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Fintech in ASEAN+3 and Implications for Financial Inclusion and Financial Stability

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4.1 Introduction

Financial technology (fintech) is a promising tool to promote financial inclusion, that is, to broaden the access of excluded households and small firms to financial products and services. Fintech uses software, applications, and digital platforms to deliver financial services to consumers and businesses through digital devices such as smartphones. Financial inclusion in turn can help promote more inclusive growth by providing the previously unbanked with access to mechanisms for savings, investment, smoothing consumption, and insurance.

In 2010, the Group of Twenty (G20) endorsed the Financial Inclusion Action Plan and established the Global Partnership for Financial Inclusion to coordinate and implement it. The action plan was updated at the 2014 G20 Leaders' Summit in Brisbane. Acknowledging the importance of fintech, the action plan commits to implementing the G20 Principles for Innovative Financial Inclusion under a shared vision of universal access (BIS and WBG 2016).

Among the important challenges, however, significant gaps in financial inclusion and financial literacy separate men and women, urban and rural residents, those with higher and lower incomes, and small and large firms, among others. While digital finance (or alternative finance) has been expected to help reduce such gaps, early adopters tend to be people with higher education, income, and digital financial literacy, and urban dwellers. Thus, even though fintech may promote financial inclusion by making it easier to access financial services, it may also tend to widen gaps in financial access, income, and wealth.

The coronavirus disease (COVID-19) pandemic, meanwhile, has increased demand for fintech services, but also presents greater challenges to financially excluded disadvantaged groups and micro, small, and medium-sized enterprises (MSMEs), which may not have adequate internet access or digital financial literacy.

A second key challenge is the potential threat to financial stability and monetary policy effectiveness. Fintech's promise for financial inclusion can only be realized if the accompanying risks are managed to maintain trust in the system and avoid a build-up of risks that could lead to financial instability. For example, the development of peer-to-peer (P2P) lending could undermine the stability of banks, by reducing both deposits and loans. The development of cryptoassets could lead to destabilizing fund flows outside of the control of traditional instruments of central banks and a loss of information about the actual amount of liquidity in the system, thereby potentially weakening the transmission mechanism and the effectiveness of monetary policy. The development of central bank digital currencies (CBDCs) could also reduce the demand for bank deposits, potentially undermining the stability of banks. The rapid pace of change in the fintech space makes it particularly difficult for authorities to assess and respond to risks (e.g., credit, liquidity) in the financial system. To be sure, the development of alternative finance may well imply a need for longer-term restructuring of the traditional banking sector, with weaker banks dropping out and others accelerating their technological development.

This chapter reviews the development of fintech in the ASEAN+3 region and considers the potential implications for financial inclusion and financial stability. It also examines other fintech-related financial risks, including microfinancial risks, money laundering, terrorist financing, illicit transfers, and risks to consumer and investor protection. In addition, it looks at the implications fintech holds for monetary policy transmission; regulatory challenges associated with the rising adoption of fintech (for fintech firms, bigtech firms, and traditional financial institutions such as banks); and the scope for regional cooperation to address these issues.

The next section describes the overall development of fintech in the ASEAN+3 region. Section 4.3 reviews the current status of financial inclusion in Asia and the contribution of fintech. Section 4.4 examines the implications of COVID-19 for fintech development in the region. Section 4.5 considers the implications of fintech for financial stability, while the section after develops implications of fintech for administrative and regulatory frameworks to ensure financial stability. Section 4.7 does

the same for the design of monetary and financial policies. Section 4.8 considers the role of regional cooperation, and the final section summarizes the discussion.

4.2 Development and Current Status of Fintech in Asia

Digital financial services are defined as financial services which rely on digital technologies for their delivery and use by consumers (Pazarbasioglu et al. 2020). Fintech broadly refers to the latest wave of innovations in digital financial services, driven by developments such as smartphones, artificial intelligence (AI), machine learning, and big data. Fintech typically excludes more traditional digital transactions such as those using credit cards or internet banking, although the divide can be somewhat arbitrary.

The Financial Stability Board (FSB) defines fintech as “technologically enabled financial innovation that could result in new business models, applications, processes, or products with an associated material effect on financial markets and institutions and the provision of financial services” (FSB 2017). These functions may be viewed as continuing efforts to reduce financial frictions, such as information asymmetries, incomplete markets, negative externalities, misaligned incentives, network effects, and behavioral distortions (FSB 2017).

The FSB classifies fintech activities into five major categories of financial services:

- Digital payments, clearing and settlement: Electronic money (e-money), mobile phone wallets, digital currencies (including cryptoassets—both unlinked and stablecoins—and CBDCs) remittance services, value transfer networks, digital exchange platforms, etc.
- Deposits, lending and capital raising (alternative finance): Crowdfunding, P2P lending, online balance sheet lending, invoice and supply chain finance, etc.
- Insurance: Insuretech.
- Investment management: Internet banking, online brokers, robo advisors, cryptoasset trading, personal financial management, mobile trading, cryptoassets.
- Market support: Portal and data aggregators, ecosystems, data applications, distributed ledger technology (DLT), security, cloud

computing, internet of things/mobile technology, artificial intelligence, and machine learning (FSB 2017).

Financial institutions are investigating the use of DLT for applications such as cross-border interbank payments, credit provision, capital raising, and for digital clearing and settlement. The ability of DLT to transfer and record ownership of digital assets and store information securely and unchangeably is an advantage that reduces information asymmetries. DLT may change the way record keeping, accounting, payment, settlement, and other key aspects of financial markets are carried out. The technology may also increase transparency and reduce counterparty risk. A number of central banks are experimenting with or researching DLT for use in financial market infrastructure. Potential benefits include increased efficiency as a result of improving end-to-end processing speed and enhancing network resilience through distributed data management (IMF 2019). Digital identity verification can also increase information security and lower transaction costs (FSB 2017). Smart contracts may also have wide potential application.

Fintech is also supported by what the FSB refers to as “policy enablers,” including digital identification, the promotion of application program interfaces (widely known as APIs) to support open banking, data protection and cybersecurity, and innovation facilitators (Ehrentraud et al. 2020). All these add up to a complex and rapidly changing ecosystem.

Moreover, an analysis of fintech cannot ignore the implications of so-called bigtech firms. Bigtech refers to large globally active technology firms with a relative advantage in digital technology, such as Apple, Facebook, Google, Ant Financial, and Tencent. Bigtech firms typically provide internet-based services (search engines, social networks, e-commerce, etc.) and/or IT platforms or supply infrastructure services such as data storage and processing capabilities which other firms can use to provide products or services (BCBS 2018). Bigtech firms can rapidly gain a large world market share when launching a new financial product or service. These firms can also affect markets given the size of their operations and their investment capacity. Many banks, financial institutions, and fintech firms are partnering with bigtech firms, which then become important third-party providers of financial services, i.e., subcontractors of specific services to financial institutions. Therefore, it will become important to properly monitor and assess their concentration risk, since they could become systemically important (BCBS 2018).

The focus of this chapter is on issues related to the development of the two major segments of the fintech industry most likely to significantly impact financial inclusion and financial stability and that are most relevant for regional cooperation in ASEAN+3. These are payments, clearing and settlement and deposits, as well as lending and capital raising (alternative finance).

Digital Payments, Clearing, and Settlement

Digital payment systems encompass digital payments and clearing and settlement mechanisms, and comprise the largest share of fintech activity by transaction value. There is no standard definition of digital (or electronic) payments, but they generally refer to “... transfers of value which are initiated and/or received using electronic devices and channels to transmit the instructions” (Better than Cash Alliance 2020). This definition notwithstanding most discussions of digital payments typically exclude the following more traditional kinds of payments, since they represent an earlier stage of development of payment services:

- Conventional credit card payments using a merchant’s point-of-sale (POS) terminal.
- Bank transfers, even if done via the internet or ATMs.

Among other methods, such payments can be made through electronic money (e-money), “... an electronic store of monetary value on a technical device that may be widely used for making payments to entities other than the e-money issuer. The device acts as a prepaid bearer instrument which does not necessarily involve bank accounts in transactions” (ECB 2021). E-money can be classified as either hardware or software. The former includes things such as stored-value cards (PASMO or Suica) and the latter includes e-wallets (or digital wallets)—that is, a software system that securely stores users’ payment information and passwords for numerous payment methods and websites.

This section focuses on the segments most relevant for issues related to financial inclusion and financial stability: digital payments, including mobile money, wallets, and P2P payments; digital remittances; and digital currencies including private cryptoassets and CBDCs.

Digital payments

The digital payments market segment is led by consumer transactions and “... includes payments for products and services which are made over the Internet as well as mobile payments at point-of-sale via smartphone applications,” as defined by Statista. Not included in this segment are transactions between businesses (business-to-business payments), bank transfers initiated online (not in connection with products and services purchased online), and payment transactions at the point of sale where mobile card readers (terminals) are used (Statista 2020a).

Digital payments comprise two major subcategories: mobile POS payments and digital commerce. Mobile money (a payment system which does not require bank accounts and instead relies on agent-banking outlets) represents a third category of digital payments not included in the Statista definition, since it does not necessarily involve either POS transactions or Internet-based transactions.

It is difficult to find comparative figures for fintech-related and conventional payment transaction volumes, although Chaudhuri et al. (2020) provide the ranges for advanced and emerging Asian economies (Table 4.1). Cash is still king in most countries, but its role is declining. What are called “digital” transactions here include mobile money and mobile payments, so these range from 5% to 35% of the total for advanced economies and from 5% to 55% for emerging economies.

Table 4.1: Comparison of Fintech and Conventional Payments in Asia
(% of total)

	Advanced Economies	Emerging Asia
Consumer	100	100
Cash	40–95	40–95
Credit cards	≤25	<5
Digital transactions	5–35	5–55
Retail merchants	100	100
E-commerce	≤20	≤20
Others	≥80	≥80

Note: Advanced economies include Hong Kong, China; Japan; the Republic of Korea; Singapore; and Taipei, China. Emerging Asia includes the People's Republic of China, Indonesia, Malaysia, Thailand, and other economies.

Source: Authors based on Chaudhuri et al. (2020).

Mobile POS payments: The mobile POS payments segment includes transactions at POS terminals processed via smartphone applications (so-called mobile wallets). Well-known providers of mobile wallets include ApplePay, Google Wallet, and Samsung Pay. Payments are made by a contactless interaction of the smartphone app with a suitable payment terminal. The data transfer can be made using wireless standard near-field communication or by scanning a quick response (QR) code. A buyer pays via a mobile wallet by making an online bank transfer or by using a digitally stored credit or debit card.

Digital commerce: This covers all consumer transactions made online for products and services. Online transactions can be settled via various payment methods (credit cards, direct debit, invoice, or online payment providers such as PayPal and AliPay). The category includes more than just fintech-related payments, but there are no data on the breakdown between fintech-related payments and others.

Table 4.2 shows the estimated value of these transactions for selected countries. Figure 4.1 shows the recent trend of total digital payments and their projection through 2024. Total transaction value in digital payments is projected to reach close to \$2.5 trillion in 2020. The market's larger segment is digital commerce, with projected total transaction value of about \$1.6 trillion. Total transaction value is expected to grow 16.3% annually and thus to reach almost \$4.5 trillion by 2024. Mobile POS payments are projected to grow 27.5% and digital commerce 8.8% in the same period. Transaction value is highest in the People's Republic of China (PRC) (\$1.9 trillion) (Statista 2020a).

