses. It enables fundraisers to collect money from a large number of people via online platforms (Kourabas, 2018; Kourabas and Ramsay, 2018).

Acknowledgements

The authors of this report would like to express their gratitude to Xiaochen Zhang for initial inputs and Alberto Isgut, ESCAP, for his suggestions, encouragement, and thoughtful edits of this text. This report was edited and formatted by Luciana Milani Baglioni and Patchara Arunsuwannakorn. Latipat Mikled provided effective research assistance.

Overview and key messages

Technology has demonstrated its potential to transform money, payments, and finance within a growing social digital transformation. While key stakeholders focus on building public infrastructure to enable faster transition towards digital economies, it is important to look inward and leverage the available developmental options that may benefit the actualisation of sustainable development goals with minimal adverse financial and economic implications. MSMEs provide the necessary pedestal to reach a larger population of unbanked and underserved segments necessary for broader financial inclusion and inclusive economic development. If this is acknowledged, ensuring their sustainability through the provision of adequate support and finance must be at the core of present policy considerations to benefit this critical group and the extended population they provide for. Ultimately, the COVID-19 implications have paradoxically presented an important opportunity for policy makers and key stakeholders to harness the existing factors surrounding individual economies in recalibrating their present and long-term recovery efforts to ensure a more resilient and inclusive economy that caters to not just the privileged, but also the neglected.

1. Introduction

This paper aims to examine how digitalisation, particularly digital payments innovations and innovative payment initiatives, such as central bank digital currencies (CBDCs), can play a pivotal role in fostering micro, small and medium enterprise (MSME) access to finance. Around the globe, there is an increasing focus on ways to exploit the potential of emerging digital financial technologies, including digital payments, to accelerate MSME access to finance and achieve the United Nations Sustainable Development Goals (SDGs). This interplay between digital payments innovations, SDGs, and MSME financial inclusion is in line with the Addis Ababa Action Agenda (United Nations, 2015), the Secretary-General's Strategy for Financing the 2030 Agenda for Sustainable Development (2018 – 2021) (United Nations, 2018), and the report of the Task Force on Digital Financing of the Sustainable Development Goals (SDGs) entitled “People’s Money: Harnessing Digitalization to Finance a Sustainable Future” (UN Secretary-General's Task Force on Digital Financing of the Sustainable Development Goals, 2020). Yet, achieving these envisaged benefits will require thoughtful consideration and management of various systemic risks and impacts across jurisdictions and governance levels.

MSMEs are a broad category of commercial enterprises, varying from single agents to firms with up to 300 employees. A more formal categorization can be based on combined criteria such as the number of employees and total assets (Table 1).

Table 1
Micro-, small and medium-sized enterprises, as defined by the International Financial Corporation

Indicator	Firm size class*		
	Micro	Small	Medium
Employees	<10**	10<50	50<300
Total assets	< \$100,000	\$100,000 < \$3 million	\$3 million< \$15 million
Total annual sales	< \$100,000	\$100,000 < \$3 million	\$3 million< \$15 million

* An enterprise is included in a specific firm size class if it meets the relevant criteria under at least two of the three indicators.

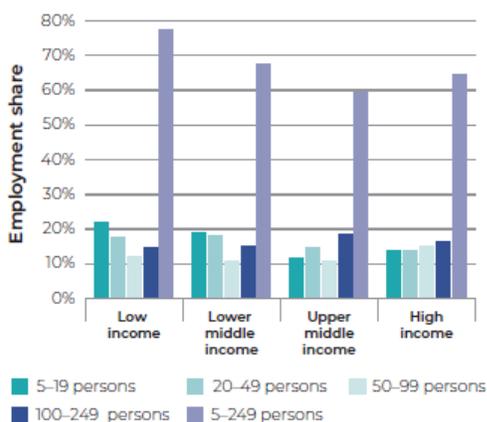
** Another IFC study explicitly states that micro-enterprises should employ at least one employee (Kushnir, Mirmulstein and Ramalho, 2010), which means that the self-employed are excluded from that category.

Source: IFC (2012) and ILO (2019).

Data from the ILO suggests that by 2019, self-employed and micro-enterprises had grown to a combined share in total employment of between 80 and 90 per cent in low- and middle-income countries (Figure 1). MSMEs account for 70 per cent of employment globally, approximately a quarter of GDP in low-middle income countries, and over 50 per cent of GDP in Organisation for Economic Co-operation and Development (OECD) countries (ILO, 2019). In Asia and the Pacific region (APAC), MSMEs account for about 90 per cent of all formal and informal business enterprises (ADB, 2020a).

Figure 1
Employment share of different firm size classes in 2013 and 2019

Panel A
Employment share of different firm size classes (medians), by country income group (%), as reported by the ILO in 2013



Note: The figure is based on data from the World Bank Enterprise Surveys reported in Ayyagari, Dermirgüç-Kunt and Maksimovic (2011), table 1.

Panel B
New estimates (2019) of the employment share of the self-employed and different firm size classes, by country income group (%)



Source: ILO calculations, August 2019.

Source: ILO (2019).

The sustainability of MSMEs through adequate government support and access to finance is thus critical to inclusive economic development. Yet, the World Bank estimates an annual shortfall of around USD 5.2 trillion in MSME financing in developing countries (IFC, 2017). Asia and the Pacific region represent the largest portion of this survey.

Globally, financial innovations and emerging technologies, particularly from the activities of FinTech start-ups and newer entrants like TechFins and BigTechs, as well as the increasing exploitation of blockchain – a type of distributed ledger technology – are quickly transforming how (non)financial services are rendered (Arner, Barberis and Buckley, 2015). Payment systems – which serve as conduits for wealth distribution in modern economies – have also undergone transformation through the introduction of innovative digital payment alternatives (termed Shadow Payment Systems), technology-enabled payment platform solutions, and digital currencies – a term broadly used to include cryptocurrencies, stablecoins, and the emerging CBDCs (Boar and Wehrli, 2021; Awrey and van Zwielen, 2019). These innovations have gained popularity among existing and previously unbanked financial consumers, boosting consumer confidence towards alternative payments solutions and benefiting greater financial inclusion. Consumers' expectations for cheaper, faster, and more efficient financial products and services have forced incumbents – traditional banks and payment services providers—to develop innovative payment solutions to compete with offers by new entrants into the payment ecosystems (Zetsche and others, 2017).

Digital payment platforms serve as data providers on MSME financial profiles capable of revolutionizing lending, low-cost agent-assisted transactions, and other efficient financial products and services by conventional banks, micro-finance institutions (MFIs), and non-bank financial

institutions (NBFIs) which gained notoriety after the 2008 Global Financial Crisis (GFC) for their shadow banking activities. Notably, the data provided by these platforms enable the factoring of cashflows within the MSMEs as usable collateral (complementing inadequate real properties) to enable access to finance within traditional lending institutions and elsewhere. Further, the increasing digital presence of MSMEs, enabled by progressive consumer confidence in e-commerce platforms, creates new markets for MSMEs (particularly small retail shops, such as “mom-and-pop” stores providing last-mile services to unbanked and underserved segments in remote areas) without requiring a considerable amount of sunk costs.¹ Simple steps, such as having a website or access to background infrastructure (internet and mobile telephony) by mobile network operators (MNOs), enable firms in developing countries to engage in global value chains (GVCs) as importers or exporters of bespoke financial products and services (Ganne and Lundquist, 2019).

Yet, policymakers and regulators at the national, regional, and international levels are increasingly concerned about the impacts of financial innovations and the activities of new entrants outside of regulatory perimeters on the intermediation of financial systems and the attendant risks to regulatory architecture and the SDGs (World Bank and CMPI, 2020a). These concerns are particularly pronounced in light of the COVID-19 pandemic. On one hand, while the pandemic negatively impacted global economic growth and furthered inequality within and across economies, it is accelerating paradoxically the adoption of financial innovations and the systemic importance of new private actors (Arner and others, 2020a). This increasing digitalisation of core finance globally in response to the COVID-19 pandemic has demonstrated the advantages of emerging technologies to sustainable development. For instance, the increased adoption of contactless and other alternative payment solutions, particularly in developing countries, has been leveraged in the distribution of government benefits to vulnerable groups in remote areas, and increased policymakers’ focus on MSME access to finance to sustain agent-assisted transactions, complementing inadequate conventional financial institutions’ reach. At the same time, however, these same disruptions taking place outside of the known regulatory parameters are raising concerns about consumer protection, financial stability, and market integrity among advanced and developing economies.

There is consensus among international policymakers that innovations in financial technology and digital payments ecosystems – particularly through artificial intelligence (AI), big data, quantum computing, and the Internet of Things – can play pivotal roles in fostering MSME access to finance and driving the achievement of the SDGs. For instance, the report of the Taskforce on Digital Financing of the SDGs highlights how digital payment solutions can drive both the development of the global digital economy and the pursuit of major SDGs such as gender equality, climate action, and poverty eradication. For this purpose, governments must take immediate and progressive steps to encourage collaboration between public and private actors in a way that drives sustainable development without jeopardizing international regulatory objectives. This requires improvements in regulatory approaches to digital payments and alignment of set goals to include MSMEs that are critical to sustainable job creation and last-mile financial services (UNCDF, 2021).

¹ For more details, see https://www.wto.org/english/thewto_e/minist_e/mc12_e/briefing_notes_e/bfmsmes_e.htm.

The fact that the operation of digital payments systems and new entrants lie outside of current regulatory perimeters raises the risk of widening gaps in the distribution of wealth and culminating in financial exclusion. This is partly due to the inadequate access by vulnerable groups to the digital infrastructure needed to access payments and broader financial services (World Bank and CMPI, 2020b; MAS, 2020). Immediate and coordinated efforts to promote safety and efficiency of payment systems which also support financial inclusion and sustainable development are therefore required by policymakers working collaboratively with key stakeholders. Pertinent regulatory challenges include consumer protection, the disintermediation of finance, concentration effects and reputation risks, market integrity, data protection, and financial stability (World Bank and CMPI, 2020b, 2020, Zetsche and others, 2017).

Within countries where micro-finance institutions (MFIs) and payment service providers (PSPs) complement traditional financial institutions (TFIs) in providing access to innovative payment solutions to unbanked and underserved populations – including MSME workers and owners in remote areas – policymakers are keen on exploiting the activities of these ‘conduits’ within their payment systems to enhance financial inclusion, eradicate poverty, and maintain overall progress towards the SDGs. Achieving this will likely be through collaborations among MSMEs, MFIs, PSPs, and coordination by national and international regulators to leverage economies of scale and scope in promoting better payment opportunities for vulnerable groups. Access to finance and growth among MSMEs is a corollary to this objective. This may be encouraged through focused government initiatives to promote uniform national payment systems that are interoperable among the different payment service providers and platforms, or in another innovative step, the consideration and development of digital payment instruments, such as CBDCs, to complement the growing digitalisation in emerging digital economies with the integration of MSMEs as providers of user interfaces to benefit a larger population of the affected group.

The paper is structured as follows: Section 2 examines global developments in the digitalisation of payment ecosystems. Section 3 considers examples particularly within the APAC region where digital payments initiatives by public and private stakeholders are enhancing local MSME financing, while Section 4 explores the challenges that digital payments pose to policymakers within the existing financial market and regulatory infrastructures. Finally, Section 5 examines recent government initiatives to develop CBDCs to revolutionise contactless payments and their prospects as a tool for sustainable development.

2. Development of Digital Payments

Technology has long transformed finance, with 19th century innovations including the introduction of the telegraph, for example, to better facilitate payments and transatlantic commercial transactions (Arner and others, 2016). More recently, global developments in finance and payments have been heterogenous, depending on the level of development and financial literacy within jurisdictions. However, major factors contributing to prominent developments include: (i) the impact of emerging technologies and new financial products such as increased automation and embedded financial services that simplify daily activities and cross-industry partnerships that allow customers’ financial and non-financial services to be addressed simultaneously (Chuard, 2020); (ii) the growth of e-commerce and global payments interconnectedness; (iii) activities of new technology-enabled payment platforms by technology firms (FinTech and TechFin) in financial

services; and (iv) consumer behaviour in response to popular payment solutions by new entrants offering cheaper, faster, and more convenient payment services through innovative financial products (World Bank and CMPI, 2020b).

A Brief History of Payments

The traditional method of physical payment was transformed in 1871 when Western Union launched electronic fund transfers (EFTs). They became popular for their speed and efficiency. The technology was further revolutionized in the 1950s by Diners Club, Carte Blanche, and American Express when accounts were linked to “charge cards”, the early form of debit cards provided through consortiums of trade finance intermediaries (TFIs). In 1958, Bank of America issued the first modern credit card, a significant innovation for modern consumer credit. In 1968, the first networked ATM appeared in Dallas, TX. IBM then invented the magnetic striped plastic card that allows the card to be readable electronically in 1969. The QR code was invented in 1994 in Japan and was approved by the International Organization for Standardization (ISO) as one of the international standards in 2000. This was at par with the development and adoption of real time gross settlement (RTGS) for large-value interbank payments clearing and settlements (BIS, 1997). PayPal launched its electronic money transfer services in 1999 and achieved its goal of bringing global payments online. In China, PayPal was quickly overtaken by e-commerce giant, Alibaba, through its introduction of Alipay in 2003. Alipay transformed the payments ecosystem within the country and broader APAC region by introducing QR codes and leveraging smart mobile devices to provide cheaper, faster, and more efficient payment solutions to billions of unbanked and underserved consumers. Furthermore, Apple Pay was launched in 2014 after Google Wallet was released in 2011. WeChat Pay rolled into a popular messaging platform in China in 2013, followed by Android and Samsung Pay a year later. Together, Alipay and Tencent’s WeChat Pay account for over 90 per cent of retail payments in China and are dominant contributors to digital payments within the APAC region and 48.6 per cent globally (CGPA, 2019), alongside UnionPay’s 45 per cent global market share of credit cards (RBR, 2020).

Demonstrating the potential of digital payments to transform developing economies and the inclusion of MSMEs, M-Pesa launched in Kenya in 2007 and quickly became the first widely successful cashless payments and peer-to-peer (P2P) mobile money transfer platform. M-Pesa accelerated financial inclusion within Kenya, Tanzania, and other Sub-Saharan African countries through vast agent networks of micro-enterprises functioning as quasi-bank branches in concert with mobile network operators (MNOs), such as Vodafone and Safaricom (Ndung’u, 2017). Today, it is lauded for providing access to financial services to millions of previously unbanked people, thus having positive impacts on economic development (Mbiti and Weil, 2011).