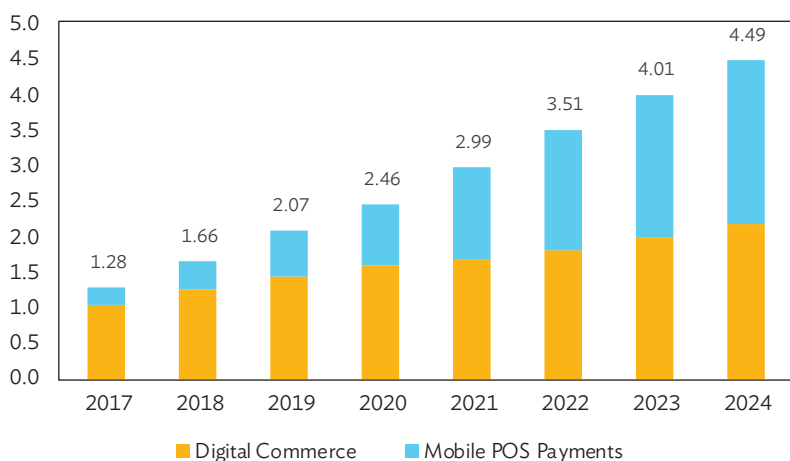
Digital commerce is clearly a more mature segment than mobile POS payments.

Table 4.2: Value of Digital Payments Transactions, 2020 Estimated
(\$ billion)

	Mobile POS	Digital Commerce	Total
PRC	755.5	1,165.0	1,920.5
Japan	...	...	165.2
Korea, Rep. of	...	...	113.5

... = not available, PRC = People's Republic of China, POS = point of sale.
Source: Statista (2020a).

Figure 4.1: Growth of Digital Payments Transaction Value in Asia
(\$ trillion)



POS = point of sale.

Note: Asia includes Bangladesh, Bhutan, Brunei Darussalam, Cambodia, the People's Republic of China, Indonesia, Japan, Kazakhstan, the Kyrgyz Republic, the Lao People's Democratic Republic, Malaysia, Mongolia, Nepal, Pakistan, the Philippines, the Republic of Korea, Singapore, Sri Lanka, Tajikistan, Thailand, Timor-Leste, Turkmenistan, Uzbekistan, Viet Nam, and other economies. Users refer to active paying accounts. Penetration rate refers to the ratio of active paying accounts to population.

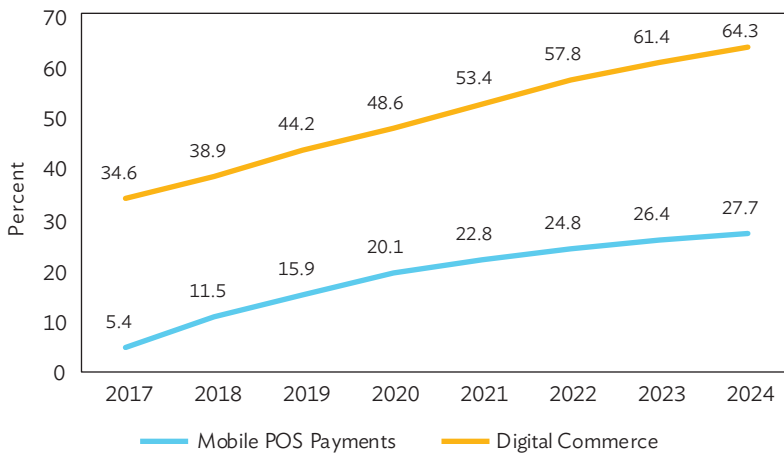
Source: Statista (2020a).

In 2019, total users of mobile POS transactions were estimated at 693 million and digital commerce users at 1.93 billion. Figure 4.2 shows the development of users of digital payments in Asia, including projections through 2024. The penetration rate of digital commerce in 2019 was 44.2% and is projected to hit 64.3% by 2024.

Figure 4.3 shows the share of mobile transactions in payments in stores in some ASEAN+3 countries. The PRC has by far the largest share, at 86%, followed by Thailand and Viet Nam. Indonesia, Malaysia, Singapore, and the Philippines all have shares in the 40% range.

Figure 4.4 shows the penetration of users of the two main providers of digital payments services in the PRC—Alipay and WeChat. These bigtech firms seem to have gained access to almost all adult users in the PRC.

Figure 4.2: Penetration Rate of Users of Digital Payments in Asia
(%)

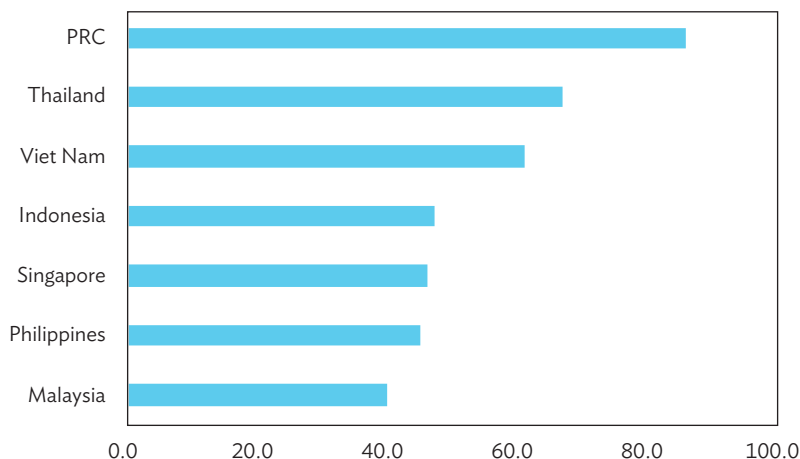


POS = point of sale.

Note: Asia includes Bangladesh, Bhutan, Brunei Darussalam, Cambodia, the People's Republic of China, Indonesia, Japan, Kazakhstan, the Kyrgyz Republic, the Lao People's Democratic Republic, Malaysia, Mongolia, Nepal, Pakistan, the Philippines, the Republic of Korea, Singapore, Sri Lanka, Tajikistan, Thailand, Timor-Leste, Turkmenistan, Uzbekistan, Viet Nam, and other economies. Users refer to active paying accounts. Penetration rate refers to the ratio of active paying accounts to population.

Source: Statista (2020a).

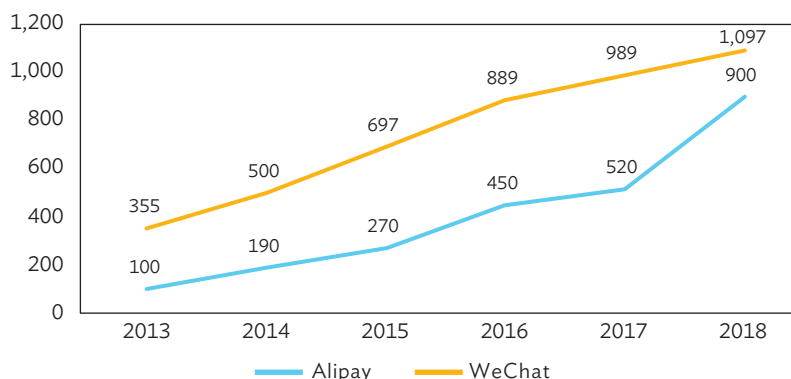
Figure 4.3: Share of Consumers Using Mobile Payments, 2019
(% share)



PRC = People's Republic of China.

Source: PwC Global Consumer Insights Survey (PwC 2019).

Figure 4.4: Penetration of Users of Digital Payments in the People's Republic of China
(million)



Note: Users refer to individuals who have used digital payments.
Source: Klein (2019).

Mobile money: This is also a subcategory of digital payments, but is separate from mobile POS and digital commerce, and hence is not counted in the Statista statistics given above. The GSM Association (GSMA) (2020) defines a mobile money service by the following characteristics:¹

- It includes transferring money and making and receiving payments using a mobile phone.
- It must be available to the unbanked, i.e., people who do not have access to a formal account at a financial institution.
- It must offer a network of physical transaction points which can include agents, outside of bank branches and ATMs that make the service widely accessible. The agents enable cash to be added to or withdrawn from an individual's e-wallet without requiring a bank deposit, i.e., a "cash-in, cash-out" service. This makes it available to the unbanked.

The GSMA definition of mobile money excludes the following:

- Mobile banking or payment services that offer the mobile phone as just another channel to access a traditional banking product.
- Payment services linked to a traditional banking product or credit card.

¹ The GSMA represents more than 750 mobile operators with almost 400 related companies, including handset and device makers, software companies, equipment providers, and internet companies, as well as organizations in adjacent industry sectors. See gsma.com.

In other words, the definition excludes more conventional payment services linked directly to bank accounts or credit cards. Since the mobile POS and digital commerce services described above typically have some link to a bank account or credit card, they are not included in this definition.

Mobile money transactions have significant advantages over other channels.

- (i) First, they reduce variable costs considerably by taking advantage of the fixed costs of the mobile network already in place. As a result, even low-value and low-volume transactions can be profitable, unlike transactions through conventional banking channels.
- (ii) Second, mobile money relies on an agent network, which is much less costly than a bank branch network.
- (iii) Third, if accompanied by appropriate risk-based regulations that exempt clients with a smaller number and size of transactions from cumbersome documentation requirements, large parts of the population in the informal economy can have access to such payments. (Beck 2020).

Total mobile payments amounted to \$68.1 billion in 2019, with somewhat over one-third in East Asia and the Pacific and somewhat below two-thirds in South Asia. The overall average compound growth rate since 2016 was 36%, and the growth rate in East Asia (53%) and the Pacific (28%) was considerably faster than in South Asia. P2P payments dominate, making up half of the total overall, followed by cash-in and cash-out, respectively, which are probably mostly related to P2P payments. The shares for other categories are relatively small—merchant payments make up only 2.6% of the total and international remittances only 0.4%, which suggests that the potential for these transactions remains largely unexploited, especially in South Asia (GSMA 2020).

The number of active accounts (used within the last 90 days before the survey) reached 151.2 million in East Asia, the Pacific, and South Asia by December 2019, almost a ninefold increase relative to the end of 2014. The number of agent outlets in East Asia, the Pacific, and South Asia has tripled over the past 5 years, and the number of mobile money agents is seven times that of ATMs and 20 times bank branches (GSMA 2020). Total active agents in East Asia, the Pacific, and South Asia reached 2.15 million in December 2019, up by 4.5% from the previous year.

It is interesting that, as part of the shift from in-kind payments to cash transfers, humanitarian organizations are increasingly using digital transactions. Since 2017, mobile money platforms have been used to deliver money and voucher assistance in at least 44 countries—almost half of all countries with a live mobile money service. As a result, the mobile money industry has been able deliver financial assistance to over 2.7 million accounts used by people affected by various crises (GSMA 2020).

Remittances and international money transfers

The World Bank estimates that inward remittances and international money transfers from migrants in ASEAN+3 in 2019 totaled \$158 billion, about 21% of global inflows, growing at a compound rate of 6.1% over the previous decade.² However, it is estimated to have fallen about 7% in 2020 due to the pandemic. Four countries accounted for most of the ASEAN+3 total in 2019, including the PRC (43%), the Philippines (22%), Viet Nam (11%), and Indonesia (7.4%).

The great bulk of these transfers are still made via traditional routes such as Western Union, but digital transactions are growing rapidly. Digital remittances can be accomplished using a web browser or an app, combined with the use of a mobile phone, tablet, or computer; and a digital funding mechanism. Digital remittances can be funded through various means, including bank accounts, cryptoassets, and mobile money. Growth of digital remittances has been boosted by the entry of digital-first money transfer organizations, and the established of these have responded by rapidly introducing digital initiation and funding capacities in response (VEEI 2021). The emergence of digital-first money transfer organization has helped substantially reduce transfer costs, making them more affordable.

According to Statista (2020a), total digital remittances in 2019 reached \$73.9 billion, or about 11.1% of total global remittances, and the total number of users reached 7.1 million. Applying the same share figure to total Asian remittances would imply a value of total digital remittances of \$34.8 billion. Digital remittances are projected to grow an average of 14%, over twice the rate of overall remittances, so the share will gradually increase.

² World Bank Annual Remittances Data (updated as of October 2020). Migration and Remittances Data. Washington, DC: World Bank. <https://www.worldbank.org/en/topic/migrationremittancesdiasporaissues/brief/migration-remittances-data> (accessed April 2021).

Digital currencies

According to the Bank for International Settlements (BIS) (2018b) a digital currency is an asset that only exists electronically and can be used as a currency (means of payment, store of value, unit of account) although it is not legal tender.³ Digital currencies sometimes use distributed ledger technology (DLT) systems to record and verify transactions made using the digital currency. These include private currencies and digital versions of national bank currencies. Digital currencies that use cryptographic techniques to verify transactions are called “cryptocurrencies” or “cryptoassets”.⁴ Digital currencies issued as liabilities of central banks are called central bank digital currencies (CBDCs) and are legal tender.

Cryptoassets: Cryptoassets such as Bitcoin enable transfers and payments to be made without using banks, instead of using public DLT. Currently, there are about 9,200 cryptoassets with a total market capitalization of around \$2.06 trillion as of 12 April 2021.⁵ This compares, for example, with the value of the US dollar monetary base of about \$6 trillion. However, widespread adoption of cryptoassets for purchases and transfers, rather than speculation, has been limited by various factors, including price volatility, regulatory concerns due to transaction anonymity—raising anti-money laundering/counterterrorist financing (AML/CFT) issues—and lack of scalability (BCBS 2018). Scalability refers to the ability to greatly increase the volume of transactions that can be processed in real time. Stablecoins such as Tether and the Diem project, whose values are linked to those of national currencies, may overcome the issue of price volatility and potentially compete more with fiat currencies, although scalability may still be an issue, as discussed in section 6.

Central bank digital currencies: Many central banks are actively researching the potential development of CBDCs, although actual implementation is still rare. Proponents of CBDCs claim that they can lower costs, expand financial inclusion, increase the efficiency of monetary policy implementation, counter competition from private digital currencies, ensure competition and contestability of the payment market, and offer a risk-free payment

³ The last part of the definition seems to be out of date, since CBDCs are digital currencies but presumably are legal tender.

⁴ The terms cryptocurrencies and cryptoassets are used interchangeably by institutions such as the FSB and the BIS. However, G20 documents refer to them as cryptoassets, so that terminology is adopted here.

⁵ Coinmarketcap. All Cryptocurrencies Database (accessed April 2021). <https://coinmarketcap.com/all/views/all/>.

instrument to the public (IMF 2019, BIS 2021). CBDC proposals are of three types:

- Account-based CBDC targeting the general public.
- Value-based or digital-token-based CBDC targeting the general public.
- CBDC based on DLT targeting financial institutions (Shirai 2020).

In some advanced economies such as Sweden, the declining use of cash and the potential to have negative interest rates have motivated the study of CBDC as an alternative, robust, and convenient payment method. A CBDC could increase contestability of the payment market, thus reducing the risk of a few large private payment providers dominating the market. In developing countries, the focus is more on improving operational and cost efficiency. In countries with underdeveloped financial systems and a large portion of unbanked citizens, a CBDC is viewed as way to increase financial inclusion and support digitalization (IMF 2019, BIS 2021).

CBDCs can have varying degrees of anonymity in transactions. A non-anonymous CBDC could make the monitoring of transactions easier. Many central banks seem to favor a hybrid approach that allows the authorities to trace large-value transactions, which are more important for detecting tax avoidance, money laundering, terrorist financing, and other illicit purposes, while small transactions remain anonymous. Several central banks are focusing research on a two-pronged approach with anonymous tokens for small holdings/transactions, and traceable currency for large ones (IMF 2019).

A CBDC can have features similar to cash or deposits, and can be interest-bearing. A CBDC that closely competes with deposits would tend to lower bank credit and output, while a cash-like CBDC could lead to the disappearance of cash. Therefore, the optimal CBDC design balance would maintain bank intermediation while keeping a diverse portfolio of payment instruments. When network effects matter, i.e., an increase in the number of users of a service increases the convenience of that service, an interest-bearing CBDC could alleviate the central bank's concern about the potential disappearance of cash by increasing the distinction of the CBDC from cash (Agur, Ari, and Dell'Ariccia 2019). However, these trade-offs may be lessened by having a two-tier system where banks or other financial institutions distribute the CBDCs to individuals or firms.

Central banks in ASEAN+3 are exploring the potential use of CBDCs (Table 4.3). The People's Bank of China (PBOC) is one of the most active in developing a retail CBDC. The PRC's version of a sovereign digital currency—the so-called Digital Currency Electronic Payment—has been managed by the PBOC since 2014 under a centralized system and does not use blockchain technology. The PBOC has been conducting tests involving its Digital Currency Electronic Payment system in four cities—Suzhou, Xiongan, Shenzhen, and Chengdu, at 20 private firms, as well as at sites for the 2022 Beijing Winter Olympics. PBOC governor Yi Gang said in May 2020 that the PRC had “basically completed” the top-level design, standard setting, research on functions, and integration tests of the digital yuan (PBOC 2020). State media reported in August 2020 that major state-owned banks were conducting large-scale internal testing of a digital wallet application, moving closer toward the official launch of a CBDC.⁶ According to Huang (2020), the PBOC's planned digital currency is a coupled hybrid of digital currency and electronic payment, issued by the central bank, but operated and exchanged by authorized operators. This makes it a two-tier system, where the central bank does not directly interact with the public. This structure would help avoid competition with private financial institutions, and thus limit the risk of financial disintermediation. Notably it is token-based, and therefore does not require a link to a bank account. This would make it accessible to foreigners as well as Chinese residents.

The National Bank of Cambodia became the first central bank in Asia to implement such a system with the launch of its blockchain-powered payment system, named Project Bakong, in October 2020. The P2P payment system runs on top of the Hyperledger Iroha blockchain designed by the Japanese technology company Soramitsu. Unlike many CBDC prototypes, it does not involve the exchange of central-bank-backed tokens, but is based on fiat currencies and supports transactions in both Cambodian riel and US dollar. This quasi-central bank digital currency is similar to m-Pesa developed in Kenya, and the goals are to reduce money transfer costs and increase financial inclusion. Bakong connects all financial institutions and payment service providers under a single payment platform which allows for fund transfers to be processed on real-time basis without the need of a centralized clearing house (NBC 2020).

⁶ See the report by Reuters at <https://es.reuters.com/article/marketsNews/idUSL4N2F80SA> for more information.

**Table 4.3: Research and Development in ASEAN+3
Related to Central Bank Digital Currency**

Country/ Project Name	Characteristics	Progress
Cambodia Project Bakong	Retail two-tier issuance; blockchain based system, but using Cambodian riel and US dollars, so technically not CBDC	Implemented 2020
PRC Digital Currency Electronic Payment	Retail two-tier-tier issuance; Hybrid (central and DLT payment network)	Conducting tests in Suzhou, Xiongan, Shenzhen, and Chengdu; "top-level design" basically completed
Japan Project Stella	No plans to issue CBDC, but research focuses on implications of DLT for financial market infrastructure	Experiments; Phase 4 explores how confidentiality and auditability could be balanced in a DLT environment; CBDC experiments to start Spring 2021
Korea, Rep. of	No plans to issue CBDC, but conducting mock tests of DLT-based interbank payment and settlement systems	Experiments
Hong Kong, China	Studying retail CBDC together with the BIS; studying local use of e-CNY; participating in the mCBDC Bridge wholesale CBDC project with the PRC, Thailand, and the United Arab Emirates	Study stage
Singapore Project Ubin	Wholesale, a collaborative project with the industry to explore the use of blockchain and DLT for clearing and settlement of payments and securities	Experiments, 5 phases of project completed in July 2020
Thailand Project Inthanon	Proof-of-concept for wholesale CBDC for interbank and cross-border settlements; also prototype development project for CBDC for business	Experiments

CBDC = central bank digital currency, CNY = Chinese yuan, DLT = distributed ledger technology, PRC = People's Republic of China, US = United States.

Source: Bank of Japan and European Central Bank (2020), Bank of Thailand (2021), Huang (2020), Kishi (2019), Monetary Authority of Singapore (2020a), Shirai (2019), and Supadulya et al. (2019).

The Monetary Authority of Singapore (MAS) in November 2016 embarked on the collaborative Project Ubin with the financial industry to explore the use of DLT for clearing and settlement of payments and securities. The project aims to help the MAS and the industry better understand the technology and the potential benefits it may bring (FSB 2017). In December 2016, the Bank of Japan and the European Central bank launched a joint research project on DLT and jointly studied the use of DLT for financial market infrastructure. The Bank of Korea and the Bank of Thailand have also been conducting research projects.

However, none besides the PBOC has announced plans to set up a CBDC, much less a retail CBDC. A number of reasons have been cited for the PBOC's rapid move toward adoption of retail CBDC, including the intention to promote financial inclusion (Huang 2020). It may also have been prompted by concerns about the dominance of the two main private payment systems and their resulting accumulation of transaction-related information and the potential spread of private stablecoins such as Facebook's Diem, which could constrain internationalization of the yuan.

Alternative Finance: Crowdfunding, P2P Lending, and Online Balance Sheet Lending

After digital payments, alternative finance is the second largest fintech segment providing financial access for households and small firms. Table 4.4 shows the development of an online alternative finance market in ASEAN+3 based on the survey data reported by the Cambridge Centre for Alternative Finance (CCAF 2020, 2021); and CCAF, the Academy of Internet Finance at Zhejiang University, and the Asian Development Bank Institute (ADB, CCAF, and AIFZU 2018). It shows a boom-and-bust pattern of online alternative finance markets and the dominance of the PRC market in the region until 2019. The PRC market rapidly grew from 2013 to 2017 but then plummeted by over 99% by 2019 as a result of tighter regulation of the P2P lending sector. A similar trend can be seen in the total market volume of ASEAN+3. By 2020, total volume of the region dropped about 98% from the peak in 2017 due to the PRC market drop. In contrast, market volume in Japan, the Republic of Korea, and Southeast Asian economies has continued to increase, although erratically in some cases. Most growth of the ASEAN market was contributed by Indonesia, which reached almost \$1.45 billion in 2018 compared to only \$80.00 million in 2017, although it has been flat since then.