A Technological Revolution in Payments

While most developments in payments were witnessed within conventional financial institutions or in collaboration with them, a new clime of alternative payment systems leveraging technology like blockchain evolved predominantly after the 2008 Global Financial Crisis. Innovations in decentralised systems began with Bitcoin, a digital currency that was released in 2008. Bitcoin catalysed the distributed ledger technology revolution, a movement that sparked a wave of new technology providers in financial services (Awrey and van Zwieten 2019; Cornelli and others, 2020). The total transaction value in the digital payments segment is projected to reach USD

6,682,332m in 2021 with a projected annual growth rate of 12.01 per cent in the next four years and resulting in a projected total amount of USD 10,517,932m by 2025 (Statista, n.d.).

Cutting-edge technologies drive economies towards digitisation and payment systems' transformation. Through technological advancements, clogs within domestic and cross-border legacy payments systems that cause high costs, limited access, inadequate speed, and lack of transparency are progressively becoming a thing of the past (World Bank and CPMI, 2016). The financial market infrastructure of most economies is now dependent or largely complemented by technologies used for processing different forms of end-user, back-end interbank and cross-border payments clearing and settlements (e.g., RTGS, TARGET2, SWIFT). Two new promising infrastructures are the Pan-Africa Payment and Settlement Systems (PAPSS) and Nexus, the former developed by the Afrexim Bank and the latter by the Bank for International Settlements (BIS). Both offer more efficient cross-border payments, including FX exchange and settlement, by providing platforms to connect domestic payments systems in new ways. Emerging technologies are also used by financial institutions to provide front-end solutions for efficient consumer interfaces (most recently through APIs and white label systems in collaboration with technology providers) and back-end compliance with the extensive regulatory requirements applicable to both deposit-taking financial institutions and payment service providers (PSPs) after the GFC. These financial technologies have impacted not only private actors within the payment systems, but also necessitated a rethinking by national and international regulators of the future of money, monetary policies, and sustainable development in the context of an increasingly digitalized economy (Brunnermeier, James and Landau, 2019). The prominent technologies revolutionising finance, capable of benefiting MSMEs' access to finance, digital payments development, and SDGs realisation are briefly considered here.

The ABCD's of Financial Technology

Artificial intelligence (AI) and the Internet of Things (IoT), Big Data and quantum computing, cloud computing, and distributed ledger technologies (DLT), such as blockchains, are often referred to as the 'ABCD' for short and are at the heart of technological innovations in finance today (Zetzsche, Arner and Buckley, 2020). AI is a tool of big data analytics which uses complex computer programming and algorithms, alongside other big data analytical tools, such as machine and deep-learning and IoT to process complex pools of information using software capable of human cognitive abilities. It has been used to revolutionise payments using APIs and near-field communication for consumer activities by leveraging basic digital infrastructure and smart devices (World Bank and CPMI, 2020). Within MSME financing, a multitude of new financial services and products, such as 'robo-advisors', wealth management, crowdfunding, and digital credit is increasingly benefiting MSMEs' access to uncollateralised lending by using software programming for loan assessments, credit scoring, and the determination of investment decisions (Cornelli and others, 2020).

Data and big data analytics revolve around collecting extensive pools of information and information systems in digitised form for the facilitation of payment and financial services and the efficiency of general financial systems (World Bank and CPMI, 2020b). The type of data considered can include individual information and other entities who are key participants within payment systems, records of transactions, and other relevant information necessary for the execution of obligations (World Bank and CPMI, 2020b). For MSME financing, big data is particularly important to overcome the barriers to MSMEs access to finance arising from information asymmetries, particularly from credit scoring of MSMEs from cash flows and transactional projections. Through

big data and data analytics tools, cash flows may increasingly be considered as viable alternatives to qualify MSMEs for loans from conventional credit institutions, especially where real property collateral is lacking.

Cloud computing “enables the use of an online network ‘cloud’ of hosting processors to increase the scale and flexibility of computing capacity” (FSB, 2019). More simply, cloud computing is the delivery of computing services—including servers, storage, databases, networking, software, analytics, and intelligence—over the Internet (“the cloud”) to offer faster innovation, flexible resources, and economies of scale.² It offers an easier, more efficient, and relatively cheaper option for providing digital payments and financial services due to the capacity to source large volumes of data from global servers in real-time. As such, financial data are now increasingly stored in online data servers and localised silos operated by third-party technology providers, such as Bloomberg, and contracted by TFIs or public entities. With this, traditional finance intermediaries are able to provide faster and more efficient solutions to financial and payment obligations across multiple jurisdictions, using data from the servers to facilitate digital identity authentication, and reusing the data pool for various regulatory compliance applicable to financial institutions within the existing macro-prudential regulations (Zetsche, Arner and Buckley, 2020).

Lastly, blockchain refers to a network of interlinked information nodes, accessible through an open source “to propose, validate and record state changes (or updates) to a synchronized ledger that is distributed across the network’s nodes” (World Bank and CPMI, 2020b). Variants of blockchain technology, including DLT, are used to develop cryptocurrencies, facilitating faster and cheaper peer-to-peer payments without the need for TFIs (Zetsche, Arner and Buckley, 2020). There is also increased demand for this technology in back-end processing of fast payments and general regulatory compliance on the part of both financial institutions, and better coordination of regulation and supervision by regulatory bodies, broadly termed supervisory technology ‘SupTech’ (Jung, 2019) and regulatory technology ‘RegTech’ (Zetsche, Buckley and Arner, 2019).

While these technologies examined above are not exhaustive, they represent significant catalysts of innovations in finance and payment ecosystems. Next, we focus more narrowly on the impact of social digital transformations on MSME finance, particularly from technology-enabled commercial access points and new market entrants’ activities. Accordingly, this discussion focuses briefly on e-commerce accelerations and global interconnectedness, as well as the impact of BigTechs and FinTechs.

E-commerce and Global Interconnectedness

E-commerce is the provision of commercial services, including the sales of goods and services online, using digital means and payments (Jallouli and others, 2019). Globally, providers of e-commerce business have served as catalysts to the development of digital payments and digitalisation within the economies they operate and internationally (Li and others, 2020). By providing a more efficient, quicker, and cheaper service through electronic platforms, they have drawn a larger population to use non-cash payments methods for remote transactions (Scott, 2015). For example, internationally recognised e-commerce platforms and advertising firms, such as Paypal, Baidu, JD.com, Alibaba, Facebook, and Amazon provide electronic marketplaces with merchants (and the retail industry, including numerous MSMEs as network agents) from all over the world, sometimes with complementary digital payment alternatives (e.g., AliPay, Facebook Pay, WhatsApp Pay, and Amazon Pay) specific to their online platforms and accepted across their

² For more details, see <https://azure.microsoft.com/en-us/overview/what-is-cloud-computing/>

integrated commercial value chains. These firms also offer the traditional common digital payment methods in collaboration with conventional financial institutions, including online money transfer and internet banking, banking (credit/ debit) cards payment with partnering financial institutions and, recently, mobile-based payments (OMFIF, 2020). MSMEs have gained unprecedented strength by catering to an online base. The digital world was the weakness of MSMEs because of the high setup cost decades ago, but with the development of enabling digital infrastructure by MNOs, it has turned into their strength, transforming e-commerce into a game-changer for them.

The impact of the COVID-19 pandemic on physical markets and restrictions of movement across most jurisdictions have accelerated the adoption of digital payments and the inclusion of MSME-assisted transactions, particularly within developing countries. Payments for e-commerce transactions have expanded to include innovative digital payment solutions that take advantage of the spread of mobile telephony, telecommunications, and internet penetration (Lacka, Chan and Yip, 2014). New payments platforms available through popular e-commerce platforms, such as PayPal's e-money transfer account, Alipay, or Amazon Pay, allow the transfer of funds from consumers or entities' transaction accounts with TFIs or credit cards to electronic wallets for purchases of goods and services from merchants (including MSMEs) onboarded within the platforms (PayPal Inc., 2020). These examples of digital payments utilise Unstructured Supplementary Service Data (USSD) or Subscriber Identification Module (SIM) Toolkits and emerging technologies like APIs enabled on consumer smart devices.

Although e-commerce is driving digital payments in most countries, notable impact, especially concerning MSME inclusion, is more pronounced in low-middle income countries and the least developed jurisdictions. Among fast-developing economies with broader financial inclusion from larger adult population with access to mobile phones and the internet, such as China, Korea (the Republic of), Japan, and Singapore, the gravitation towards cashless societies does not rest principally on agent-assisted transaction networks similar to what is observed in predominantly low-income economies. For example, China, perhaps the country which has undergone the most notable digital financial transformation, has spearheaded the drive towards a cashless society by leveraging its two most popular mobile payment wallets, one of which is an e-commerce platform: Ant Group – an affiliate of Alibaba – and its mobile wallet, Alipay; the other contributor is WeChat Pay, a peer-to-peer payment platform available through Tencent's WeChat (OMFIF, 2020). Mobile payment transactions within China alone now average 101.4bn CNY and together with India, they account for over 70 per cent of digital payment transactions.

In addition to the increasing use of mobile telephony and internet penetration, the growth of non-bank financial intermediaries (NBFIs), particularly FinTech start-ups, TechFins and BigTechs, is a major catalyst of digital payments development, digitalisation, and access to finance for MSMEs within APAC (Buckley and others, 2019; Cornelli and others, 2020). Non-banks – prominent after the GFC – are providers of financial services (including credit, investments, peer-to-peer (P2P) lending, equity crowdfunding, online supply chain finance, deposit-taking, and payments) who operate outside of the costly regulatory perimeter of TFIs, thus enabling them to provide cheaper, faster, and more flexible financial solutions with relatively less regulatory intervention (Buckley and others, 2019). Digital finance through their activities (market-based financing) can positively impact access to finance for financially excluded populations, which includes MSMEs and other vulnerable groups (ADB, 2017; Tadjibaeva, 2019). Their emergence is partly related to consumers' distrust towards TFIs after the GFC and the yearning for financial efficiency with minimal limiting interventions (Aldasoro, Huang and Kemp, 2020). FinTech, or 'financial technology', was an emergent and resultant sector. It broadly refers to the provision of financial services through

technology, mostly by start-ups, that leverage online facilities usually in collaboration with TFIs (Enriques and Ringe, 2020). A primary advantage stemming from this increased use of technology over legacy manual systems is their minimal or non-requirement of physical market infrastructure. Instead, FinTech companies rely on cheaper existing digital infrastructures and incumbents to realise their data-driven business models (Alt, Beck and Smits, 2018).

The contributions of these tech giants towards MSMEs access to finance are considered in the next section.

FinTech and BigTech: Non-Bank Financial Intermediaries

TechFins refers to global technology giants (i.e., “BigTech” firms) in information and communications technology (ICT) that have traditionally been involved in nonfinancial activities (including MNOs) but now foray into the provision of financial services. Within digitalisation and digital payments developments more specifically, they refer to large companies which extend their services to include sophisticated payment and financial solutions on their existing platforms (World Bank and CMPI, 2020b). TechFin companies are typically owners of impactful global ICT platforms across a range of sectors such as advertising, social networking, cloud computing, and e-commerce. Their core businesses are in information technology and consulting (e.g., cloud computing and data analysis), which account for around 46 per cent of their revenues. Financial services represent about 11 per cent. While BigTechs serve users globally, their operations are mainly located in APAC with 42.9 per cent and North America with 37 per cent (BIS, 2019a). Consumer data within this platform is gathered and authenticated for activities within the closed-loop platforms using technology-enabled processes, including voice and facial recognition, fingerprints, and personalised access codes for digital identity. Examples of these non-bank PSPs interfaces include mobile-payment applications, super apps, online proprietary platforms, and smart devices. They gather significant data on consumer behaviour, such as spending and saving capabilities from the users of their technology platforms using algorithms and other advanced technology. This data enables them to provide tailored innovative payment solutions across their interoperable integrated platforms and value-chains globally. Their activity in financial services (consumer lending, wealth management, business banking, MSME finance, retail deposits, and savings) is quickly competing (and/or complementing) with TFIs in advanced and developing countries, although to varying degrees (Restoy, 2021). The dominance of FinTech and TechFins has been attributed to three main qualities: the use of data analytics tools, network externalities, and their interwoven activities (extending beyond payments to include digital credit, which we consider in the next section) (BIS, 2019a).

Non-bank financial services provided by BigTechs and FinTechs on one hand improve the existing market of financial services by increasing efficiency. On the other hand, they open financial access to people within regions where the financial market is still nascent.

While there are numerous success stories of digital payment technology developments, both private-sector driven and government-led, some questions remain as to how they are enhancing MSME specifically. We suggest that the focus should be on the barriers limiting MSMEs access to finance. This will provide the background for engagements on how the digitisation of finance (and payments) may positively impact MSMEs’ financing within the APAC region.

3. Enhancing MSME financing through digital payment development

Ninety per cent of formal and informal enterprises in APAC are MSMEs (ADB, 2020a). They include informal retail shops and “mom-and-pop” stores providing last-mile financial services to populations in remote areas, and they drive the sustainable growth of job creation, goods and service delivery, income generation, and poverty eradication (OECD, 2008). They complement bank branches in the lower-middle income countries of East Asia and the Pacific, Sub-Saharan Africa, and South Asia.³ Despite this fundamental role, financial inclusion for MSMEs is grossly inadequate, especially among low-middle income countries and the least developed countries. Surveys suggest that APAC has the largest financing gap among MSMEs globally (57 per cent) with an estimated value of USD 2.7 trillion (IFC, 2017). These figures become worrisome when demand for financing from informal enterprises in developing countries (of 128 surveyed countries) is factored. During the referenced period in the survey, the demand for finance stood at USD 2.9 trillion with the cumulative financial gap in the developing countries standing at USD 5.2 trillion (IFC, 2017).