Table 4.4: Online Alternative Finance Market Value and Development of ASEAN+3
(\$ million)

Year	PRC		Japan		Korea, Rep. of		ASEAN		ASEAN+3	
	Value	Growth (%)	Value	Growth (%)	Value	Growth (%)	Value	Growth (%)	Value	Growth (%)
2013	5,560	...	87	...	2	...	11	...	5,660	...
2014	24,240	336.0	115	32.5	2	13.7	26	141.4	24,384	330.8
2015	102,000	320.8	351	205.6	40	1,642.7	47	76.2	102,438	320.1
2016	243,000	138.2	398	13.5	376	830.8	216	362.9	243,991	138.2
2017	358,000	47.3	349	-12.5	1,130	200.3	325	50.4	359,803	47.5
2018	215,400	-39.8	1,069	206.6	753	-33.4	2,190	574.2	219,412	-39.0
2019	84,346	-60.8	599	-44.0	1,605	113.1	2,271	3.7	88,820	-59.5
2020	1,161	-98.6	1,141	90.6	1,304	-18.8	2,705	19.1	6,310	-92.9

PRC = Peoples' Republic of China.

Note: Online alternative finance includes P2P lending, balance sheet lending, invoice trading, securities, crowdfunding, profit sharing, and others. The ASEAN economies included in the aggregation exclude Brunei Darussalam and the Lao People's Democratic Republic.

Source: CCAF (2020); and CCAF, AIFZU, and ADBI (2018), Global Alternative Finance Benchmarks Database (accessed July 2021).

Within alternative finance, lending, and crowdfunding are the two major segments. Table 4.5 breaks down the lending and crowdfunding segments in total volume of business in 2020. Lending is by far the largest segment in both Asia and the Pacific (excluding the PRC) and the PRC, dominated by P2P lending. Within crowdfunding, P2P consumer lending is the largest category in both the Asia and the Pacific (excluding PRC) and the PRC. Invoice trading is a separate and relatively small segment. Alternative lending in the PRC has shrunk dramatically since 2017 as a result of tighter regulation of the sector and the exit of many platforms. The clampdown attempted to bring order to what previously had been a very lightly regulated sector and to weed out unethical and fraudulent practices such as investor guarantees by platforms and thefts of investor funds by platform operators.

Table 4.5: Total Transaction Value of Major Alternative Finance Segments in Asia and the Pacific, 2020

Model	Definition	Transaction Volume (\$ million)	
		Asia and the Pacific ex-PRC	PRC
Marketplace/P2P consumer lending	Individuals or institutional funders provide a loan to a consumer borrower.	2,363.6	7.0
Marketplace/P2P Business Lending	Individuals or institutional funders provide a loan to a business borrower.	1,819.7	0.3
Marketplace/P2P property lending	Individuals or institutional funders provide a loan for a property of a consumer or business borrower.	541.8	0.0
Balance sheet business lending	The platform entity provides a loan directly to a business borrower using its own balance sheet.	2,266.5	1,132.0
Lending subtotal		6,991.6	1,139.3
Revenue sharing/ profit sharing, crowdfunding	Individuals or institutions purchase securities from a company, such as shares or bonds, and share in the profits or royalties of the business.	51.5	0.0
Real estate crowdfunding	Individuals or institutional funders provide equity or subordinated-debt financing for real estate.	351.8	0.0
Equity-based crowdfunding	Individuals or institutional funders purchase equity issued by a company.	333.5	0.0
Other crowdfunding		938.6	8.3
Crowdfunding subtotal		1,675.4	8.3
Invoice trading	Individuals or institutional funders purchase invoices or receivable notes from a business at a discount.	241.8	13.5
Total alternative finance		8,908.8	1,161.1

P2P = peer-to-peer, PRC = People's Republic of China.

Note: Asia and the Pacific here includes economies in East Asia, Southeast Asia, South Asia, Central Asia, and Oceania, consistent with the Asian Development Bank's country groupings, excluding the PRC.

Source: CCAF, AIFZU, and ADBI (2018), Global Alternative Finance Benchmarks Database (accessed July 2021).

Alternative finance is still tiny compared with conventional finance.

Table 4.6 compares alternative finance loans with conventional loans as a percentage of gross domestic product in 2019. Only the PRC's figure exceeded 0.1% and the figure for the PRC fell drastically in 2020 due to tighter regulation of this sector. The share of equity-related alternative finance is similarly tiny compared with conventional stock market issuance volumes.

Table 4.6: Comparison of Alternative Finance Lending and Conventional Lending, 2019

Economy	Loans (% of GDP)				
	(1) Total Conventional (2)+(3)+(4)	(2) Commercial Banks	(3) Credit Unions and Credit Cooperatives	(4) Microfinance Institutions	(5) Alternative Finance
Brunei Darussalam	29.1	29.1	...	...	0.0
Cambodia	117.3	90.6	...	26.7	0.0
PRC	111.4	108.4	3.0	...	0.6
Indonesia	35.5	35.5	...	...	0.1
Japan	133.4	101.5	31.9	...	0.0
Republic of Korea	117.1	88.7	28.4	...	0.1
Lao PDR	46.0	45.3	0.1	0.6	0.0
Malaysia	109.4	109.4	...	...	0.0
Myanmar	24.3	22.8	...	1.5	0.0
Philippines	34.0	34.0	0.0	...	0.0
Singapore	136.4	136.4	...	...	0.1
Thailand	83.3	70.8	12.5	...	0.0
Viet Nam	134.9	133.0	2.0	...	0.0

... = not available, GDP = gross domestic product, PRC = People's Republic of China, Lao PDR = Lao People's Democratic Republic.

Source: Authors' estimates; Cambridge Centre for Alternative Finance's Global Alternative Finance Benchmarks Database; IMF Financial Access Survey Database; and IMF World Economic Outlook April 2021 Database (accessed July 2021).

4.3 Current Status of Financial Inclusion in Asia and Role of Fintech

Current Status of Financial Inclusion in ASEAN+3

According to the World Bank, financial inclusion means "... that individuals and businesses have access to useful and affordable financial products and services that meet their needs—transactions, payments, savings, credit and insurance—delivered in a responsible and sustainable way" (World Bank 2018). Actual usage of financial services is also important for financial inclusion, as are financial literacy and education. Financial inclusion is considered an enabler for 7 of the 17 Sustainable Development Goals, and the G20 committed to advance financial inclusion worldwide and reaffirmed its commitment to implement the G20 High-Level Principles for Digital Financial Inclusion (GPFI 2016).

Financial inclusion has been adopted as a high-priority target by the ASEAN+3 countries and the Asian Development Bank (ADB). Improved financial access enables firms and households to smooth consumption, make long-term investment plans, and cope with unexpected emergencies. People who hold accounts at banks or other financial institutions are more likely to use other financial services, such as credit and insurance, to start and grow businesses, invest in education or health, manage risk, and smooth consumption against shocks, which can improve their quality of life (GPFI 2016).

Individuals: Financial accounts

The most commonly cited measure of financial inclusion is the percentage of adults of age 15 and above who have an account at a formal financial institution. This can be either a bank, some other savings institution, or a microfinance institution. Figure 4.5 shows the evolution of this figure for the PRC, Japan, the Republic of Korea, and most ASEAN countries from 2014 to 2017, based on the World Bank's Global Findex Survey results from those years. The figure shows three distinct clusters: high-income countries with financial inclusion rates of over 90% (Japan, Republic of Korea, and Singapore); upper middle-income countries with financial inclusion rates of 80%–90% (the PRC, Malaysia, and Thailand); and middle-income countries in the range of 15%–50% (Cambodia, Indonesia, the Philippines, and Viet Nam). The figure for the Lao People's Democratic Republic (Lao PDR) was not available in 2014, but was 29% in 2017, putting it in the third group as well. Most countries improved modestly in the 2 years, except Indonesia, which showed a large increase of 12 percentage points, and Viet Nam, with a slight decrease. The level of financial inclusion correlates well with other development-related measures such as per capita GDP and overall financial development.

Figure 4.6 shows the share of the adult population that have used digital payments based on the World Bank's Global Findex Database in 2014 and 2017. Digital payments in the figure include credit card payments, so the definition is broader than that given in section 4.2. Countries appear to be divided into the same three groups as for the holding of financial accounts. Digital payments are quite common in the Republic of Korea, Japan, and Singapore, with Japan coming on top in both years. Around 95% of the Japanese population made or received digital payments in 2017, up by six percentage points from 2014. Presumably the bulk of these are traditional credit card payments, but use of e-money is increasing as well. Increasing

use of digital payments can be seen in all countries except Cambodia, with especially large increases in Thailand (up 29 percentage points) and the PRC (up 22 percentage points).

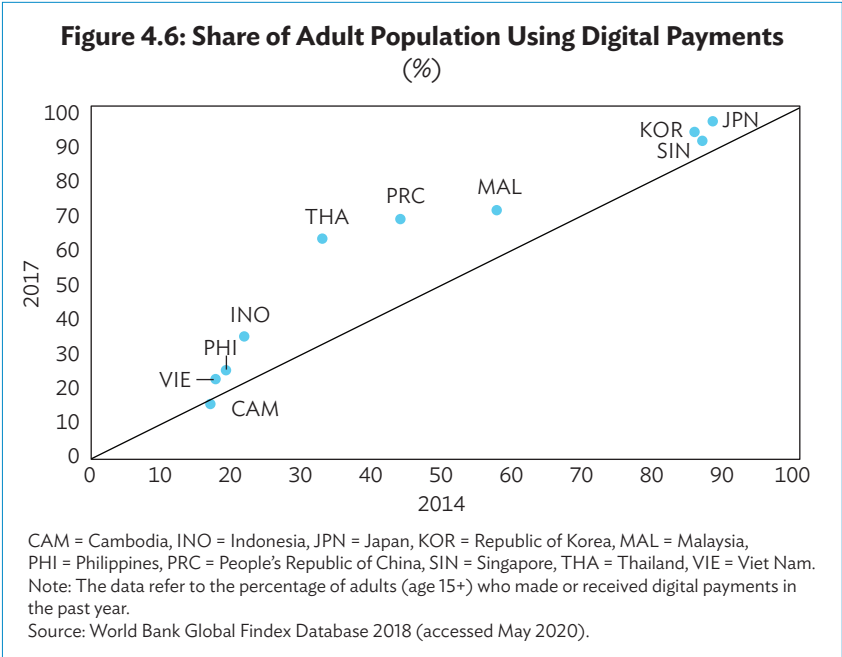
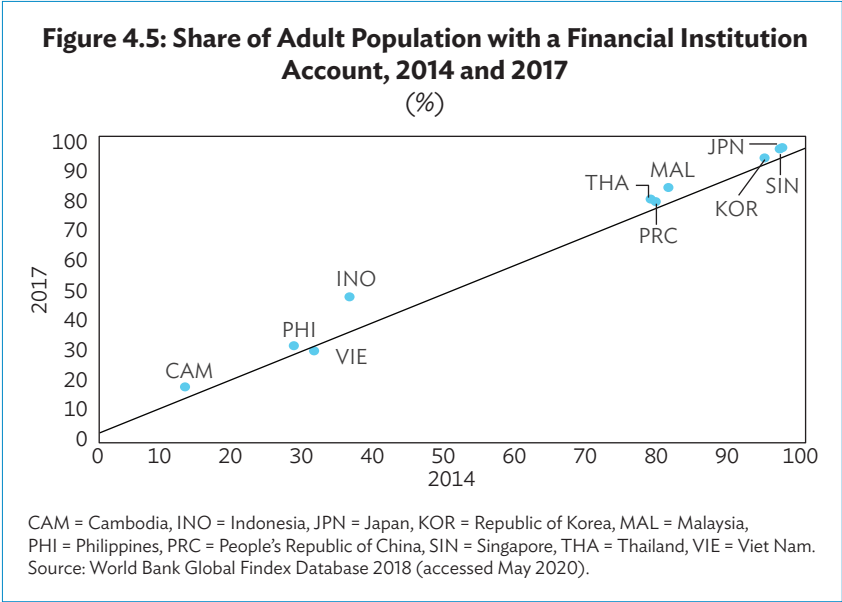
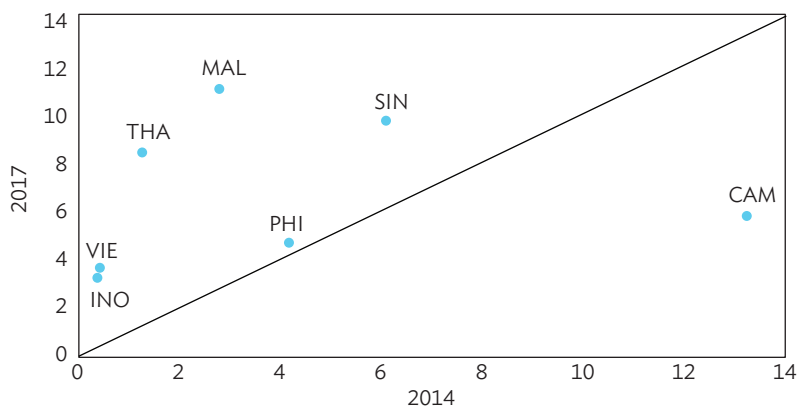