Although at varying degrees, the cumulative barriers to MSME finance (supply-side and demand-side) include the information asymmetry due to inadequate credit registries and credit scoring (ADB, 2020a; Abe, Troilo and Batsaikhan, 2015); a lack of adequate collateral or guarantee requirements, partly due to inefficient collateral registries, bank's limited risk appetite towards interest caps, and high-risk assets of most MSMEs (ESCAP, 2017; Abe and others, 2012); managerial skill deficiencies; financial illiteracy; and a general concentration of internal finance through savings and friendly loans. These factors significantly impact the development of MSMEs. They exacerbate MSMEs' risk of default and over-indebtedness. Under these conditions, it is no surprise that TFIs are reluctant to make credit available to MSMEs due to their high likelihood of default and non-performance. For example, in Indonesia, 74 per cent of the 63 million MSMEs have limited access to institutional credit and other financing options (PwC, 2019). Furthermore, bank credit data between 2010-2019 in Southeast Asia suggests that while MSMEs' outstanding loans are greater in larger economies, they also account for the larger per centage (4.1 per cent) of non-performing loans in banks' credit portfolios (ADB, 2020a). These factors extend to the vulnerable groups that MSMEs cater to, and the COVID-19 pandemic has only exacerbated the situation. The pandemic has crippled most developing economies and constricted government spending on the development of MSMEs as enablers of sustainable development. A report by the Asian Development Bank states that losses from the catastrophic impact of the COVID-19 pandemic are expected to affect global GDP by up to USD 7.4 trillion in 2020 and a further USD 5.4 trillion in 2021. Within APAC, the loss projections are as high as USD 2.2 trillion in 2020 and USD 1.4 trillion in 2021 (ADB, 2020b). Now in 2021, the main barriers to MSMEs' access to finance revolve around lack of revenues, cash flows, and finance (in India, for example, MSMEs have recorded up to 25 per cent losses in earnings due to the pandemic) (Roy, Patnalk and Satpathy, 2020); a lack of public support and economic stimulus; inadequate resources and information; and limited assistance from TFIs (PTI, 2016).

Digitalisation and new market entrants within most emerging economies are quickly providing solutions to these barriers (IFC, 2020), leveraging emerging technologies in onboarding unbanked vulnerable groups, including informal MSMEs, and providing faster and cheaper uncollateralised credit (“FinTech Credit”) to MSMEs who are unable to secure loans from credit institutions and TFIs (Cornelli and others, 2020). In fact, a recent survey of 79 countries suggests that the total market

³ For more details, see <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>.

volume of credit by FinTech and TechFin companies in 2019 is about USD 800 billion globally, with APAC having a larger share in countries such as China, Japan, and Korea (the Republic of). Other prominent contributors include countries in Africa and Latin America (Cornelli and others, 2020). However, 2018-2019 data shows that regulatory and market developments are causing a decline in the volumes, particularly in China. Furthermore, key findings suggest that the trend is more prominent within areas with less stringent banking regulations and advanced judicial systems. However, alternative credit sources have largely complemented rather than substituted the traditional credit methods (i.e., TFI bank credit).

Initiatives driving developments in digital payments and MSME financing within APAC feature both government-led projects and market-driven alternatives relying on agent networks provided by MSMEs for facilitating payments and distributing government benefits to the broader population of unbanked and underserved segments in remote areas. In the following section, we attempt to demonstrate this by using prominent examples, particularly from low-middle income economies and least developed countries within the region.

Market-led projects

Although outside the APAC region, a notable example of a market-led initiative on payments development also benefiting MSMEs relates to M-Pesa, an MNO payment and mobile money transfer service that has gained considerable international acclaim (Nair and Emozozo, 2018). M-Pesa was established in 2007 in Kenya by Vodafone and Safaricom. Through this mobile-based payment method, which relies on USSD or SIM toolkits, cashless payment and money transfer services are provided throughout the country and across several more in sub-Saharan Africa. The services rely on the spread of mobile telephony and internet penetration, as well as the activities of retail merchants (MSMEs) acting as network agents in remote areas providing quasi-banking services (Hove and Dubus, 2019). The service “M-PESA Business” is an enhancement of the existing service “Lipa Na M-PESA” which includes payment of salaries, utility payments, promotional pay-outs, dividend payments, and funds withdrawal to an owner’s number, bank, or at a M-PESA agent. It is ideal for retail-focused MSMEs, such as supermarkets, restaurants, pharmacies, and boutiques that regularly collect money from customers as part of their business. Airtime can also be sold to customers using collected funds and earn commission.⁴ As an extension of services, M-Shwari was developed in 2013 (including MSMEs), which gave consumers quick access to short-term loans to the tune of USD 20.6 million. 2.8 million small businesses were included as recipients (Cook and McKay, 2015; Abe, Freeman and Troilo, 2021). By the end of 2014, merely one year later, M-Shwari boasted 9.2 million savings accounts (FSDAfrica, 2015).

Similar market-led initiatives abound within the APAC region. For instance, the popularity and impact of BigTech in social networking and e-commerce have influenced China’s dominance among its peers. Chinese led tech-conglomerate Alibaba Group Chairman and CEO Daniel Zhang issued a staff memo announcing the launch of the 2020 Spring Thunder Initiative to help SMEs succeed in what were trying circumstances in April 2020. The initiative includes (i) helping export-focused SMEs to expand into new markets through digitalized logistic subsidiary AliExpress; (ii) fostering ten digitized manufacturing clusters with production output valued at tens of billions in RMB; (iii) creating 1,000 Alibaba digitized agricultural centres across China; and (iv) the finance subsidiary, Ant Financial online merchant bank, working with hundreds of traditional banks to provide zero-

⁴ For more details, see <https://www.safaricom.co.ke/business/sme/m-pesa-payment-solutions/m-pesa-business-till-buy-goods>.

contact loans to tens of millions of SMEs. He stated, “Small and medium enterprises are the lifeblood of an economy. If SMEs are alive, then the economy will remain alive. If SMEs are thriving, then the economy will thrive” (Alizila, 2020).

Indonesia, a rapidly developing innovation hub, has benefited from mobile telephony's technological advancement and popularity and now engages tech entrants in providing innovative services from electronic and mobile wallets. The entrants include GoPay, LinkAja, and OVO, through which it provides faster payment services to its population and across Southeast Asia. The growth has also been witnessed in e-commerce platforms such as Bukalapak, Traveloka, and Tokopedia, all of which are engaged by the government in ensuring that government aid reaches a larger population of the unbanked and underbanked citizens. “In 2020, we see the enthusiasm of MSMEs joining in increasing drastically,” said the VP of Marketplace Bukalapak Kurnia Rosyada, in the event “Virtual Chat: New Strategies for Bukalapak to Help MSMEs in Pandemic Difficult Times.” According to Kurnia, with the newly added business analysis features, MSMEs can get sales analysis such as trends and consumer interests (Mime Asia, 2021). The increase in the number of merchant partners at Bukalapak and Tokopedia aligns with the government's appeal for MSMEs to penetrate the digital ecosystem during the pandemic.

Other prominent market-led initiatives providing greater access to finance include Amazon Pay's ecosystem in India. Further afield, Grab, TrueMoney, and Gojek also offer uncollateralised digital credit, micro-payments, and funds transfer to MSMEs and clients in the APAC region without access to institutional credit. These companies rely on algorithms and big data for their automated loan assessments and disbursement (Chen and Mazer, 2016). China's MYbank uses Alipay's technology to serve millions of MSMEs with loans taking less than three minutes to apply, one second to approve, and needing zero human intervention (Business Wire, 2019). Furthermore, Ant Financial's digital lending business “CreditTech” was reputed to be the largest contributor to the tech giant's revenue in 2020 (39.4 per cent) (Ant Group, 2020). Bangladesh's BKash in collaboration with CityBank also launched a collateral-free digital lending project in 2020, providing automatic loan processing (up to Tk 10,000) for small businesses through their BKash account with scheduled flexible repayments at low-interest rates (Hossain, Yoshino and Taghizadeh-Hesary, 2018). It is also driving change in mobile money climate through agent-assisted transactions (180,000 agents) by using MSMEs as agent networks of BRAC Microfinance, an international organisation based in Bangladesh, to provide disintermediated P2P transfers at very low fees to about 23 million customers (IFC, 2016). Similarly, Grab, a decacorn in Singapore partnered with Singtel, an MNO, for a full digital banking licence in 2020 to provide business loans through Grab Finance, a joint venture with Japanese company Credit Saison to MSMEs using its platforms.

These examples demonstrate the activities of private actors towards MSME financing to overcome the adverse impacts of the inadequate credit available to MSMEs in the region. Digital finance is projected to increase global GDP in emerging economies by up to 6 per cent (about USD 3.7 trillion) by 2025. These projections are amplified by the accelerated adoption of COVID digitalisation (Manyika and others, 2016). In developing countries with underdeveloped capital markets infrastructure, digital finance through P2P lending and equity crowdfunding is providing viable alternative credit options. In Singapore, Malaysia, and Indonesia, funding societies had a cumulative funding portfolio of USD 1.9 billion as of December 2020 (Abe, Freeman and Troilo, 2021). The impact has been recognised by the public authorities who are increasingly partnering with TFIs and technology providers to foster more inclusive economic development within developing countries. The next section examines case studies of government-led initiatives.

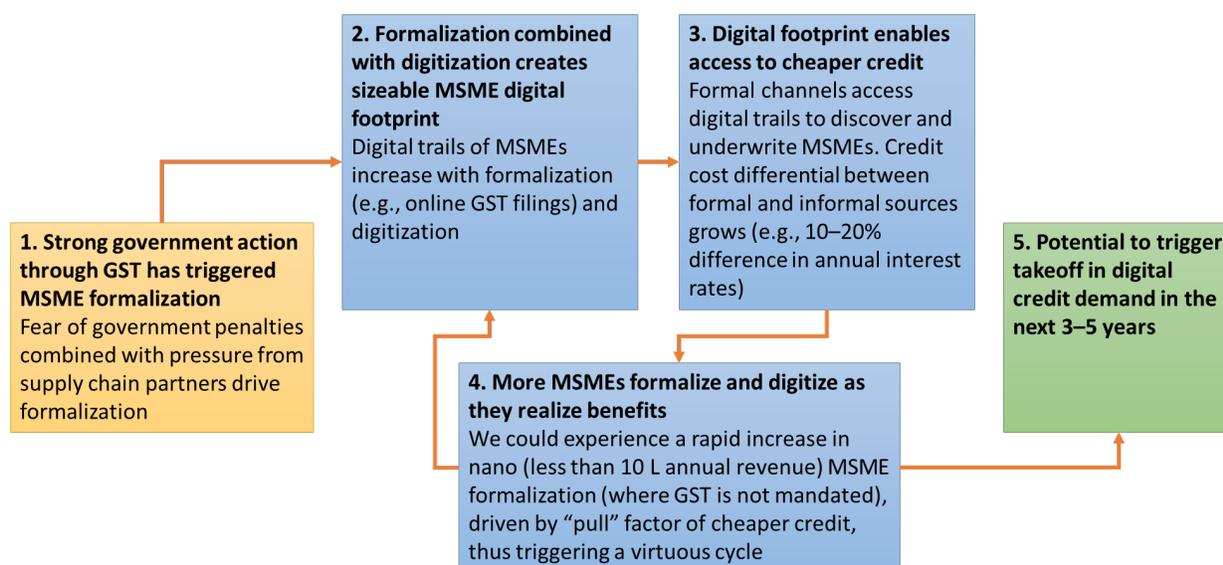
Government-led projects

Financial inclusion and the SDGs are primarily the responsibility of national (and regional) regulators. To realise these goals, fundamental initiatives are led by the policymakers using a range of regulatory tools and measures (e.g., secured lending reforms in the Pacific Islands, including Tonga, Solomon Islands, and Marshall Islands, to facilitate more corporate lending to micro businesses) (Freeman, 2015). In other circumstances, governments partner with private actors to benefit a larger segment of the vulnerable groups within their economies. Within Asia and the Pacific, efforts towards developing sustainable digital infrastructure have focused on the interoperability of national payment systems. For example, several interoperable payment gateways exist, including Indonesia's Gerbang Pembayaran Nasional (GPN) established in 2017 in which the Bank of Indonesia partnered with Bank DKI; PayNet in Malaysia, which was launched in 2019; PromptPay in Thailand, which was developed in 2017; and National Retail Payment System, which was established in the Philippines in 2018, to name but a few. It must be stated that the efficacy of these initiatives is premised on the overall commitments of the government to such initiatives, supported by available public funding (Abe, Freeman and Troilo, 2021). The latter has been a critical factor considering the catastrophic implications of the COVID-19 pandemic that has constricted government revenues and dramatically reduced public spending to sectors not acknowledged as crucial to economic stability (e.g., the banking sector). To facilitate MSMEs' access to finance, government initiatives have generally included directly (or indirectly) the provision of guarantees to help MSMEs secure credit (e.g., PhilGuarantee established in 2019 created a centralised credit guarantee by merging all existing schemes); granted concessional loans; secured lending programmes; created specialised banks (e.g., Cambodia SME Bank, Malaysia SME Bank, Thailand SME Development Bank) (Abe, Freeman and Troilo, 2021) and special funds; debt finance measures; interest rate subsidies; soft loans (e.g., SME Development Fund and Credit Guarantee Fund in Vietnam); employment support (especially due to COVID-19 affecting up to 81 per cent of the global workforce, with Singapore having the highest unemployment within APAC (2.4 per cent) (Ministry of Manpower, 2020; ILO 2020a); business cost reductions; mandatory MSME lending requirements to TFIs (e.g., 2019 Philippines Innovation Act; and Indonesia mandatory lending introduced in 2012) (ADB, 2020a, 2020b); and tax measures (World Bank, 2020). This section touches upon some of the prominent government-led initiatives driving developments towards digitalisation in payments and MSME financial inclusion.

Perhaps the most distinguishing feature of India's development of digital payments is arguably the concerted effort of the government towards digital payments through the demonetization act – Unified Payments Interface (UPI)— made in 2016 as part of the “Indian Stack” initiative, which has increased the level of financial inclusion within the population to about 90 per cent (Zetzsche and others, 2020). Through this state-owned payment platform, registered persons (including local and international incumbents and tech firms) may initiate and execute payments and other financial services throughout the country without the need to physically access traditional banks. According to Omidyar-BCG research, MSME digital lending through UPI has the potential to reach USD 80-100 billion in annual disbursement, which is between 10-15 fold. The bright potential is due to three major digital lending advantages: fast loan approval speed, credit underwriting insight, and operating cost efficiency. The analysis also shows a partnership with digital platforms like e-commerce and payment providers for customer sourcing. Digital loan fulfilment has 30-40 per cent cost advantage over traditional models with predominantly paper-based manual processes for cost of acquisition, and 40-50 per cent for cost of underwriting operations and servicing. Considering India's special economic conditions and tax structure, digital lending could trigger a value-added

cycle by incentivizing more MSMEs to formalize their finance to reduce the cost of borrowing. The circle starts with strong government action through Indian Goods and Services Tax (GST) which triggered MSME formalization. Once it is formalized, a sizeable MSME digital footprint that enables cheaper credit access will be created with the help of digitalisation (Omidyar Network and BCG, 2018). See Figure 2.