Figure 4.7 shows inclusion rates for adults with a mobile money account for the same periods. Data for the PRC, Japan, Republic of Korea, and the Lao PDR are not available. All countries except Cambodia showed increases, with the largest increases seen in Malaysia and Thailand. The reason for the large decline in Cambodia is not clear. The market is still relatively small, with no country having a share above 11%. Nevertheless, this segment is likely to show rapid growth.

Figure 4.7: Share of Adult Population with a Mobile Money Account (%)



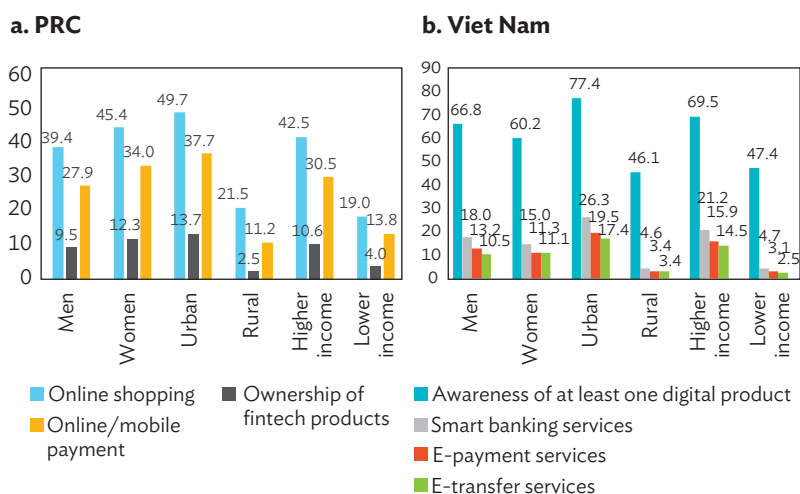
CAM = Cambodia. INO = Indonesia, JPN = Japan, KOR = Republic of Korea, MAL = Malaysia, PHI = Philippines, PRC = People's Republic of China, SIN = Singapore, THA = Thailand, VIE = Viet Nam. Source: World Bank Global Findex Database 2018 (accessed May 2020).

Implications of fintech for income and wealth distribution

One key challenge is significant gaps in financial inclusion and financial literacy between men and women, urban and rural residents, those with higher and lower incomes, and small and large firms, among others. While digital finance has been expected to help reduce such gaps, its early adopters tend to be those with higher education, income, and financial literacy, or those who live in urban areas. For example, studies of fintech adoption in the PRC, Japan, and Viet Nam showed that individuals in higher-income groups are significantly more likely than those in low-income groups to adopt fintech services, and that men are significantly more likely than women to adopt fintech services (Huang, Wu, and Yang 2020, Morgan and Trinh 2020; Yoshino, Morgan, and Trinh 2002). Thus, even though fintech may promote financial inclusion, it has the potential to widen gaps in financial access, income, and wealth.

Figure 4.8 shows usage gaps in fintech products by gender, location (urban versus rural), and income group in the PRC and Viet Nam. In both countries, gender gaps appear to be small, although many other countries exhibit large gender gaps. However, the gaps in fintech adoption among rural and urban residents and among income groups in both countries are large. For example, only 2% of PRC rural residents own fintech products, while 14% of urban residents do. The share of the poor (those below the PRC's poverty line) who hold fintech products is only about one-third the share of those with higher incomes (Huang, Wu, and Yang 2020). A similar pattern is also seen in Viet Nam (Morgan and Trinh 2020).

Figure 4.8: Gaps in Usage and Awareness of Fintech Products in the PRC and Viet Nam
(% of total respondents)



PRC = People's Republic of China.

Note: The poorer group in the PRC is defined as those under the PRC poverty line. Viet Nam's poorer group consists of those in households with total income less than 85 million dong (equal to 75% of the median household income in our sample).

Source: Huang, Wu, and Yang (2020) and Morgan and Trinh (2020).

The COVID-19 pandemic has increased demand for fintech services, but also presents greater challenges to vulnerable groups, including the elderly, the less educated, owners of small and medium-sized enterprises (SMEs) and start-up firms, rural residents, and women, who may not have adequate access to online services or the knowledge to use them appropriately and safely. This suggests that, in addition to promoting investment in internet access for disadvantaged groups, it is also necessary to promote

digital financial literacy; design tools to assess it; and develop programs to promote digital financial education, including specialized programs for disadvantaged groups.

Micro, small, and medium-sized enterprises: Issues of access

Micro, small, and medium-sized enterprises (MSMEs) are the backbone of ASEAN+3 economies, accounting for 47%–97% of employment and 30%–60% of GDP (ADB 2015). They are, thus, crucial in spreading economic gains down to the base of the economy, which can help reduce poverty, create better quality jobs, address informality, and broaden economic inclusivity (IFC 2013, OECD 2017). They are likewise key in generating value added, promoting innovation, fostering environmental sustainability, and maximizing the benefits of digitalization (OECD 2017).

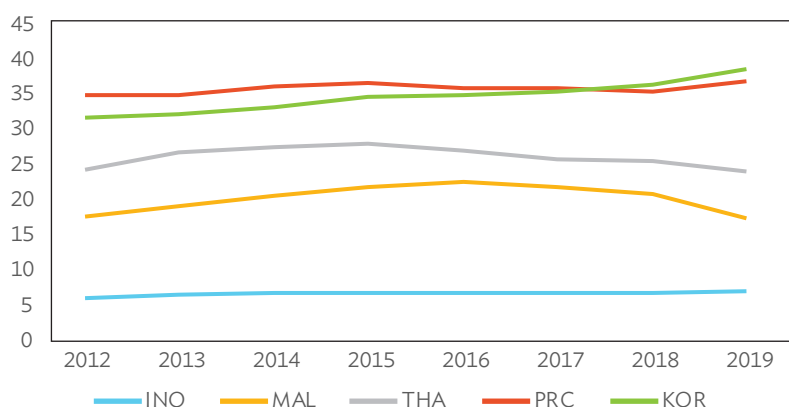
Nevertheless, it is well known that MSMEs have difficulty accessing finance for a number of reasons, including higher risk, lack of adequate or traditional collateral, and lack of reliable accounting data. Actual data on lending to MSMEs is limited. Figure 4.9 shows the ratio of commercial bank loans to SMEs as a percentage of GDP for countries, with available data in the IMF's Financial Access Survey.⁷ The figures differ widely, with shares well below 10% in Indonesia, but over 35% in the PRC and the Republic of Korea, and in the range of 15%–30% in Malaysia and Thailand. However, these are well below the shares of SMEs in GDP.

The range of ratios of bank lending to SMEs to total lending in ASEAN is similarly wide. The latest publicly available data (Table 4.7) show that it is less than 1% in Brunei Darussalam, less than 7% in Singapore and the Philippines, close to 20% in Indonesia and the Lao PDR, and over 30% in Thailand.⁸ ADB (2020) data further indicate that the share of SMEs in banks' lending portfolios generally declined between 2015 and 2019, except in Indonesia.

⁷ IMF Financial Access Survey Database. <https://data.imf.org/?sk=E5DCAB7E-A5CA-4892-A6EA-598B5463A34C> (accessed July 2021).

⁸ ADB Asia SME Monitor 2020 Database. <https://data.adb.org/dataset/2020-adb-asia-sme-monitor-vol1-country-regional-reviews> (accessed July 2021).

Figure 4.9: Commercial Bank Loans to SMEs
(% of GDP)



INO = Indonesia, KOR = Republic of Korea, MAL = Malaysia, PRC = People's Republic of China, SMEs = small and medium-sized enterprises, THA = Thailand.

Source: IMF Financial Access Survey 2020 (accessed July 2021).

Table 4.7: Share of SME Loans in Total Bank Loans, ASEAN
(%)

Economy	2015	2019 ^a
Brunei Darussalam	...	0.2
Indonesia	19.3	19.6
Lao PDR	30.9	19.8
Malaysia	18.7	14.6
Philippines	7.9	6.1
Singapore	6.3	5.8
Thailand	33.5	30.9

... = not available, Lao PDR = Lao People's Democratic Republic, SMEs = small and medium-sized enterprises.

^aThe data of Singapore are for 2018.

Source: ADB (2020), Asia Small and Medium-Sized Enterprise Monitor Volume 1: Country and Regional Reviews Database (accessed July 2021).

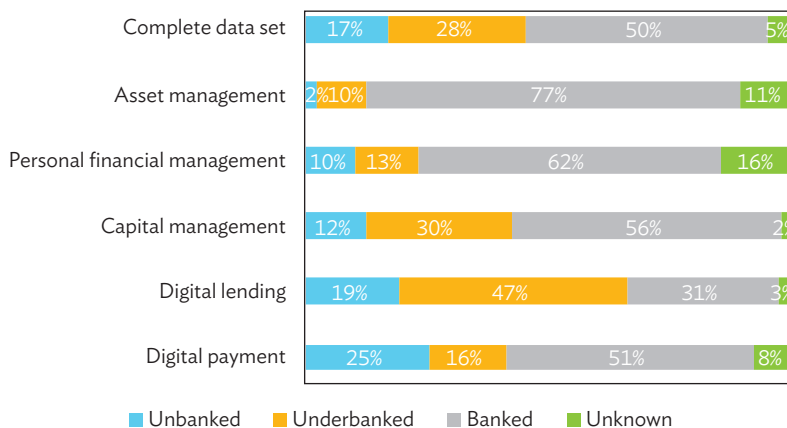
Role of Fintech in Expanding Financial Inclusion

Notably, digital payments have significantly penetrated nonbanked or underbanked groups.⁹ Figure 4.10 shows that 25% of digital payment customers in ASEAN countries are unbanked, the highest penetration for any fintech segment, and another 16% are underbanked. This underscores

⁹ Individuals who have a bank account but limited to no access to other financial products and services are classified as being underbanked.

the strong potential for digital payments to expand financial inclusion. Presumably these are people with mobile money accounts, which do not require the holder to have a bank account. Digital lending (part of alternative finance) has the next highest penetration rate of the unbanked, at 19% of the total.

Figure 4.10: Banked Status of Fintech Customers in ASEAN, 2019



Note: The data for ASEAN exclude Brunei Darussalam and the Lao People's Democratic Republic. Complete data set refers to average of all of the segments shown below it.
Source: CCAF, ADBI, and FinTechSpace (2019).

For example, in Thailand, digital payments are viewed as a critical element for fintech development and adoption. The adoption of digital payments can be a first step toward development and adoption of digital (online) banking (savings and borrowing), and other online financial products such as investment and insurance (Moenjak, Komprajya, and Monchaitrakul 2020).

Digital finance such as P2P lending and crowdfunding can significantly expand the access of individuals and MSMEs to finance. This can be accomplished in various ways, such as using nontraditional data including bill-paying records to generate credit scores and using distributed ledger technology (DLT) to record nontraditional assets as collateral. However, despite rapid growth in recent years, penetration remains low overall. Table 4.8 shows levels of new digital finance as a share of GDP in various ASEAN+3 countries. Aside from the PRC, the figures are tiny, less than 0.1% of GDP, and far smaller than the figures for commercial bank loans to SMEs as a share of GDP shown in Figure 4.9. This reflects the small

size of such loans, and their limited use mainly for working capital. It may also reflect basic limitations of the model, such as the lack of collateral or collection mechanisms in case of default. Inadequate access to the internet may also inhibit participation, especially in rural areas. This suggests that concerns about the competition of digital finance with traditional bank lending should not be exaggerated, at least in the near term.

It may take further technological and other innovations to fully unlock the potential of alternative finance to support financial inclusion. One possible approach is to integrate fintech into other financial inclusion policies. Two such examples from the Philippines include the following: (i) regulations were changed to allow banks to open microfinance windows to cater to MSME demand for small loans without collateral; and (ii) the central bank established a nationwide Credit Surety Fund for MSMEs' loans with participating banks. Loans granted under this scheme did not require collateral and credit history.

Table 4.8: Digital Finance Outstanding, Share of GDP
(%)

	PRC	Japan	Korea, Rep. of	ASEAN	ASEAN+3
2013	0.06	0.00	0.00	0.00	0.03
2014	0.23	0.00	0.00	0.00	0.13
2015	0.92	0.01	0.00	0.00	0.53
2016	2.16	0.01	0.03	0.01	1.20
2017	2.91	0.01	0.07	0.01	1.67
2018	1.55	0.02	0.04	0.07	0.93
2019	0.59	0.01	0.10	0.07	0.37
2020	0.01	0.02	0.08	0.09	0.03

ASEAN = Association of Southeast Asian Nations; ASEAN+3 = the ASEAN members plus the People's Republic of China (PRC), Japan, and the Republic of Korea; GDP = gross domestic product.

Note: The data refer to outstanding credit. The data for ASEAN exclude Brunei Darussalam and the Lao People's Democratic Republic.

Sources: CCAF (2020); CCAF, AIFZU, and ADBI (2018), Global Alternative Finance Benchmarks Database (accessed July 2021); and World Bank, *World Development Indicators* (accessed July 2021).

However, fintech credit options can vitally complement the banking sector in addressing the financing needs of the MSMEs and nonbank financial institutions, whose outstanding credit is also still relatively small but continues to expand.¹⁰ MSME participation in the capital markets remains limited. According to ADB (2020), MSME equity market capitalization in 2019 was about 14.8% of GDP in Viet Nam, the Lao PDR (5.9%),

¹⁰ ADB Asia SME Monitor 2020 Database. <https://data.adb.org/dataset/2020-adb-asia-sme-monitor-vol1-country-regional-reviews> (accessed July 2021).

Cambodia (2.6%), Singapore (1.9%), Malaysia (1.4%), Thailand (1.3%), and the Philippines (0.1%). Development of MSME bond markets in the region remains nascent (Shinozaki 2014). In addition, burgeoning bank-fintech partnerships and open banking initiatives indicate that fintech is not only influencing bank operations through competition, but also through adoption of new ways to develop products, approach the market, and assess the risks (Chuard 2021, Fintech News Philippines 2021).

4.4 COVID-19 and Fintech Adoption

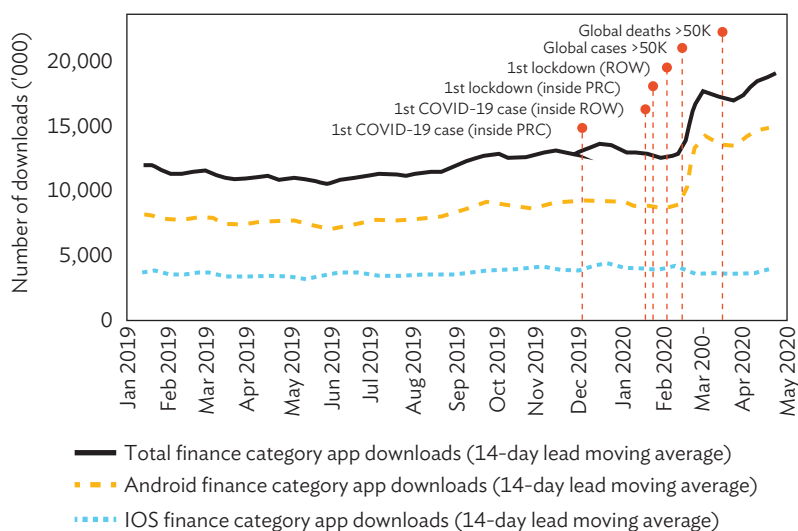
In response to social distancing, quarantining, and lockdowns to slow COVID-19's spread, individuals have increasingly adopted digital finance and fintech platforms. Using data from mobile apps in 74 countries from January to May 2020, Fu and Mishra (2020) find that downloads of financial applications (apps) have increased substantially since the outbreak of COVID-19 in January 2020. Except in Europe, financial app downloads grew from 24% to 32% in major regions. Figure 4.11 shows the sharp increase of fintech mobile app downloads since February 2020, when the first lockdowns outside of the PRC were implemented. The 14-day lead moving average number of daily downloads jumped from around 12,000 to more than 17,000 within a month and have kept growing at slower rates since then. The Android market drove growth, while the iOS market remained flat.

Use of financial apps also grew. At the end of March 2020, social distancing, lockdowns, and isolation led to a 72% increase in their use in Europe (deVere Group 2020). Between December 2019 and March 2020, use of financial apps grew significantly in Japan, the Republic of Korea, the US, the PRC, and several other major countries in Europe. Weekly growth was 55% in Japan and 35% in the Republic of Korea, and by about 20% in the PRC and the US (Statista 2020b). Developing economies, meanwhile, tended to report very large increases in digital payments and remittances, and smaller increases in digital lending, digital capital raising, digital banks, and digital deposits, according to a global survey of financial regulators. However, some economies reported significant decreases in digital lending, due to lower credit demand resulting from the economic downturn (World Bank and CCAF 2020).

The pandemic also prodded governments to expand efforts to provide financial aid and other cash transfers to their constituents electronically, as they are more efficient, cheaper, and reduce direct human contact, including visits to bank branches. For example, the Philippine government

boosted promotion of digital currency by raising to 56 the number of government institutions that accept digital payment through EGov Pay, the government's e-payments platform, by the end of March 2021 (Endo 2020).

Figure 4.11: Impact of COVID-19 on Adoption of Fintech Mobile Apps



PRC = People's Republic of China, ROW = rest of the world
Source: Fu and Mishra (2020).

Roles, Opportunities, and Future of Fintech

The spread of COVID-19 highlights the role fintech and digital finance can play in helping individuals and firms adapt to shifting norms. Fintech allows individuals and businesses to access financial services cheaply, efficiently, and conveniently—especially money transfers and payments—while maintaining social distancing and reducing human contact (Arner et al. 2020, Ozili 2020, WAIFC 2020).

In developing countries, where the urgency of financial inclusion has become clearer amid the pandemic and economic slowdown, fintech is essential to better financial inclusion, because many people in those countries mainly use mobile handsets to access financial services (Haidar 2020). The fintech industry also plays a significant role in government crisis

responses, benefiting from multiple measures from several central banks promoting fintech and digital finance to eliminate physical contact (Berg et al. 2020). The top three areas where fintech was having impact were digital disbursement of payments and remittances, delivery of government relief/stimulus funding, and healthcare, according to a global survey of financial regulators (World Bank and CCAF 2020).

Nonetheless, several risks associated with fintech also increased during the pandemic, such as cyberattacks, money laundering, and threats to data privacy (Zachariadis, Ozcan, and Dinçkol 2020). World Bank and CCAF (2020) also found that cybersecurity risks were financial regulators' biggest concern, followed by operational risks and consumer protection. Security and trust in fintech clearly need to improve (Ozili 2020). Korobov (2020) predicts several possible changes in the fintech industry after COVID-19 passes. First, fintech and retail services might merge, leading to all-in-one fintech apps which offer multiple services on one platform. Second, new collaborations between banks and fintech firms may arise as pressure mounts on banks to innovate. Third, governments and central banks will need to enact new regulations to monitor banking and fintech industries.

Challenges

Yet, the fintech industry, like other industries, is facing several challenges, such as economic slowdown, tighter financing conditions, and reduced investment. Fintech funding plunged in many regions (CB Insights 2020). In January–March 2020, fintech funding dropped 69% in Asia and fintech deals 23%, while venture-backed fintech funding dropped to \$6 billion. GP Bullhound's fintech index dropped by \$24 billion in January–March 2020, while fintech mergers and acquisitions and funding also slowed (Fintechnews Switzerland 2020).

COVID-19 also made life more difficult for financial regulators. Nonetheless, World Bank and CCAF (2020) reported high organizational preparedness, resilience, and adequacy of resources, although this was truer of advanced economies than of developing economies. This mainly reflects general resilience and adaptability amid COVID-19, rather than preparedness for a pandemic of this magnitude.

4.5 Implications of Fintech for Financial Stability

Fintech's widespread use has potential positive and negative implications for financial stability. This section focuses on the implications of the two main fintech sectors of interest—digital payments and alternative finance.

On the positive side, FSB (2017) argues that, theoretically, technology-enabled innovation in financial services has positive effects on economic growth and financial stability through multiple transmission channels, including decentralization and diversification, greater efficiency, transparency, and the access and convenience of financial services.

Yet, fintech can pose microfinancial and macrofinancial risks. Microfinancial risks leave individual firms, financial market infrastructure, or sectors particularly vulnerable to shocks. These include financial risks (maturity mismatch, liquidity mismatch and leverage) and operational risks (governance/process control, cyber risks, reliance on third parties, legal/regulatory risks, and business risks of critical financial market infrastructure). These apply to both incumbent banks and new fintech entrants (BCBS 2018).

Macrofinancial risks are system-wide vulnerabilities that can amplify shocks to the financial system, raising the likelihood of financial instability. They include unsustainable credit growth, contagion, procyclicality,¹¹ excess volatility of markets, and systemically important financial institutions (FSB 2017). Table 4.9 categorizes the kinds of risks arising from fintech, and they are described in more detail in the following subsections.