Figure 2
Formalization Cycle



Source: Omidyar Network and BCG, 2018.

A similar government initiative, “Bakong”⁵, is driving financial inclusion among unbanked segments and financially excluded MSMEs in Cambodia through the all-in-one mobile payment and banking app interoperability (combining e-wallets, mobile payments, online banking, and payment apps). The government through this approach developed an all-inclusive interoperable payment platform interface by integrating large networks of local banks, financial institutions, and PSPs, thereby facilitating peer-to-peer fund transfer services among consumers of the extensive networks using smart devices (e.g., scanning QR codes, keying in phone numbers or selecting from contact lists) and offering increased cashflows to MSMEs through the management of sales using electronic payment platforms in the increasingly digitalised environment.

In Lao People’s Democratic Republic, a least developed economy in APAC with only 41 per cent of financial inclusion among its adult population, a government initiative in collaboration with the UNCDF in June 2015 termed “BCOME” support of “Making access to finance more inclusive for poor people” has occasioned increased financial inclusion among the 67 districts in all 18 of the country’s provinces. The success of the initiative has been credited to the activities of network agents (increased from nine agents in 2015 to 125 in 2017) who are micro-businesses (BCEL agents) providing last-mile financial services (up to 12,393 agent-assisted transactions between May 2015-January 2017) on behalf of the bank to unbanked and underserved segments of the developing country in return for a commission. In fact, evidence from the survey of the initiative in 2017 suggests that most network agents are women, acknowledging the success of the project

⁵ For more details, see <https://www.coindesk.com/cambodia-launches-bakong-blockchain-payments>.

towards fostering gender equality and empowering vulnerable groups. Many activities through the initiatives include money transfers, utility bills payments, and mobile top-ups within cash-to-accounts, account-to-cash, and cash-to-cash transactions (LADLF, 2017). This initiative is complemented by MSME financing through the SME Promotion Fund, a soft loan program to provide struggling small businesses with faster access to finance without the traditional rigours (ADB, 2020a).

4. Digital Payments and the SDGs

There is no financial market infrastructure or participant that is fully insulated from risks (within market operations and activities of participants) to the constituents or the broader financial system. With globalisation, these risk potentials have increased significantly through the increasing interconnectedness of economies, particularly in cross-border payments and international remittances for which the APAC region is particularly noteworthy. Knock-on effects of failures and risks in financial products, markets, and players may pose contagion risks of market failures (from interconnectedness) to global payments and financial systems, evident during the 2008 GFC where the failure of a significant financial institution resulted in negative externalities within global interconnected financial institutions and economies (Arner and others, 2016).

With the focus of this paper on the role of digital payments on SDGs and MSME finance, particular consideration will be on how technology-enabled new players within payment systems pose regulatory challenges to existing financial market infrastructure, key stakeholders, and regulatory systems. Through this, the paper aims to provide strong objectives upon which regulators and policymakers within APAC (and globally) may implement innovative regulatory initiatives to foster sustainability and inclusive development. The challenges of new technologies through which digital finance and payments are provided by key activities of new players (non-banks including FinTech and TechFin) have been a source of growing concern for policymakers and regulators globally (Zetzsche and others, 2017). In recent times, the concern revolves around their activities outside of the regulatory perimeter of TFIs and new emerging forms of risks to consumers and financial stability. Critical risks emanate from the leveraging of big data by technology firms harvesting consumer information (largely unhindered) through background platforms on social networking, advertising, and e-commerce (a form of 'digital data barter'). These practices by new players can have a negative impact broadly on competition, financial stability, and consumer privacy if not well regulated (Abe, Freeman and Troilo, 2021). While some of these concerns are addressed within existing macro-prudential regulations developed after the GFC, our attention will be focused on the interaction between digital payments, MSME financing, and the realisation of SDGs. For that purpose, we concentrate on challenges to access to finance and payment services and regulations primarily linked to sustainable finance and the SDGs.

Financial Access --- SDG1: No Poverty, SDG8 Decent Work and Economic Growth

A 2014 World Bank survey suggested that more than half of adults in lower-middle income countries have no access to conventional bank accounts, while two-thirds in low-income developing countries have no bank account at all (World Bank, 2014). A more recent survey by Facebook put the number of adults without access to basic financial services globally at 1.7 billion (Libra Association Members, 2020).

Financial inclusion is set prominently as an enabler of many SDGs, such as SDG1 on eradicating poverty and SDG 8 on promoting economic growth and jobs. Research carried out in Kenya has revealed that mobile money has lifted as many as 194,000 households – 2 per cent of the Kenyan population – out of poverty, and has been effective in improving the economic lives of poor women and members of female-headed households (UNCDF, 2021). There is also growing evidence of financial inclusion creating more stable financial systems and economies, mobilizing domestic resources through national savings, and helping to boost government revenue (UNCDF, 2021). Kenya's Equity Bank has contributed similarly by using ATMs, mobile branches, and agents to reach a previously unserved customer base (Pickens, Porteous and Rotman, 2009). Similar transformative change has been witnessed in the Philippines through the activities of G-Cash, launched in 2004, by MNO Globe Telecom. G-Cash provides cheap and faster P2P transfers as well as micro-payments to unbanked and underserved populations using the SMS interface within mobile devices. In China, the Alipay platform increased mobile payment market share dramatically from 3.5 per cent in 2011 to 83 per cent in 2018 (Walk the Chat, IPSOS).

Similarly, Cambodia's Wing Money accounts for one of the most successful stories about how digital payments and MSME inclusion have reshaped financial inclusion. Wing was initially developed by ANZ-Royal bank and inspired by M-PESA but sold in 2011 to the group owning the MNO, Mobicom. The success began with the launch of a simpler over-the-counter transaction in 2021. Customers no longer require an account for transactions when MSME agents complete transactions in their stead. Instead, customers can send phone credits to themselves and relatives, save for later use via Phone Top-Up, pay utility bills, transfer money – Wing-to-Wing, or Wing-to-any-mobile phone – and receive money from anyone within the country or abroad up to a limit for free. The financial function conveniently serves for workers in the informal sector and other MSMEs to receive salary and build up the awareness of saving.⁶ Upon this background, Wing and Canadia Bank Plc recently signed an agreement in June 2020 to explore new partnerships to drive financial inclusion and provide every Cambodian with easy access to finance.

Financial literacy is the essential key towards independent and efficient wealth management, which contributes to eliminating poverty. By gaining financial knowledge and acknowledging the debilitating effect of unreasonable working conditions and salaries, the demand side of the labour market forces employers to improve the working conditions and equality. In 2012, the Investor and Financial Education Council (IFEC) was established in Hong Kong, China to improve financial literacy among Hong Kong's adult population. With proper financial education, people are better able to manage their resources and thus improve their financial buoyancy, wherein they can meet current and ongoing financial obligations while enjoying their life.⁷ Digital Payments require financial literacy by all stakeholders for its promotion. The following six socio-economic issues are set to be the main focus to reduce the inequality: low-income families; development of the younger generation; public health care and social welfare for elderly populations; investment scams and other fraudulent activities; FinTech development for financial inclusion; and housing problems of avoiding irrational financial choices (IFEC, 2021). It is germane to tackle these issues using the available advancement in technology while also examining the existential threats to developments in the increasingly digitised clime.

⁶ For more details, see <https://www.wingmoney.com/en/>.

⁷ For more details, see <https://www.ifec.org.hk/web/en/about-ifec/fls/fls.page>.

Digital Identity --- SDG10: Reduced Inequalities, SDG16.9: Legal Identity

Digital identity broadly refers to the determination of the identity of payment initiators and recipients to promote the transparency of transactions and the prevention of financial crimes (Arner and others, 2017). It is the bedrock upon which digital transformation of the financial market architecture rests (MAS, 2020). One of the major disadvantages of traditional payment methods (e.g., cash transactions) and a driver for digital payment alternatives is the high potential of cash to be used for crime due to its inherent anonymity. In response, international regulatory bodies have worked extensively in developing regulatory systems to ensure consumer protection and foster market integrity by enhancing customer identification requirements and payment validation protocols (broadly termed 'Know Your Customer' (KYC) and Customer Due Diligence (CDD)) through which all financial institutions and PSPs are required to authenticate the identity of all customers (payment initiators and receivers at every stage of a transaction) to ensure transparency and prevent financial crimes (anti-money laundering/ counter-financing of terrorism) (Arner and others, 2017). In compliance with these requirements, incumbents require formal identification documents, typically issued by a national government (e.g., passports, national identity cards, driver's licence, or voter's registration card) for transaction account's opening and the initiation of most payment instructions. While these de-risking efforts have had a significant impact on crime prevention and encouraging transparency, they have had the unintended consequences of financially excluding a majority of low-income and unregistered vulnerable groups within developing economies with largely inadequate identification registries (World Bank and CMPI, 2020b). This means that they are consequently cut off from the opportunities of social benefits provided to members of the population with this identity.

Identity is especially important within digital payments systems since, from initiation through execution, payments are done remotely with little or no physical interaction between the counterparties (Arner and others, 2017). There is, therefore, a need for payments authentication to validate transactions and prevent financial crimes. In digitally advanced economies, such as Singapore and China, digital identification may be completed through biometric technologies embedded within digital payments platforms (e.g., WeChat, AliPay, Grab Pay) due to the integration of digital identity registries with national registries (MAS, 2020). However, in developing jurisdictions where a significant proportion of the adult population has no formal means of identification due to multiple factors, including poverty, illiteracy, government inefficiency (or, in the case of internal immigrants in Myanmar, ineligibility), access to social benefits and basic financial services become a daunting task. This clog is not peculiar to individuals but also extends to micro businesses in remote areas owned by ethnic minorities and members of vulnerable groups like women. To ameliorate this, current efforts include the integration of national identity within interoperable platforms, thus preventing the costly implications of customer due diligence and KYC. This is encouraged through the onboarding of MSMEs and digital payment platforms in government revenue generation schemes (e.g., utility bills payment, government levies collection, and taxes through established mobile-money transfer platforms or agent-assisted networks like what obtains in Lao People's Democratic Republic) and social benefits, discussed earlier (LADLF, 2017). Digitalisation of identity has the potential to guarantee increased access to finance and social benefits among developing jurisdictions, with the impact of M-Pesa on hitherto unbanked segments in sub-Saharan Africa being an instructive example.

Efforts are ongoing globally and within APAC countries to encourage easier access to finance and payment solutions through less restrictive on-boarding identity requirements (UN Secretary-General's Task Force on Digital Financing of the SDGs, 2020). This has largely been achievable

through collaborations by the government with technology firms in establishing a formalized digital identity database through which consumers may access payments and financial services (and even government aid packages) within the country if they have been validated by the partnering authenticating platforms (like the social networking platform, telecommunications, or e-commerce) (World Bank and CPMI, 2020). India's Aadhaar has been successful in this context: the identity system provides a universal identification to the users (estimated to be 90 per cent of the population), which is valid across several partnering platforms, state institutions, and conventional financial institutions, provided that the authentication has been validated by one of the approved partners. As a result of its success (and learning from some of its challenges and shortcomings), countries worldwide (recently Ghana and Nigeria) and APAC are developing similar systems with global support through the World Bank's ID4D initiative. For example, the Philippines initiated a national ID system—PhilSys—through which it aims to provide access to its unbanked and underserved population, which forms most of its working-class individuals. A similar approach was adopted in Thailand with the National Digital Identification (NDID) system expected to ease private business transactions. The impact of such government initiatives is invaluable to the promotion of financial inclusion and the actualisation of global SDGs because the scope of application and adoptability is unified. Through this, PSPs and TFIs can satisfy the strict compliance requirements of domestic regulators and comply with international best practices (e-KYC and CDD) while extending their services to a larger clientele, including vulnerable groups and MSMEs (World Bank and CPMI, 2020).

Women-led MSMEs --- SDG5: Gender Equality

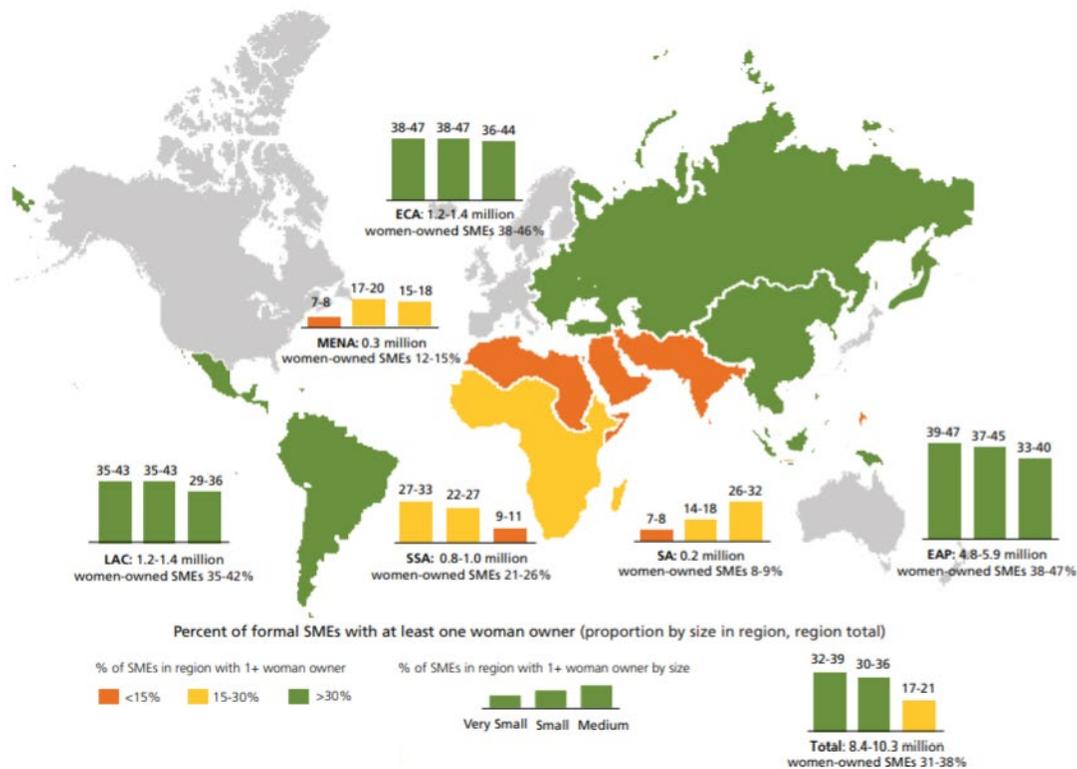
Based on the IFC's Enterprise Finance Gap Assessment Database, it is estimated that globally there are roughly 9.34 formal million women-owned SMEs in over 140 assessed countries. They account for about 31-38 per cent of all MSMEs in emerging market economies, but their average growth rate is significantly lower than men-led MSMEs.⁸ Financial access is the key to growth potential realization for women-led MSMEs. Figure 3 presents the formal SME total credit gap by gender, sector, and size as per region in the last decade. It is a global concern, especially in Latin America and the Caribbean, Europe and Central Asia, East Asia, and the Pacific. The credit gap reached above 45 million. There are clearly gender-specific barriers when it comes to accessing formal financial services including, though not limited to: (i) women legally unable to own immovable assets (i.e., ownership of land and buildings) required as loan collateral; (ii) possessing less formal education and fewer qualifications; (iii) greater degree of business informality among women-led MSMEs; and (iv) a range of regulatory and socio-cultural barriers including financial institutions' attitudes, such as imposing higher interest rates to female clients (IFC and GPFI, 2011). Besides a need for direct financial assistance, women-led MSMEs also reported a need for more mentoring and financial literacy support from government institutions. This suggests that a comprehensive policy framework covering finance and non-finance issues should be elaborated further for women-led MSMEs in the region (Abe, Freeman and Troilo, 2021).