The entry of nonfinancial “bigtech” firms into financial services has implications for regulation, both for financial stability and consumer protection. The growing use by bigtech and other firms of exploding amounts of personal data raises important questions about consumer protection and privacy (Beck 2020, Carstens 2021).

Moreover, consumer protection becomes a greater concern as financial innovators introduce new products and services and increase financial inclusion. Lack of trust in financial services, partly due to experiences of fraudulent activities and financial crises, has been an important factor hindering the increase of financial inclusion (Beck 2020).

¹¹ Procyclicality refers to forces that tend to magnify the volatility of economic cycles, such as positive feedback loops between the real and financial sectors of the economy.

Table 4.9: Fintech-Related Macrofinancial and Microfinancial Risks

Sector	Macrofinancial	Microfinancial	
		Financial	Operational
Payment systems	Systemically important financial market infrastructure,	Financial market infrastructure failure	Cyber risks, third-party contractors
	Systemically important bigtech firms		
Remittances	Encourage volatile capital flows		Cyber risks
Digital currencies			
Cryptoassets			
Unlinked		DLT settlement finality	Cyber risks
		Exchange failure	Weak code and cryptography
Stablecoin	Weakening of banking sector	DLT settlement finality	Cyber risks
	Weaken monetary policy transmission	Exchange failure	Strength of code, cryptography
	Encourage volatile capital flows		
CBDC	Weakening of banking sector		Cyber risks
	Weaken monetary policy transmission		
	Encourage volatile capital flows		
Alternative finance			
Lending	Weakening of banking sector	Moral hazard of lending platforms	Cyber risks
	Contagion risks	Maturity mismatch, leverage	
	Procyclicality	Platform failure	
Equity-related		Platform failure	Cyber risks

CBDC = central bank digital currency, DLT = distributed ledger technology.

Source: Authors.

The lack of data and information on fintech activities constrains assessment of the implications for financial stability. Industry and academic groups are voluntarily collecting data on fintech activities, but these efforts are nascent. Also, the kinds of data regulators and supervisors need may differ (FSB 2017). So far, based on current estimates, fintech firms are not regarded as systemically important. Based on a study of 75 fintech firms quoted on the Nasdaq and Frankfurt stock exchanges using variance-covariance analysis, Franco et al. (2020) estimate that within the US

financial system, fintech firms increase systemic risk by around 0.03%, while in Europe they contribute close to 0%.

Based on this and other studies, the Committee on the Global Financial System and the Financial Stability Board (CGFS and FSB 2017) concluded that, so far, fintech-related credit is generally still small enough not to pose a systemic risk. Nonetheless, this conclusion could change if fintech services grow further. Particularly, the recent entry of bigtech firms, which have a competitive advantage due to the massive amounts of data on consumer spending behavior they possess, presents new and difficult regulatory trade-offs between financial stability, competition, and data protection (BIS 2019, Amstad 2019).

General Fintech Risks

Cyberattacks increasingly threaten the entire financial system, and fintech could raise this risk. The BIS cites cyber risk as perhaps the biggest fintech-related threat to financial stability, at least in the short term. The susceptibility of financial activity to cyberattacks is likely to increase as systems of different institutions become increasingly connected, if one of them proves to be a weak link (FSB 2017).

The computer code underpinning digital finance raises information asymmetry risks. The inability to know whether the code, public or otherwise, does what it is supposed to do increases uncertainty, particularly when a computer code (or proof of work or consensus finding) takes the place of a third party (Amstad 2019).

Decentralization may also increase information asymmetry, e.g., when comparing an initial coin offering with an initial public offering, since the latter is vetted by a central exchange, while the former is not. However, decentralization could also lower information asymmetries, following the general argument that decentralized markets are more efficient than a centrally planned economy and thus can allocate resources better (Amstad 2019).

Some fintech activities could increase reliance on third-party (outside contractor) service providers. For example, concentration of cloud computing services among a small number of firms could have significant implications for cloud-based financial services if operational problems arise. Disruptions to third-party services—such as operational problems—

are more likely to pose systemic risks if such third parties connect increasingly with systemically important institutions or markets (FSB 2017).

Payment System Risks

If innovative payment and settlement services develop into systemically important financial market infrastructure, their losses could impair the supply of important services and become an obstacle to recovery or orderly resolution. Some of these important services may be provided by a parent company in other business lines, such as bigtech firms, whose other operational priorities might conflict with the offering of financial services, and could be outside the normal financial regulatory scope (FSB 2017). Network effects and economies of scale and scope could also tend to promote greater market concentration and the emergence of nonfinancial players as systemically important entities, which could reduce system resilience.

As noted, because of their relatively small size, cryptoassets are not yet considered a systemic risk. Moreover, given the low probability of a private cryptoasset such as Bitcoin ever accounting for a significant share of transactions, the likelihood of a private cryptoasset ever becoming systemically important is low. However, this situation could change if one or more of them is widely adopted (FSB 2017). These risks are discussed below.

Operational risk is probably the main microfinancial risk related to cryptoassets, especially those that are decentralized and have little or no formal governance structure. Enforcing operational requirements to ensure the efficiency and stability a cryptoasset that has no governance structure and allows anyone to participate as part of the infrastructure would no doubt be challenging (FSB 2017). For example, private cryptoassets can work only if the incentives incorporated into their design support transactions in an environment where participants do not trust each other. These incentive structures have performed relatively well so far, but only at a relatively low scale. The risk remains that a private cryptoasset system could be introduced whose design is unstable (FSB 2017).

Individual users of cryptoassets face risks, e.g., the insolvency of critical third-party service providers of cryptoasset infrastructure such as exchange platforms. Bitcoin exchanges have failed numerous times to sufficiently safeguard the Bitcoins held by users, leading to millions of dollars of losses.

Widespread use of digital currencies (either private cryptocurrencies or CBDCs) might reduce demand for cash and related payment infrastructure, which could damage the ability of the payment infrastructure to provide efficient and reliable services. Regulation and supervision of a private cryptoasset would inherently be more difficult in view of its borderless nature. Digital currencies and digital wallets could displace traditional bank-based payment systems, while payment aggregators could become the main channel for accessing banks and applying for new bank accounts and loans, thereby becoming systemically important. Other oligopolies or monopolies may also develop, for example, in the collection and processing of customer data (FSB 2017).

Widespread use of cryptoassets might also diminish central bank control over monetary policy and economies and inhibit the effectiveness of lender-of-last-resort interventions, with negative implications for financial stability since monetary policy actions also support that. Section 4.7 discusses this issue further.

If the transaction volume of a global stablecoin increases dramatically, it is not clear that the issuer would be able to continue to supply it without disrupting payments and creating substantial volatility in the stablecoin value. In an economy with an unstable, unreliable government, the availability of a global stablecoin might increase the risk of capital flight. Therefore, a shift in holdings from a domestic fiat currency to a stablecoin may not only reduce the effectiveness of monetary policy but may also lead to significant depreciation of some currencies (Shirai 2020).

The Group of 20 leaders saw a need for monitoring the development of cryptoassets, noting that “... [W]hile crypto-assets do not pose a threat to global financial stability at this point, we are closely monitoring developments and remain vigilant to existing and emerging risks” (G20 2019). The G20 leaders also expressed concerns about stablecoins in their November 2020 communique, noting that “... [n]o so-called ‘global stablecoins’ should commence operation until all relevant legal, regulatory and oversight requirements are adequately addressed through appropriate design and by adhering to applicable standards” (G20 2020).

DLT solutions entail a number of new risks. In post-trade clearing and settlement, settlement finality is a legally well-defined moment, normally underpinned by a statutory, regulatory, or contractual framework related to a given financial transaction. Conversely, in a DLT solution based on majority votes, multiple parties have permission to update a shared ledger.

These parties must agree on the particular state of the ledger by consensus, meaning that the finality of settlement using this model may only be probabilistic (FSB 2017).

A key question for new technologies such as DLT is whether they can be implemented and operated securely across a wide range of adverse conditions. A DLT system is not immune to cyberattacks. It is vulnerable within software and hardware components, and hence could face increased risk of cyberattacks through its distributed network of participants validating transactions and updating the distributed ledger.

The strength of cryptography is another operational challenge for DLT solutions. If the system's encryption is compromised, a DLT solution may be at risk. As risks and threats are continually changing, the operators of DLT solutions must ensure that procedures and controls are continually assessed, improved, and adapted. This may be especially difficult in an open and "permissionless" system.¹²

There are also concerns about risks and limits to the smooth, not to mention feasible, operation of a payment system operating using DLTs. Morris and Shin (2018) develop a model in which banks using DLT-based payment systems have the option to delay payment. Depending on the parameters of the system, they find that banks would have an incentive to delay payments, which could lead to a "stalemate" of the system. Only a central bank would be able to break this stalemate, thereby undermining the argument for a decentralized system. BIS (2018a) also raises numerous questions about the feasibility of DLT-based payment systems, including scalability, a potential deficit of trust due to the fragility of the consensus approach to transaction verification, congestion issues leading to volatility of fees,¹³ and volatile prices.

Potential gridlocks or deadlocks may also pose major systemic risks. Such a situation could occur if participants lack sufficient liquidity to settle transactions, which could lead to settlement queues.¹⁴

¹² A permissionless system is one where the number of participants on the network is unlimited, and no one needs to get permission from another user in order to take part in it.

¹³ In settlement systems for cryptocurrencies, transaction fees can rise sharply when the number of transactions increases, especially if transactors desire rapid settlement.

¹⁴ This eventuality is normally addressed through liquidity saving mechanisms and queue management in existing Real-Time Gross Settlement systems.

The implications of DLT for wholesale and retail payments need to be carefully studied. DLT solutions are still at an early stage as a financial service instrument, and major work is needed to sufficiently evaluate their effectiveness.

Alternative Finance Risks

Fintech developments may accelerate the finance industry's recent tendency to shift credit intermediation away from commercial banks to nonbanks, a diverse and growing sector. To be sure, the alternative finance sector is still tiny and, were it to grow dramatically as result of penetration by bigtech firms, it probably would be subject to tighter regulation.

P2P lending is a major example of this. Greater competition from fintech lenders such as P2P lending platforms could reduce the profitability of traditional banks. The “unbundling” of bank business lines, as banks respond to competitive pressures by outsourcing certain activities to reduce costs, could shrink banks' revenue bases, making them more subject to losses and reducing their cushion of retained earnings as a source of internal capital.

The P2P lending business model carries inherent risks for financial stability (Nemoto, Storey, and Huang 2019). There are problematic incentives for platforms to originate loans without holding the risk of these loans. For example, P2P platforms usually receive revenue as a function of the loan volume generated, which could incentivize them to maximize loan origination at the expense of credit standards. In several countries, including the PRC, P2P platforms have committed fraudulent behavior and run Ponzi-like schemes. In response, Chinese regulators have largely shut down the sector.

Funding for these platforms mainly comes from individual investors who are not protected by deposit insurance, unlike bank deposits, which are insured in many countries.¹⁵ If lending platforms use their own balance sheet to intermediate funds, this could lead to maturity mismatches. On the other hand, P2P lending platforms are not seen as performing maturity transformation, so liquidity mismatch does not seem to be an issue. Leverage is not generally perceived to be an issue either, although

¹⁵ Moral hazard arises when investor returns are guaranteed by platforms, because investors would have no incentive to distinguish among risk categories.

it could be if P2P or crowdfunding platforms leverage their own balance sheets to fund lending activities (FSB 2017).