The Digital Financing Task Force (DFTF) Report 2020 states, "Policymakers and regulators should encourage market innovation to develop SME lending and investment platforms, which integrate sustainability criteria and client protections, and avoid algorithmic discrimination against women-owned businesses" (UN Secretary-General's Task Force on Digital Financing of the Sustainable Development Goals, 2020, pp. 51). Over the past decade, the IFC has played a critical role in

⁸ For more details, see <https://data.world/finance/ifc-enterprise-finance-gap>.

helping SMEs worldwide gain greater access to financing⁹. The IFC works to increase access to financial services for formal SMEs in developing countries: providing funding to FIs focusing on SME financing; providing advisory services to build the capacity of financial institutions to serve SMEs; and raising awareness on SME banking best practices. As a leading financial centre in APAC, Hong Kong’s Investor and Financial Education Council’s (IFEC) work presents a good example for other Asia-Pacific countries to develop a financial literacy strategy for MSME development (Abe, Freeman and Troilo, 2021). Fullerton India and Indian HDFC Bank are two of many examples which offer special digital loans for women with lower rates, quick access online, and low collateral requirements. From application to approval, all processes are online.¹⁰ There is no restriction on the end use of the loan so that women led MSMEs can use it to start their business or boost growth.¹¹

Figure 3
Formal SME total credit gap by gender, sector and size as per region: 2003-2010



Source: IFC and GPFI (2011).

⁹ For more details, see https://www.ifc.org/wps/wcm/connect/Industry_EXT_Content/IFC_External_Corporate_Site/Financial+Institutions/Priorities/Digital+Finance/.

¹⁰ For more details, see <https://www.fullertonindia.com/personal-loan-for-women.aspx>.

¹¹ For more details, see <https://www.hdfcbank.com/personal/resources/learning-centre/borrow/best-type-of-small-business-loan-for-women>.

5. Regulation

Digital payments exploit the advancement in technological infrastructure – internet penetration and mobile telephony – in providing innovative payment solutions to unbanked and underbanked members of economies, sometimes with minimal or no requirement for intermediation (Awrey and van Zwieten, 2017). The potential disintermediation of TFIs and PSPs, while greatly advantageous towards efficiency and costs, implies that the necessary regulatory safety nets—micro and macroprudential regulations—are not immediately applicable to their activities since they are not considered as deposit-taking institutions which require specific licence and subjection to extensive regulatory compliance (Fenwick, Van Uytsel and Ying, 2020).

The advent of FinTech firms and tech giants within the payment services clime have heralded new forms of risks outside of traditional financial risks that are popular among incumbents, but just as impactful, if allowed to grow unmanaged. The primary theories of regulations, especially for banking institutions and bundling of payments with other financial services, revolve around market integrity, consumer protection, financial stability, and financial efficiency and development (Armour and others, 2017). Several regulations (on market integrity, financial stability and macroprudential, consumer protection) by domestic and international regulatory bodies apply to incumbents as part of an entity-based regulatory approach (Restoy, 2021). However, the activities of new entrants in payments are mostly outside of the regulatory perimeter of these regulations and therefore go largely unsupervised. There is also the issue of regulatory hierarchy, which implies that since tech giants' activities do not affect the core financial system's stability due to their limitations of scope, they do not warrant interventions like other financial institutions. Nevertheless, the activities of the new entrants are growing rapidly within domestic and cross-border economies and may threaten the financial stability of economies through their increasing interconnectedness with incumbents and systemic risks cross-pollination.

Recent scholarly discourse and international policy outputs have examined the activities of new entrants in financial and payments markets and identified the potential risks that they pose to public regulatory policy and consumer protections generally (BIS, 2019a). The cumulative of these risks are termed 'Techrisks' (Buckley and others, 2020) and broadly include cyber security, transparency (of services and fees, accounts mobility across different platform providers, conditions for initiation, authorisation, and execution of payment instructions), consumer protection, and data privacy. The extensive debate on competition and antitrust implications of potential data monopolies by new entrants have also been considered recently to justify renewed policy initiatives that conflate the hierarchy of regulatory theories and design. Therefore, this paper will concisely examine the regulatory challenges of digital payments and the activities of new technology providers within APAC and globally. Our focus as it affects the SDGs and financial inclusion will revolve around operational resilience of new entrants and transparency of activities to ensure consumer protection and market integrity necessary for achieving sustainable finance.

Transparency and Cyber Security

With increased internet penetration transforming how finance and payment services are provided, and the growing consumer demand for technology-enabled financial services, the traditional protective measures for ensuring security of financial institutions from fraud, attacks, and fostering operational resilience now stand challenged (Buckley and others, 2020). Perhaps a considerable demerit of disintermediation is the loss of the entity-based protections and guarantees applicable

to incumbents, despite their complex and costly compliance implications (Kaja, Martino and Paccos, 2020).

Besides the basic computer literacy required for mobile telephony operation, most consumers using digital payments lack adequate technical know-how on how the complexities of new emerging technologies operate. Instead, they concern themselves with the ready advantages of speed, cost reduction, efficiency, and user-friendliness of the new payment solutions. The immediate fallout is that the objective to ensure operational resilience is significantly in the hands of platform owners. This is because the management of the platforms is outside of the regulatory ambit of the existing regulatory architecture (Buckley and others, 2020). With the primary aim of most business entities as profit maximisation and market domination, the realities of operating unregulated create a moral hazard and conflict of interest for platform owners deciding between the protection of platform users at increased operational costs or profit maximisation through cost reductions. The activities of hackers and internet criminals within platforms and external hacks can disrupt the payment processes and threaten the financial well-being of users. While internal efforts by platform owners to provide top-notch security guarantees for their users exist, it is a considerable challenge for regulators and, indeed, policymakers to leave such crucial public policy obligations in the hands of private actors who do not share the liabilities for threats to financial stability or loss of integrity in the domestic financial systems.

Digital payments, especially decentralised digital currencies (examined in detail in the next section of this paper), exploit one of the emerging technologies – blockchain – (considered earlier in this paper) through which transactions are registered on a publicly distributed ledger network (or decentralised network) with the aid of cryptography and algorithms which prevent, to a large extent, the possibility of cyber threats and platform instability. While the blockchain system has made digital currencies an appealing payment alternative due to the gains of (almost) complete disintermediation and promotion of faster P2P transactions, the majority of cyber insecurities within cryptocurrencies originate from attacks within online digital currency wallet providers with far-reaching implications for digital wallet users who most times lose all or most of their digital currencies stored on the platforms as a result of the attack (Awrey and van Zwieten, 2017). This situation is exacerbated by the fact that digital currency wallet providers are not construed as deposit-taking institutions that may benefit from deposit guarantee schemes by central banks, insolvency resolutions, and support in the event of their failure (Awrey and van Zwieten, 2017).

There are several scholarly discourses on potential ways to regulate digital payments' cyber security risks. Still, the recent activities of China, which consider major TechFins as systemically important institutions within Asia and the Pacific, are worthy of mention (Zhou, Arner, and Buckley, 2018). In fact, these regulatory considerations within the country have resulted in a decline in credit volumes by the technology entrants, demonstrating the limiting impact of regulatory interventions on financial innovation and growth. Despite their potential and sporadic growth, BigTech firms are not yet considered globally significant financial institutions (G-SIFIs) worthy of the extra layer of financial regulation in most economies. While this ensures that financial innovation is not smothered with extreme regulatory measures, it exposes the broader financial market to systemic risks from interconnections (Buckley and others, 2020). One of the ways that FinTech has grown sporadically is through collaborations with traditional payment and financial services providers through their activities as third-party providers and outsourcing agents contracted by TFIs to reduce the operational costs of carrying out front- and back-end activities themselves, amidst the plethora of regulatory requirements and attendant costs and delays.

Some tech giants in recent times are not merely collaborating with TFIs but now leveraging their goodwill by holding high stakes within the incumbent's equities. The immediate implication is that it creates a growing entity that is capable of becoming too-big-to-fail and thus adversely affecting the traditional financial market infrastructure should there be a disruption of the activities within the BigTech players (reputational risks), causing an urgent withdrawal of equities in the incumbents (Buckley and others, 2020). To ameliorate this, the Chinese government recently passed a law to limit the amount of equity interest that BigTech firms (such as the Ant Group) may possess within Chinese financial institutions to insulate them from the cross-pollination of risks and market failures of the new entrants' platforms (Zhu, 2021).

Another notable regulatory development in APAC on BigTech and the risks of cyber security disruptions revolves around the requirements for deposit reserves by the new entrants with the central banks to guarantee liquidity and protect consumers in the event of a market shock or failure. The People's Bank of China has regulations that require significant non-banks and payment services providers, such as Tencent and Ant Group, to have 100 per cent reserve requirements of their client's balances at all times. While this step is admirable, it remains to be seen within which global jurisdictions this policy initiative will be replicated.

Data Privacy and Consumer Protection

Consumer protection is one of the primary purposes of regulatory theories, whether micro or macroprudential. With the interconnectedness of global payment systems brought about by globalisation and advancement in technology, the need to guarantee consumer safety within the financial market infrastructure has become a top priority among domestic and international policymakers (Buckley and others, 2020).

Financial technology providers and BigTech have gained a considerable advantage from economies of scale and scope from their abilities to harness consumer data harvested from their primary platforms in e-commerce, telecommunications, social networking, and advertising, and then exploiting the same to render tailored financial services to consumers with relative flexibility compared to traditional payment service providers (Buckley and others, 2020). However, the largely unregulated activities of these new entrants increase the risks of data manipulations and breaches of privacy, which may promote financial crimes, challenge market integrity, and systematically affect the financial stability of the payments and financial system (Trakman, Walters and Zeller, 2020). Traditional regulatory measures for compliance and supervision of financial and payment institutions – particularly banks – are inefficient in dealing with the largely cloud-based solutions offered by newer entrants to the financial markets.

The potential for data monopolies by new entrants and manipulations continues to rise despite efforts by legacy systems' regulators to evolve and manage these exposures. In response, some jurisdictions, such as the European Union, have enacted extensive data privacy laws (e.g., General Data Protection Regulation (GDPR)) that are applicable to all entities, including those in FinTech and BigTech, involved in activities that overlap with individual privacy rights and big data analytics (Trakman, Walters, and Zeller, 2020). Similarly, Indonesia enacted the Data Privacy Act which is intended to protect consumer privacy within its financial system in a similar fashion to the General Data Protection Regulation (GDPR). The efficacy of this law is beyond the scope of this paper. However, it is worthy to note that it is a development with global implications, both because of its extraterritorial impact as well as its place in framing and leading policy discussions on data protection and privacy across APAC and around the world.

To understand the extent of data harvested by financial technology providers, countries have adopted several regulatory approaches to understand their activities with the aim of adequately managing their risks without stifling financial innovations. These approaches include the use of regulatory sandboxes and new open banking initiatives (World Bank and CPMI, 2020). Attempts by governments to encourage digital payments through a public-private partnership are underway in several jurisdictions, particularly in the evolutionary trends of CBDCs for which China and other transitioning economies within APAC are key players. The next section of this paper will elucidate further on this and make defensible deductions on the effects that this may have on the role of digital payments on sustainable finance and SDG realization

6. The Next Frontier: Central Bank Digital Currencies

This section examines the evolution of a new breed of payment instruments that are significantly different from traditional payment methods because they will be government-issued like conventional banknotes, but digital. Unlike the known payment instruments, such as cheques, cash, and coins; credit transfers and debit cards; contactless card payments and e-money; that all have issuers, either public or private financial institutions, digital currencies are fundamentally different. These currencies are not issued by a central bank or financial institutions; instead, most (particularly Bitcoin, which is the most popular) operate within a decentralized network. “At the most basic level cryptocurrency, digital currency or virtual currency is a medium of exchange that functions like money (in that it can be exchanged for goods and services) but, unlike traditional currency, is untethered to, and independent from, national borders, central banks, sovereigns, or fiats” (Maese and others, 2016, pp. 468).

The decentralized network upon which they operate may be non-permissioned or permissioned. In the former, access to the distributed ledger network is unrestricted, and all members are permitted to make changes to the ledger and are subject to verification by others (an instructive example is Bitcoin). However, in the latter, usually centralised ledgers, alteration of the ledger is limited to the central authority or members with the right of access, with the only information accessible to members of the public being the information that is recorded and that cannot be subject to alteration (an instructive example is Ethereum, or the proposed Facebook Diem).

The emergence of disintermediation and control by free market forces of private payment platforms and payment instruments, such as cryptocurrencies and stablecoins, witnessed in recent times is not without precedent in the history of money, banking, payments, or finance (BIS, 2020). In fact, it is closely linked to the origin of the critical roles that central banks now play in payment and financial systems within the two-tiered monetary system as issuer of payment instruments, lender of last resort to financial institutions, and guarantor of finality of payment transactions. The last function is performed through the ‘legal tender’ status it confers on traditional payment instruments. To understand the scope of new digital currencies, we refer briefly to the evolution of central bank issued payment instruments and thereafter examine the peculiarities of new cryptocurrencies and stablecoins, their benefits and limitations, as well as reactions from central banks around the world, particularly in relation to the initiatives towards developing Central Bank-issued digital currencies (CBDCs).

Free Banking and Digital Currencies

To appreciate the concerns of central bankers and policymakers about the potential risks of leaving the regulation of payment systems and payment instruments to free market forces controlled by

competitiveness and the goodwill of financial institutions, it is useful to concisely examine the period of free banking globally during the 18th and 19th centuries before the popularity of central banking and their roles in payment system stability and consumer protection which started in the 20th century (Bodenhorn, 2002).

Free banking may broadly be described as the monetary system or model financial arrangement where participating banks are licenced to issue their own currencies (e.g., bank notes which were first developed in China centuries before that) (Orrell and Chlupatý, 2016) backed by the institution's assets and/or reserves in exchange commodities (gold, silver, and other precious metals), or, where circumstances permit, currencies issued by other partnering financial institutions with which they have existing monetary exchange arrangements, usually at par (Mishkin, 2016). Another distinguishing feature of this monetary arrangement is that despite their rights to currency issuance, the banks are not subjected to extra regulatory requirements, save those applicable to all enterprises. They were instead allowed to reign free in an environment where the powers of central banks as 'lender of last resort' were either non-existent, limited, or completely frozen. They operated in an environment of stiff competition among themselves, with market forces playing critical roles in controlling the supply of banknotes and the level of deposits supported by the institution's reserve (Bodenhorn, 2002).

In today's monetary arrangements, where both public and private institutions play a critical role and the power to issue money is vested in central banks (BIS, 2020), the closest arrangement to the free banking period is observed within the configurations of cryptocurrencies and stablecoins (World Bank and CMPI, 2020b). Like the financial institutions within the free banking period, they issue currencies independently and are not subject to the complex regulatory framework applicable to traditional deposit-taking financial institutions. As such, the risk potentials of cryptocurrencies (Brummer, 2019) and stablecoins (BIS, 2019b) are similar to those that arose during the free banking period. A major challenge of free banking was that small financial institutions with little reserves to compete with their larger counterparts were often forced to go out of business. With no existing bankruptcy laws, liquidity schemes, and deposit insurance arrangements which exist today, the inevitable collapse of the weak banks due to the activities of market forces, strong and sometimes unfair competition, and lack of necessary deposit insurance and guarantee schemes resulted in financial instability, loss of market integrity, and substantial losses of consumer wealth.

Unlike free banking, however, cryptocurrencies are a form of digital currency that is not issued by a specific financial institution (Brummer, 2019). They operate anonymously through decentralized network nodes and through which payment arrangements are initiated and completed using complex algorithms solved on an open-source distributed ledger network using cryptography without the need for an intermediary. The transactions, which are recorded on the ledger and acknowledged by all the nodes on the network, constitute a blockchain. The peer-to-peer payment style of the privately issued currency, which is not backed by any commodity, asset, or central bank guarantee, relies on market forces and the trust of its users in determining its price. Cryptocurrencies include Bitcoin, which was the very first of the tokenised payment instruments and others such as Ethereum. Due to their payment processing using emerging technologies like blockchain and without the necessity of intermediation for issuance or transfers, payments are initiated remotely from any part of the world over the P2P online network (Animashaun, 2019). Regulators are therefore unable to regulate the activities over the network because it lacks any physical infrastructure to which the many entity-based regulations may apply.

The immediate benefits of the disintermediated processing of payments through blockchain are faster, cheaper, and more efficient payments cycles, even for cross-border transactions. However, there are two principal concerns with cryptocurrencies. First, the lack of regulation and heavy reliance on technology leaves the payment instruments, and indeed its payment system (and entities providing online storage for the users) at risk of cyber threats, which often result in substantial or even total loss of the digital currencies (Awrey and van Zwieten, 2017). The second demerit relates to the volatility of cryptocurrencies since their stability is not decided by issuers or pegged to other assets outside the network like fiat currencies issued by banks, commodity assets (e.g., gold), or even the assets of the issuing institution, assuming one existed. While the demography of users is considerably small (but growing) compared to legacy payment instruments, the potential risks of cryptocurrencies, particularly to consumer protection and financial crimes (AML/CFT), have been a cause for concern for regulators despite their many payment advantages.

New breeds of cryptocurrencies, called stablecoins (e.g., Tether), later emerged with several characteristics that attempt to ameliorate the principal concerns surrounding cryptocurrencies, particularly their price volatility (BIS, 2019b). Stablecoins are either pegged to a fiat currency (or a basket of currencies) which determines their price at every point, a commodity asset (e.g., gold, silver), or are determined by the issuer (or their background algorithm). Due to their relative stability, stablecoins have gathered wider user acceptability, making them a viable option for domestic and cross-border payments. However, like cryptocurrencies, stablecoins lack the traditional safeguards of central banks in the event of market failures or bankruptcy of the issuer. Also, their acceptability is subject to participation within a closed-loop platform. As such, they are not readily acceptable by merchants, a significant driver of financial inclusion for low-income and vulnerable groups. The concerns of global regulators and policymakers about stablecoins are more evident in perhaps the most topical stablecoin – Libra, now renamed Diem – due to be launched by a global tech giant, Facebook, as an integral part of its technology-enabled payment system to be managed by a group of private actors in different techno-finance sectors. The payment system will be accessible to all users of Facebook's integrated platforms across the globe (Zetsche, Buckley and Arner, 2019).

This proposed stablecoin is a digital currency with a permissioned payment system, in which Facebook is responsible for its issuance, maintenance, and the management of payments processed by individuals and connected merchants across its platforms. While the initiative is laudable for accommodating higher demography of unbanked and underserved populations, it carries substantial risks to consumer protection due to its operations outside of the regulatory perimeter applicable to traditional deposit-taking institutions and payment system providers (Zetsche, Buckley and Arner, 2019). There are also concerns about consumer data privacy, data monopolization and manipulation, and horizontal interoperability and competitiveness with other similar platforms. Further still, there are fears that if stablecoins take hold, they could result in a currency substitution and financial instability to the extent that TFIs may lose deposits, thus impacting their ability to provide credit and liquidity within the broader financial market. In response, many jurisdictions have voiced their concerns and plan stiff regulatory approaches to combat the likely exposures when the stablecoin is launched.

As a response to the several activities on digital payments and innovative payment instruments, there is a growing reaction from central banks across advanced economies and even developing countries to harness the technological advantages featured in these novel payment system instruments and arrangements. This aims to ensure sustainable finance and promote financial inclusion, particularly within their domestic financial market infrastructures. The prominent initiative

on payment systems led by the government, aside the many state-owned payment platforms, relate to the development (or active consideration) of a central bank-issued digital currency (CBDC) to promote a more efficient way for payments among domestic end users, and facilitate cross-border payments with interconnected economies (World Bank and CMPI, 2020b).

CBDCs: Prospects and Limitations

Beside the developments in digital payments, perhaps the most notable of government-led initiatives on the promotion of financial inclusion and access to finance for the unbanked or underbanked is the initiatives on CBDCs. In fact, the several design models under active consideration may potentially revolutionise how MSMEs may access finance from traditional lending institutions (due to higher digitisation and interoperability) and new financial access points (the likely explosive growth rate that will result from increased financial inclusion and digital economic activities).

Broadly, CBDCs are digital monies with all the qualities of banknotes, except the tangibility (Geva, Grunewald and Zellweger-Gutknecht, 2021). They are issued by central banks as legal tender to be used as a means of payment and store of value which makes them acceptable by operation of law within the issuing territories (or other territories subject to special arrangements) as instruments for the settlement of debts (Arner and others, 2020b). While the majority of CBDCs are still at the pilot or developmental stage, save the CBDC launched in 2020 by the Bahamas and perhaps the tests of digital yuan by China (KrASIA, 2021) and e-Naira by Nigeria, it is expected that the operating network upon which the payment instruments will be based will rely critically on blockchain and DLT. This is unlike the decentralised blockchain model used in cryptocurrencies; CBDCs will instead employ a permissioned model managed by the government, similar to how stablecoins are managed by private issuers. Also, unlike cryptocurrencies which operate through decentralised networks with no asset backing, or stablecoins backed by fiat currencies or assets determined by private issuers, the holders of CBDCs will have a direct claim to the central bank's reserve. Its issuance, pricing, and volatility will be managed by central banks through their extensive monetary policies, alongside bank notes, coins, and other central bank issued payment instruments (Arner and others, 2020b).

The results from a survey by the Bank for International Settlements (BIS) on global developmental trends and initiatives on CBDCs demonstrate that the government-issued payment instrument may hold the key to achieving sustainable finance and other SDGs within advanced economies and developing countries (Boar and Wehrli, 2021). According to the survey, about 86 per cent of central bankers are actively researching or developing CBDCs, although the type of CBDCs and motivation varies with other variables, including the economic status of the jurisdictions and the level of technological and financial systems' advancement. The primary motivations for CBDC development, which align with the actualisation of sustainable finance from the global survey of major central banks, include the promotion of financial inclusion within the domestic financial system (including individuals and MSMEs), financial stability, and payment systems' efficiency and safety (Boar and Wehrli, 2021). Other rationales for the widespread consideration of CBDCs which align with the paper's focus include: the provision of a digital payment instrument to complement the growing trend in the digitisation of finance and alternatives to traditional payment instruments (cash) and functionalities; increasing revenue generation from seigniorage made possible from harnessing the development in technology; increasing revenue generation and access to finance for unbanked populations (especially MSMEs owned by vulnerable groups); achieving better monetary

policies that align with modern global sustainability trends; and interlinking payment systems with digital identity requirements within an increasingly digital economy.

These motivations are critical to ameliorating the regulatory challenges highlighted earlier in this paper, particularly on access to finance (including digital infrastructure, interoperability, and digital identity) and regulations (consumer protection, data privacy, and financial crimes). Through the CBDC initiative, regulators are put in a vantage position to provide for a larger proportion of their population within the economy (including MSMEs) through a payment instrument that complements and competes with the privately-owned digital payment options. There is also the benefit of interoperability and network effects which come with the backing of the central banks that render the digital currencies legal tender.

The advantages of CBDCs over stablecoins relate to their redeemability and finality. Although both operate through permissioned payment systems (private vs public), the redeemability of stablecoins is largely dependent upon the viability of the private financial institution that issued them (e.g., Facebook Diem). By implication, any risk to the private financial institution threatens severe consequences for the users of the payment instruments and the integrated payment systems since the stablecoins are not backed by a central government that guarantees deposit schemes and ensures finality from its use as a means of exchange or settlement of debt. Conversely, CBDCs are backed by central banks' reserve and other sovereign assets threats to their redeemability are unlikely.

The pressing question is whether CBDCs are to be used for promoting financial inclusion within specific domestic economies alone. Or whether the application should be extended to promote cross-border payments among multiple jurisdictions, in which case it will also be used by financial institutions in interbank clearing and settlements and wholesale payments. The latter thought is particularly important for the Asia-Pacific region which contributes substantially to global revenue from cross-border retail payments and international remittances. If CBDCs are applied to cross-border payments, the revenue from seigniorage and international remittances will have great impact on the financing of the SDGs due to the disintermediation of correspondent banks and processing costs. It is worthy to reiterate that the levels of technological advancement and economic status of the countries within APAC vary: while there are global innovators who are front-runners in digital payments and digital finance, such as China, India, Korea (the Republic of), Australia, Japan, Singapore, and Hong Kong, China the region also includes developing economies like Thailand, Indonesia, Philippines, Lao People's Democratic Republic, and Cambodia, to name the most prominent, who require progressive government interventions to promote financial inclusion and eradicate poverty, especially after the COVID-19 pandemic. It is proposed that the leveraging of agent-assisted transactions through digitisation and financing of MSMEs may offer workable sustainable developments in the latter group. In fact, the background agent networks already exist in almost all of the developing economies within the region.

A BIS survey identified two types of CBDCs in different stages of development and their motivations. The report suggests that, on one hand, advanced economies are particularly inclined to promote payment safety and efficiency through retail and wholesale CBDCs (BIS, 2021). On the other hand, developing countries are particularly interested in applying innovative payment instruments (digital cash) in the promotion of financial inclusion and payment safety and efficiency among their population in an increasingly digitised economy. The distinguishing feature between retail and wholesale CBDCs applies essentially to the target group of its issuance and use: while retail CBDCs (also called 'general purpose') are issued for end-users like households and

individuals, wholesale CBDCs are to be used for large volume payment transactions, typically between financial institutions and/or cross-border interbank payments. It will appear from this distinction that CBDCs are unlikely to cure the heterogeneity of digital payments and instruments within APAC: while global innovators may be inclined to explore wholesale CBDCs, it is hard to see the immediate motivation of the developing economies to consider this type. However, regional arrangements may prove beneficial in how the new payment instruments may promote a more unified development and wealth distribution within the region. For instance, several cross-border initiatives and CBDC joint projects are under active consideration within jurisdictions in the region. Through these initiatives, digitisation and wealth distribution may extend to interconnected jurisdictions within the regional arrangements (Auer, Haene and Holden, 2021). This is made particularly possible by the advantages of blockchain in resolving issues of payments clearing settlement across multiple jurisdictions in real-time through the joint access to the distributed ledger network.

Potential Limitations and the Way Forward

CBDCs are still at different stages of development and many questions remain, including the legal capacity of central bankers to issue digital cash and legislative hurdles to existing policies; CBDCs' efficiency in the face of constantly evolving privately issued digital currencies and other private digital payments solutions; and interoperability across multiple jurisdictions in promoting retail and wholesale cross-border payments. To tackle issues affecting the realisation of global goals, particularly poverty eradication, gender equality, and financial inclusion achievable through MSME finance, policymakers and stakeholders must collaborate to promote inclusive initiatives that are capable of benefitting the population without exposing the economy to increased risks of instability. Presently, the scope should extend to the possible limitations of CBDCs and their intended objectives. This will likely prepare all stakeholders on how to adjust and benefit from the many prospects.

The design that most CBDCs will adopt is still largely unknown but greater attention is on the benefits of DLT variants of blockchain through which most transactions may be recorded automatically to central ledgers operated by the central banks with transactions facilitated by private intermediaries (Geva, Grunewald and Zellweger-Gutknecht, 2021). The alternative models include hybrid systems where central banks or private actors are primary operators of the new payment systems, the efficiency and likely disruptions in these models are beyond the scope of this paper but considered elsewhere (Geva, Grunewald and Zellweger-Gutknecht, 2021). With constantly growing digital payment options by private actors, how does the CBDC hope to compete with the constant financial innovation to ensure that efforts towards financial inclusion and payment systems' efficiency are not short-lived? Should regulations be made so strict to encourage the popularity of publicly issued digital cash over its private counterparts? If yes, will this result in systemic clog to financial innovation and competition, thus negating the two-tier monetary system practiced in major financial systems? It appears that there may be a rare opportunity for a symbiotic relationship between CBDCs and other digital payment instruments, particularly stablecoins. This will likely be leveraged through the creation of interoperable CBDC designs that will build on existing public-private partnerships within the intermediary-based global payments architecture. For MSME finance, this will likely result in greater opportunity for growth through access to funds made available within the likely collaborations.

To reiterate, stablecoins are pegged to fiat currency or commodity exchange assets to which they are redeemable. This feature alleviates consumers' fear of volatility and risks of loss of the token's

capacity as a store of value. However, the significant risk on interoperability of the payment instrument across multiple platforms remains, except where there is a public-private partnership through which stablecoins may be redeemed by publicly issued assets, like CBDCs, in which case, the payment instruments will become interoperable. The indirect link to a central bank-backed asset will foster acceptance across different payment platforms. The immediate implication of this trend on financial inclusion and other SDGs will be obvious from the universality of acceptance as it will promote not only increased usage among end-users but also MSMEs who are critical to the 'last mile' access to finance for vulnerable groups and persons in remote areas. In fact, social benefits, government stimulus, and other aids may be directed to deserving MSMEs when circumstances require the same, thus eradicating the need for reliance on already depleted personal resources as the favoured finance option due to the complexity of conventional credit applications and access. The interoperability also cures the clog of digital identity since equivalent authentication mechanisms may be developed through public-private partnerships.

On the second and perhaps the most critical of the limitations on the application of the payment instrument for cross-border payment and international remittances, several ancillary issues arise. For example, the determination of fiat currency or commodity-asset to which the CBDCs will be pegged during the cross-border payments, and the interoperability of the payment instrument among multiple jurisdictions to enable it to compete with other innovative digital payments developed by the private actors. From recent findings, there appears to be a growing initiative between several jurisdictions to develop jointly operable platforms for cross-border payments and remittances. Examples of these initiatives include: Project "Stella" by the European Central Bank and the Bank of Japan; Project "Jasper- Ubin" by the Bank of Canada and the Monetary Authority of Singapore; Project "Inthanon-LionRock" by the Hong Kong Monetary Authority and the Bank of Thailand; and Project "Aber" by the Saudi Arabian Monetary Authority and the Central Bank of the United Arab Emirates (Boar and Wehrli, 2021). It is hoped that these initiatives will expand to give meaningful growth to the application of CBDCs, particularly in retail payments through which a greater prospect of financial inclusion and payment system efficiency may be achieved in the near future. Of course, the wholesale payments system can take more considerable efforts to determine a long-term approach to sustainable development and access to finance not only in designated economies, but also across the interconnected global payment systems network more broadly.

7. Conclusion

Technology has demonstrated its potential to transform money, payments, and finance within a growing social digital transformation. While key stakeholders focus on building public infrastructure to enable faster transition towards digital economies, it is important to look inward and leverage the available developmental options that may benefit the actualisation of sustainable development goals with minimal adverse financial and economic implications. MSMEs provide the necessary pedestal to reach a larger population of unbanked and underserved segments necessary for broader financial inclusion and inclusive economic development. If this is acknowledged, ensuring their sustainability through the provision of adequate support and finance must be at the core of present policy considerations to benefit this critical group and the extended population they provide for. Ultimately, the COVID-19 implications have paradoxically presented an important opportunity for policymakers and key stakeholders to harness the existing factors surrounding individual economies in recalibrating their present and long-term recovery efforts to ensure a more resilient and inclusive economy that caters to not just the privileged, but also the neglected.

References

- Abe, Masato, and others (2012). Policy Guidebook for SME Development in Asia and the Pacific. Bangkok: ESCAP. Available at <https://www.unescap.org/resources/policy-guidebook-sme-development-asia-and-pacific>.
- Abe, Masato, Michael Troilo, and Orgil Batsaikhan (2015). Financing Small and Medium Enterprises in Asia and the Pacific. *Journal of Entrepreneurship and Public Policy*, vol. 4, No. 1, pp. 2-32.
- Abe, Masato, Nick Freeman, and Mike Troilo (2021). Rethinking MSME Finance in Asia and the Pacific: A Post-Crisis Policy Agenda. Bangkok: ESCAP. Available at <https://www.unescap.org/kp/2021/rethinking-msme-finance-asia-and-pacific-post-crisis-policy-agenda>.
- Aldasoro, Iñaki, Wenqian Huang, and Esti Kemp (2020). Cross-border links between banks and non-bank financial institutions. *BIS Quarterly Review*. Available at https://www.bis.org/publ/qtrpdf/r_qt2009e.htm.
- Alizila (2020). Daniel Zhang Shares New Relief Initiatives for SMEs, 7 April. Available at <https://www.alizila.com/daniel-zhang-shares-new-relief-initiatives-for-smes/>.
- Alt, Rainer, Roman Beck, and Martin Smits (2018). FinTech and the transformation of the financial industry. *Electronic markets*, vol. 28, No. 3, pp. 235–243. Available at <https://link.springer.com/article/10.1007/s12525-018-0310-9>.
- Animashaun, Sijuade (2019). Regulating Virtual Currency Payment Systems. *Cambridge Law Review* vol. IV, No. 2, pp. 29-67. Available at <https://ssrn.com/abstract=3835762>.
- Ant Group (2020). IPO Prospectus. Available at <https://www1.hkexnews.hk/listedco/listconews/sehk/2020/1026/2020102600165.pdf>.
- Armour, John, and others (2016). Principles of Financial Regulation. Oxford University Press.
- Arner, Douglas W., and others (2016). The evolution of FinTech: A new post-crisis paradigm? *Georgetown Journal of International Law*, vol. 47, No. 4, pp. 1345-1393.
- _____ (2017). FinTech, RegTech, and the Reconceptualization of Financial Regulation. *Northwestern Journal of International Law & Business*, vol. 37, No. 3. Available at <https://scholarlycommons.law.northwestern.edu/cgi/viewcontent.cgi?article=1817&context=njilb>.
- _____ (2020a). Digital Finance & the COVID-19 Crisis. University of Hong Kong Faculty of Law Research Paper, No. 2020/017. Available at <https://ssrn.com/abstract=3558889>.
- _____ (2020b). The Future of Data-Driven Finance and RegTech: Lessons from EU Big Bang II. *Stanford Journal of Law, Business & Finance*, vol. 25, No. 2, pp. 245–288.
- Arner, Douglas W., Janos Barberis, and Ross P. Buckley (2015). The Evolution of FinTech: A New Post-Crisis Paradigm? University of Hong Kong Faculty of Law Research Paper, No. 2015/047, UNSW Law Research Paper, No. 2016-62. Available at <https://ssrn.com/abstract=2676553>.

- Asian Development Bank (2017). Accelerating Financial Inclusion In South-East Asia With Digital Finance. Available at <https://www.adb.org/sites/default/files/publication/222061/financial-inclusion-se-asia.pdf>.
- _____ (2020a). Asia Small and Medium-sized Enterprise Monitor 2020 Volume I: Country and Regional Reviews. Manila: ADB. Available at <http://dx.doi.org/10.22617/TCS200290-2>.
- _____ (2020b). Asia Small and Medium-sized Enterprise Monitor 2020 Volume II: COVID-19 Impact on Micro, Small, and Medium-Sized Enterprises in Developing Asia. Manila: ADB. Available at <http://dx.doi.org/10.22617/TCS200311-2>.
- Auer, Raphael, Philipp Haene, and Henry Holden (2021). Multi-CBDC arrangements and the future of cross-border payments. BIS Papers, No. 115. Available at <https://www.bis.org/publ/bppdf/bispap115.pdf>.
- Awrey, Dan, and Kristin Van Zwieten. (2017). The Shadow Payment System. *The Journal of Corporation Law*, vol. 43, No. 4, pp. 775–816.
- _____ (2019). Mapping the Shadow Payment System. SWIFT Institute Working Paper, No. 2019-001, Cornell Legal Studies Research Paper, No.19-44, Oxford Legal Studies Research Paper No. 55/2019. Available at <https://ssrn.com/abstract=3462351>.
- Bank for International Settlements (1997). Real-Time Gross Settlement Systems. Available at <https://www.bis.org/cpmi/publ/d22.pdf>.
- _____ (2019a) III. Big tech in finance: opportunities and risks. BIS Annual Economic Report 2019. Available at <https://www.bis.org/publ/arpdf/ar2019e3.pdf>.
- _____ (2019b). Investigating the impact of global stablecoins. G7 Working Group on Stablecoins. Available at <https://www.bis.org/cpmi/publ/d187.pdf>.
- _____ (2021). Central bank digital currencies: executive summary. Available at <https://www.bis.org/publ/othp42.pdf>.
- Boar, Codruta, and Andreas Wehrli (2021). Ready, steady, go? – Results of the third BIS survey on central bank digital currency. BIS Papers, No. 114. Available at <https://www.bis.org/publ/bppdf/bispap114.pdf>.
- Bodenhorn, Howard (2002). Free Banking. In *State Banking in Early America*. Oxford University Press.
- Brummer, Chris (2019). Cryptoassets: Legal, Regulatory, and Monetary Perspectives. Oxford University Press.
- Brunnermeier, Markus K., Harold James and Jean-Pierre Landau (2019). The Digitalization of Money. Available at https://scholar.princeton.edu/sites/default/files/markus/files/O2c_digitalmoney.pdf.
- Buckley, Ross P., and others (2019). The Dark Side of Digital Financial Transformation: The New Risks of FinTech and the Rise of TechRisk. UNSW Law Research Paper, No. 19-89, European Banking Institute Working Paper, No. 2019/54, University of Luxembourg Law Working Paper, No. 2019-009, University of Hong Kong Faculty of Law Research Paper, No.

- 2019/112, Singapore Journal of Legal Studies (Forthcoming), Available at <https://ssrn.com/abstract=3478640>.
- _____ (2020). Techrisk. *Singapore Journal of Legal Studies*, Mar. 2020, pp. 35-62.
- Business Wire (2019). MYbank Works With Financial Institution Partners to Serve Over 15 Million SMEs, 24 June. Available at <https://www.businesswire.com/news/home/20190623005055/en/MYbank-Works-With-Financial-Institution-Partners-to-Serve-Over-15-Million-SMEs>.
- CGPA (2019). China: A Digital Payments Revolution. Available at <https://www.cgap.org/research/publication/china-digital-payments-revolution>.
- Chen, Greg, and Rafe Mazer (2016). Instant, Automated, Remote: The Key Attributes of Digital Credit. CGAP Blog, 8 February. Available at <https://www.cgap.org/blog/instant-automated-remote-key-attributes-digital-credit>.
- Chuard, Max (2020). Cloud and SaaS technology can drive inclusive banking. World Economic Forum, 10 December. Available at <https://www.weforum.org/agenda/2020/12/cloud-and-saas-technology-can-drive-inclusive-banking>.
- Cook, Tamara, and Claudia McKay (2015). How M-Shwari Works: The Story So Far. CGAP & FSD Kenya Access to Finance Forum, No.10. Available at <https://www.cgap.org/research/publication/how-m-shwari-works-story-so-far>.
- Cornelli, Giulio, and others (2020). Fintech and big tech credit: a new database. BIS Working Paper, No.887. Available at <https://www.bis.org/publ/work887.pdf>.
- Enriques, Luca, and Wolf-Georg Ringe (2020). Bank–FinTech partnerships, outsourcing arrangements and the case for a mentorship regime. *Capital Markets Law Journal*, vol. 15, No. 4, pp. 374–397.
- European Commission (n.d.). What is digital finance?. Available at https://ec.europa.eu/info/business-economy-euro/banking-and-finance/digital-finance_en.
- Fenwick, Mark, Steven Van Uytsel, and Bi Ying (2020). Regulating FinTech in Asia: Global Context, Local Perspectives. Available at <https://doi.org/10.1007/978-981-15-5819-1>.
- Financial Stability Board (2019): FinTech and market structure in financial services – Market developments and potential financial stability implications. Available at <https://www.fsb.org/wp-content/uploads/P140219.pdf>.
- FinScope (2015). Consumer Survey Highlights. Available at <https://finmark.org.za/system/documents/files/000/000/464/original/finscope-cambodia-pocket-guide.pdf?1615192894>.
- Freeman, Nick (2015). Financing Small and Medium Sized Enterprises for Sustainable Development: A View from the Asia-Pacific Region. United Nations Economic and Social Commission for Asia and the Pacific MPDD Working Paper, No. WP/15/05. Available at <https://www.unescap.org/resources/financing-small-and-medium-sized-enterprises-sustainable-development-view-asia-pacific>.

- FSDAfrica (2015). The growth of m-shwari in Kenya – a market development story. Available at <https://www.fsdafrica.org/publication/the-growth-of-m-shwari-in-kenya-a-market-development-story/>.
- Ganne, Emmanuel, and Kathryn Lundquist (2019). The digital economy, GVCs and SMEs. In *Technological Innovation, Supply Chain Trade, And Workers In A Globalized World*. Available at <https://www.oecd.org/dev/Global-Value-Chain-Development-Report-2019-Technological-Innovation-Supply-Chain-Trade-and-Workers-in-a-Globalized-World.pdf>.
- Gartner (n.d.). Gartner Glossary – Digitalization. Available at <https://www.gartner.com/en/information-technology/glossary/digitalization>.
- Geva, Benjamin, Seraina Neva Grunewald, and Corinne Zellweger-Gutknecht (2021). The e-Banknote as a ‘Banknote’: A Monetary Law Interpreted. *Oxford Journal of Legal Studies*, vol. 41, No. 4, pp. 1119–1148.
- Hossain, Monzur; Naoyuki Yoshino, and Farhad Taghizadeh-Hesary (2018). Local financial development, access to credit and SMEs’ performance: Evidence from Bangladesh. ADBI Working Paper Series, No.906. Tokyo: ADB Institute. Available at <https://www.adb.org/publications/local-financial-development-access-credit-smes-performance-bangladesh>.
- Hove, Leo V., and Antoine Dubus (2019). M-PESA and Financial Inclusion in Kenya: Of Paying Comes Saving?. *Sustainability*, vol. 11, No. 3, pp. 568. Available at <https://doi.org/10.3390/su11030568>.
- International Finance Corporation (2012). Interpretation Note on Small and Medium Enterprises and Environmental and Social Risk Management. Available at https://www.ifc.org/wps/wcm/connect/b8f8dde7-893b-4809-873c-0c825f0284ef/InterpretationNote_SME_2012.pdf?MOD=AJPERES&CVID=mUtZ1j.
- _____ (2017). MSME Finance Gap: Assessment of the Shortfalls and Opportunities in Financing Micro, Small, and Medium Enterprises in Emerging Markets. Available at <https://www.ifc.org/wps/wcm/connect/03522e90-a13d-4a02-87cd-9ee9a297b311/121264-WP-PUBLIC-MSMEReportFINAL.pdf?MOD=AJPERES&CVID=m5SwAQA>.
- _____ (2020). Crowdsourcing the Future of SME Financing. 2020 Global SME Finance Forum. Available at <https://www.ifc.org/wps/wcm/connect/cff29f7-5114-49ce-8993-62e77b588c1d/2020-12-Call-for-Insights-E-publication.pdf?MOD=AJPERES&CVID=npOGOF->.
- International Finance Corporation and Global Partnership for Financial Inclusion (2011). Strengthening Access to Finance for Women-Owned SMEs in Developing Countries. Available at https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/publications/publications_report_accesstofinanceforwomensmes.
- International Labour Organization (2019). Small Matters: Global evidence on the contribution to employment by the self-employed, micro-enterprises and SMEs. Available at https://www.ilo.org/global/publications/books/WCMS_723282/lang--en/index.htm.

- International Labour Organization (2020a). ILO Monitor: COVID-19 and the world of work. Third edition -- Updated estimates and analysis. Geneva: International Labour Organization. Available at https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/briefingnote/wcms_743146.pdf.
- Jallouli, Rim, and others (2019). Digital Economy. Emerging Technologies and Business Innovation. 4th International Conference, ICDEc 2019, Beirut, Lebanon, April 15-18, 2019, Proceedings. Cham: Springer International Publishing.
- Jung, John H. H. (2019). RegTech And SupTech: the future of compliance. In *FinTech Law and Regulation*. Cheltenham: Edward Elgar Publishing.
- Kaja, Fatjon, and Edoardo D. Martino, and Alessio Maria Paces (2020). FinTech and The Law & Economics of Disintermediation. European Corporate Governance Institute - Law Working Paper, No. 540/2020, Amsterdam Law School Research Paper, No. 2020-67, Amsterdam Center for Law & Economics Working Paper, No. 2020-06. Available at <https://ssrn.com/abstract=3683427>.
- KrASIA (2021). China's digital yuan pilot tally reaches USD 5.3 billion in six months, 19 July. Available at <https://kr-asia.com/chinas-digital-yuan-pilot-tally-reaches-usd-5-3-billion-in-six-months>.
- Kourabas, Steve (2018). Equity Crowdfunding: A FinTech Story. FinTech. Australian FinTech. Available at <https://australianFinTech.com.au/equity-crowdfunding-FinTech-story/>.
- Kourabas, Steve, and Ian Ramsay (2018). Equity Crowdfunding in Australia and New Zealand. *International Company and Commercial Law Review*, vol. 29, No. 9, pp. 571-589. Available at <https://ssrn.com/abstract=3259664>.
- Lacka, Ewelina, Hing Kai Chan, and Nick Yip (2014). E-Commerce Platform Acceptance: Suppliers, Retailers, and Consumers. Cham: Springer International Publishing.
- Laos-Australia Development Learning Facility (2017). Are Rural People Gaining from Digital Financial Services in Lao PDR? An Analysis of Participation in BCEL Community Money Express (BCOME). Available at https://issuu.com/ladlf/docs/an_analysis_of_participation_in_bce.
- Li, Kai, and others (2020). How should we understand the digital economy in Asia? Critical assessment and research agenda. *Electronic Commerce Research and Applications*, vol. 44, No. 101004. Available at <https://doi.org/10.1016/j.elerap.2020.101004>.
- Libra Association Members (2020). White Paper. Available at https://wp.diem.com/en-US/wp-content/uploads/sites/23/2020/04/Libra_WhitePaperV2_April2020.pdf.
- Maese, Vivian A., and others (2016). Cryptocurrency: A Primer. *Banking Law Journal*, vol. 133, pp. 468-471.
- Manyika, James, and others (2016). Digital finance for all: Powering inclusive growth in emerging economies. McKinsey & Company. Available at <https://www.mckinsey.com/~media/mckinsey/featured%20insights/Employment%20and%20Growth/How%20digital%20finance%20could%20boost%20growth%20in%20emerging%20economies/MGI-Digital-Finance-For-All-Executive-summary-September-2016.ashx>.

- Mbiti, Isaac M. and David N. Weil (2011). Mobile Banking: The Impact of M-Pesa in Kenya. NBER Working Paper, No. w17129. Available at https://www.nber.org/system/files/working_papers/w17129/w17129.pdf.
- Mime Asia (2021). Bukalapak and Tokopedia Record MSME Partner Transactions. Available at <https://www.mime.asia/bukalapak-and-tokopedia-record-msme-partner-transactions/>.
- Mishkin, Frederic S. (2016). The Economics of Money, Banking, and Financial Markets. Harlow: Pearson Education.
- Monetary Authority of Singapore (2020). Foundational digital infrastructures for inclusive digital economies. Available at <https://www.mas.gov.sg/-/media/MAS/FinTech/FDI/Foundational%20Digital%20Infrastructures%20for%20Inclusive%20Digital%20Economies.pdf>.
- Nair, Malavika, and Rahimat Emozozo (2018). Electronic Currency In Africa: M-Pesa As Private Inside Money. *Economic Affairs*, vol. 38, No. 2, pp. 197–206.
- Ndung'u, Njuguna (2017). M-Pesa - a success story of digital financial inclusion. Research and Practitioner's Insight. Available at <https://www.bsg.ox.ac.uk/sites/default/files/2018-06/2017-07-M-Pesa-Practitioners-Insight.pdf>.
- Official Monetary and Financial Institutions Forum (2020). Asia's Unmatched digital payments growth. Available at <https://www.omfif.org/2020/08/asias-unmatched-digital-payments-growth/>.
- Omidyar Network and BCG (2018). Credit Disrupted: Digital MSME Lending in India. Available at <https://omidyar.com/wp-content/uploads/2020/09/18-11-29-Report-Credit-Disrupted-Digital-FINAL.pdf>.
- Organisation for Economic Co-operation and Development (2008). Enhancing the Role of SMEs in Global Value Chains. Paris: OECD Publishing.
- Orrell, David, and Roman Chlupatý (2016). The Evolution of Money. New York: Columbia University Press.
- PayPal Inc. (2020). Digital Payments: Thinking beyond Transactions. APAC Research Report. Available at <https://www.paypalobjects.com/digitalassets/c/website/marketing/global/shared/global/media-resources/documents/PayPal-Asia-Research-Report-Digital-Payments.pdf>.
- Pickens, Mark, David Porteous, and Sarah Rotman (2009). Banking the Poor via G2P Payments Focus Note 58. Washington, D.C.: CGAP. Available at <https://www.cgap.org/research/publication/banking-poor-g2p-payments#:~:text=Providing%20poor%20G2P%20recipients%20with,economy%20as%20fuller%20economic%20citizens>.
- PricewaterhouseCoopers (2019). Indonesia's Fintech Lending: Driving Economic Growth Through Financial Inclusion. Available at <https://www.pwc.com/id/en/fintech/PwC-FintechLendingThoughtLeadership-ExecutiveSummary.pdf>.

- RBR (2020). RBR Press Release, 7 October. Available at https://www.rbrlondon.com/wp-content/uploads/2020/10/GC25_Press_Release_071020.pdf.
- Restoy, Fernando (2021). FinTech regulation: How to achieve a level playing field. BIS Financial Stability Institute Occasional Paper, No. 17. Available at <https://www.bis.org/fsi/fsipapers17.pdf>.
- Roy, Arundhati, B.C.M Patnaik, and Ipseeta Satpathy (2020). Impact of Covid-19 crisis on Indian MSME sector: A study on remedial measures. *Eurasian Chemical Communications*, vol. 2, No. 9. Available at http://www.echemcom.com/article_114672_30a8869837121fb49cbc07f661224202.pdf.
- Scott, Hal S. (2015). The Importance of the Retail Payment System. Retail Payment Systems Conference, Harvard Law School Program on International Financial Systems. Available at <http://nrs.harvard.edu/urn-3:HUL.InstRepos:16883011>.
- Singapore, Ministry of Manpower (2020). Report: Labour Market First Quarter 2020. Available at https://stats.mom.gov.sg/iMAS_PdfLibrary/mrsd-Labour-Market-Report-1Q-2020.pdf.
- Sivarajah, Uthayasankar, and others (2017). Critical analysis of Big Data challenges and analytical methods. *Journal of Business Research*, vol. 70, pp. 263-286. Available at <https://doi.org/10.1016/j.jbusres.2016.08.001>.
- Statista (n.d.). Digital Payments. Available at <https://www.statista.com/outlook/dmo/fintech/digital-payments/worldwide>.
- Tadjibaeva, Dildora (2019). Small and Medium-Sized Enterprise Finance in Uzbekistan: Challenges and Opportunities. ADBI Working Paper, No. 997. Available at <https://www.adb.org/publications/small-medium-sized-enterprise-finance-uzbekistan-challenges-opportunities>.
- Trakman, Leon, Robert Walters, and Bruno Zeller (2020). Digital Consent and Data Protection Law – Europe and Asia-Pacific Experience. UNSW Law Research Paper, No. 20-10. Available at <https://ssrn.com/abstract=3538860>.
- United Nations (2015). The Addis Ababa Action Agenda. Available at <https://sustainabledevelopment.un.org/index.php?page=view&type=400&nr=2051&menu=35>.
- United Nations (2018). Secretary-General's Strategy for Financing the 2030 Agenda for Sustainable Development (2018 – 2021). Available at https://www.un.org/sustainabledevelopment/wp-content/uploads/2018/09/Strategy-for-Financing-the-2030-Agenda_synopsis_17-Sep.pdf.
- United Nations Capital Development Fund (2021). Request for applications. Women Enterprise Recovery Fund. Available at <https://bit.ly/3cv1Cyz>.
- United Nations, Economic and Social Commission for Asia and the Pacific (2017). Small and Medium Enterprises Financing. Available at <https://www.unescap.org/sites/default/d8files/knowledge-products/Small%20and%20Medium%20Enterprises%20Financing.pdf>.

- _____ (2019). FinTech in the Pacific Island Countries: Challenges and Opportunities. MPFD Policy Brief, No.82.
- United Nations Inter-agency Task Force on Financing for Development (2020). Financing For Sustainable Development Report 2020. Available at https://developmentfinance.un.org/sites/developmentfinance.un.org/files/FSDR_2020.pdf.
- United Nations Secretary-General's Task Force on Digital Financing of the Sustainable Development Goals (2020). People's Money: Harnessing Digitalization to Finance a Sustainable Future. Available at <https://unsdg.un.org/sites/default/files/2020-08/DF-Task-Force-Full-Report-Aug-2020-1.pdf>.
- World Bank (2014). The Global Findex Database. Available at <https://globalfindex.worldbank.org/>.
- _____ (2020). Map of SME-Support Measures in Response to COVID-19. Available at <https://www.worldbank.org/en/data/interactive/2020/04/14/map-of-sme-support-measures-in-response-to-covid-19>.
- World Bank and Committee on Payments and Market Infrastructures (2016). Payment's aspects of financial inclusion. Available at <http://documents1.worldbank.org/curated/en/806481470154477031/pdf/107382-WP-REPLACEMENT-PUBLIC-PAFI-Report-final-in-A4.pdf>.
- _____ (2020a). Payment aspects of financial inclusion: application tools. Available at <https://www.bis.org/cpmi/publ/d195.pdf>.
- _____ (2020b). Payment's aspects of financial inclusion in the FinTech era. Available at <https://www.bis.org/cpmi/publ/d191.pdf>.
- Zetsche, Dirk A., and others (2017). From FinTech to TechFin: The Regulatory Challenges of Data-Driven Finance. European Banking Institute Working Paper Series 2017, No. 6, University of Hong Kong Faculty of Law Research Paper, No. 2017/007, University of Luxembourg Law Working Paper, No. 2017-001. Available at <https://ssrn.com/abstract=2959925>.
- Zetsche, Dirk A., and others (2020). The Future of Data-Driven Finance and RegTech: Lessons from EU Big Bang II. *Stanford Journal of Law, Business & Finance*, vol. 25, No. 2, pp.245–288.
- Zetsche, Dirk A., Douglas W. Arner, and Ross P. Buckley (2020). Decentralized Finance (DeFi). *Journal of Financial Regulation*, vol. 6, No. 2, pp. 172-203. Available at <https://ssrn.com/abstract=3539194>.
- Zetsche, Dirk A., Ross P. Buckley, and Douglas W. Arner (2019). Regulating LIBRA: The Transformative Potential of Facebook's Cryptocurrency and Possible Regulatory Responses. European Banking Institute Working Paper Series, No. 2019/44, University of New South Wales Law Research Series UNSWLRS 19-47, University of Hong Kong Faculty of Law Research Paper, No. 2019/042. Available at <https://ssrn.com/abstract=3414401>.
- Zhou, Weihuan, Douglas W. Arner, and Ross P. Buckley (2018). Regulating FinTech in China: From permissive to balanced. In *Handbook of Blockchain, Digital Finance, and Inclusion*. Academic Press.

Zhu, Julie. EXCLUSIVE Chinese state firms to take big stake in Ant's credit-scoring JV -sources. *Reuters*, 1 September. Available at <https://www.reuters.com/technology/exclusive-chinese-state-firms-take-big-stake-ants-credit-scoring-jv-sources-2021-09-01/>.