Lending platforms are also subject to macrofinancial risks. For example, large and unexpected losses suffered by a single fintech lending platform could lead to expectations of losses across the sector, possibly triggering contagion risks. Also, unstable interactions between investors and borrowers on fintech lending platforms could develop if a sudden unexpected rise in nonperforming loans leads to a sharp reduction of new funds. Having a large share of retail investors could raise this risk (FSB 2017).

A rising share of fintech credit could tend to lower lending standards and lead to more procyclical supply of credit. If fintech platforms grow to the extent that certain segments of the real economy rely heavily on credit from them, then any difficulties in those platforms could lead to a reduction in credit supply.¹⁶

4.6 Administrative and Regulatory Frameworks for Ensuring Financial Stability

Macprudential and Microprudential Risks Related to Fintech

According to the FSB (2017), regulation of fintech so far has focused mostly on consumer and investor protection, market integrity, financial inclusion, and promoting innovation or competition. Few regulatory authorities have cited financial stability as an objective for recent or planned regulatory reforms related to fintech.

Rapid innovation in fintech and its multifaceted aspects pose particular challenges for regulation. Most importantly, regulators need to balance requirements for microfinancial and macrofinancial stability against the benefits of innovation and financial inclusion. Regulation of fintech for financial stability also needs to be squared with the demands of regulation for consumer and investor protection, cybersecurity, data protection and anti-money laundering/counterterrorist financing (AML/CFT). Finally, “cross-border” issues involving the regulation of telecommunication firms and bigtech firms need to be considered. Countries differ in their emphasis on promoting fintech as opposed to regulating it (IMF 2019).

¹⁶ As noted in Section 4.3, this does not seem to be a risk in the near term.

Potential macrofinancial risks brought about by fintech include non-sustainable credit growth, increased interconnectedness or correlation, incentives for greater risk-taking by incumbent institutions, procyclicality, contagion, and systemically important financial institutions (SIFIs) (FSB 2017). Macrofinancial issues pertaining to systemic importance are contained in the FSB's SIFI framework, which recommends that financial institutions identified as systemically important be subject to stronger supervisory oversight, higher loss resilience, and recovery and resolution plans (FSB 2017).¹⁷

Potential microfinancial risks include both financial risks (maturity mismatch, liquidity mismatch, and leverage) and operational risks (governance/process control, cyber risks, reliance on third parties, legal/regulatory risks, and business risks of critical FMIs). Financial risks can be addressed mainly by regulating alternative finance platforms. Basic principles of such regulation would include forbidding platforms from providing guarantees to investors, forbidding them to use their own capital for investment activities, and requiring them to register and report regularly to regulatory authorities. Operational risks such as cyber risks may be addressed by appropriate supervision, although this probably will require developing new capacities on the part of regulators.

General Approach to Regulation of Fintech

The Bali Fintech Agenda, supported by the IMF and the World Bank, is perhaps the most comprehensive attempt in one framework to address these issues related to fintech. Table 4.10 shows its main elements, which underline the complex nature of the problem.

The relevant standard-setting bodies have also issued guidelines and standards related to fintech. As examples, the Basel Committee's Core Principles are applicable for assessing innovations in banking and the interaction between banks and fintech firms; the IOSCO Objectives and Principles are applicable for use of fintech in securities markets; the International Association of Insurance Supervisors (IAIS) Insurance Core Principles are relevant for fintech applications in insurance (InsurTech); and the Committee on Payments and Market Infrastructures (CPMI)-IOSCO Principles for Financial Market Infrastructures are applicable to fintech uses in payments, clearing and settlement (FSB 2017). In some

¹⁷ Bigtech firms that are engaged in fintech should also be defined as SIFIs if their scales become significant in the future.

countries, prudential authorities do not have authority over nonbanks, and some services previously conducted by banks are now being provided by firms not regulated by bank supervisors (BCBS 2018). In such cases, a new regulatory perimeter will have to be defined to promote systemic financial stability.

Table 4.10: Bali Fintech Agenda Elements: Balancing Opportunities and Risks

No.	Elements
1	Embrace the opportunities of fintech
2	Enable new technologies to enhance financial service provision
3	Reinforce competition and commitment to open, free, and contestable markets
4	Foster fintech to promote financial inclusion and develop financial markets
5	Monitor developments closely to deepen understanding of evolving financial systems
6	Adapt regulatory framework and supervisory practices for orderly development and stability of the financial system
7	Safeguard the integrity of financial systems
8	Modernize legal frameworks to provide an enabling legal landscape
9	Ensure the stability of monetary and financial systems
10	Develop robust financial and data infrastructure to sustain fintech benefits
11	Enhance collective surveillance and assessment of the financial sector

Source: IMF (2018).

To the extent that fintech activities are innovative and are not covered by existing legislation or regulation, legal and regulatory frameworks will need to be adapted and expanded. This applies to the full range of financial services, from customer interfaces to back-office systems and infrastructure (FSB 2017). The BIS classifies fintech-related regulatory innovations and policy responses into three categories: (i) those that adjust the regulatory perimeter and/or directly target fintech activities, (ii) those that focus on the use of new technologies in the provision of financial services standard-setting; and (iii) those that facilitate financial innovation or promote digital financial services more broadly (Ehrentraud et al. 2020).

Financial sector private laws, especially laws which pertain to payment and securities transfers, require a high degree of legal certainty to be effective. However, in contrast to previous efforts, which were responses to greater computing power and high-speed telecommunications, the continual need to better understand the rapidly evolving fintech environment is a key challenge (IMF 2019).

Fintech developments pose at least three challenges to legal certainty. First, various fintech business models have developed at high speed. They have moved within just a few years from basically zero to taking a key role in debates about the financial system. This contrasts with the normally drawn out processes for new regulations commonly seen in a system of public consultation with the most important involved stakeholders. The second challenge is related to the sheer number of government bodies involved. Financial regulation in many jurisdictions is spread across a number of institutions, including the central bank, financial supervisory bodies, other government departments such as the tax authorities, legislative, and the AML regulator. Third, for both regulators and market participations, fintech increasingly requires knowledge of computer coding on top of the normal legal and financial market knowledge (Amstad 2019).

Regulatory authorities may need to adjust their supervisory architecture and practices to fintech. Most regulatory authorities supervise fintech activities in line with ongoing supervisory processes in those firms' current organizational structures, yet some have significantly revised that structure (Ehrentraud et al. 2020).

Another challenge is to define the regulatory perimeter, i.e., what institutions and market participants fall under financial stability regulation and supervision, and hence also under the financial safety net (Beck 2020). Regulatory perimeter issues may affect the ability of authorities to follow fintech-related developments, depending on how flexible the existing regulatory framework is.

As bigtech firms increasingly enter financial markets as direct competitors of traditional financial institutions, financial authorities face new challenges on both a national and international level. A key question related to fintech and bigtech firms is whether one should regulate only financial activities or the whole entities. The activities of bigtechs are closely integrated and data from one operation is used in others as well. An example is Alibaba's Ant Financial and Alipay. Activity-based regulation may not be sufficient to treat banks and bigtech firms equally, because bigtechs are not subject to entity-based prudential regulation (Carstens 2021).

Regulatory fintech sandboxes, accelerators, and innovation hubs can be an important source of information about new activities and business models, and can provide important information to understand their risks

and incentives. However, even though sandboxes give policy makers valuable insights, they cannot be relied on as an all-encompassing solution for understanding the implications of and regulating fintech. They can be supplemented by “innovation facilitators,” such as accelerators and innovation hubs (IMF 2019).

Finally, regulations on consumer protection and programs for financial literacy must also take into account the need to extend them to digital financial services. Digital financial literacy encompasses knowledge different from conventional financial literacy, including knowledge about fintech services, their risks, how to protect oneself from those risks, and how to seek redress if one suffers damages (Morgan, Huang, and Trinh 2019). Without adequate knowledge, consumers are likely to make inappropriate use of fintech products and may suffer losses due to fraud or identity theft.

Digital Payment Services

Many countries have implemented fintech-specific regulations for digital payment services. Some countries aim to facilitate nonbank access to the payments market. In Japan, the Payment Services Act of 2009 allows nonbank firms to perform fund transfers, previously reserved exclusively for banks. However, unlike bank transfers, these nonbank transfers are limited to a maximum of ¥1 million. In Singapore, the pre-2019 framework was split into two pieces of legislation that regulated payment systems, stored value facilities, and money-changing and remittance businesses separately (Ehrentraud et al. 2020).

Many countries have a separate regulatory framework for e-money services. There are two broad types of e-money licensing regimes. In the first, e-money services are treated as a banking business and subject to bank-like prudential regulation. In the second type, nonbank e-money service providers need to obtain a particular license from the authority, subject to specific requirements (Ehrentraud et al. 2020).

Many countries have issued or plan to issue new regulations covering mobile payments and digital currencies. These regulations often aim to increase financial inclusion and provide greater access to consumers for payment services, as well as ensuring the smooth functioning of the payments systems, in line with existing responsibilities for payments infrastructure (FSB 2017).

Tokenization is developing in parallel to the spread of open application program interfaces or APIs, promoted by global payment card providers. The growing trend of third-party apps getting access to bank accounts and payment card accounts has focused more attention on the question of how to authenticate customers reliably (IMF 2019).

One of the most important challenges to developing a regulatory approach for cryptoassets is the lack of a common categorization. Regulators' definitions of cryptoassets usually share the following elements: (i) form of the asset—whether it is a digital or electronic representation of value; (ii) properties of the asset—if it can be transferred, stored, and traded electronically; and (iii) function of the asset—if it can be used as a means of payment or exchange, store of value, or unit of account. Usually, regulators use the underlying economic function as the main criterion for classifying cryptoassets and determining whether they fall within the regulatory perimeter and, if so, which regulation applies. In the case of stablecoins, the underlying assets criterion is also being used to determine regulatory requirements. In light of the risks of criminal and terrorist misuse of cryptoassets, countries are revising their regulatory frameworks to incorporate international AML/CFT guidance (Ehrentraud et al. 2020).

The Banking Sector

The development of fintech sectors will affect bank operations and, potentially, their financial stability through multiple channels. Although fintech firms often compete with banks and other traditional financial institutions, collaboration based on complementarities of comparative advantages is also widespread. Both trends are likely to accelerate following the pandemic.

On one hand, fintech firms provide services to groups not normally well served by banks, including the poor and MSMEs, and in this sense complement traditional providers. Banks have also benefited from the provision of innovative technologies by third parties (FSB 2019). Fintech firms have helped banks create a variety of new business models, shift them toward digital means of service provision (e.g., mobile and online banking), reach out to new customers with state-of-the-art platforms, and set up in-house incubators and innovation labs.

On the other hand, competition between fintech firms and other established financial institutions is emerging. For instance, purely digital banks such as Webank are directly competing for customers from traditional banks and even attracting new ones with their technological advantages and low-cost services. Bigtech firms are entering financial services at a rapid pace. Starting with payments, bigtech firms such as Alipay and WeChat Pay have expanded into other services including lending, insurance, and savings and investment products, either on their own or with financial institution partners. Compared with the incumbents, bigtech firms have the advantages of big data analysis, large networks, and economies of scale and scope, which might lead to greater concentration (Frost et al. 2019). Big banks are beginning to feel these competitive pressures and are responding in different ways, such as buying up small fintech firms or investing heavily in fintech.

In response to these developments, bank supervisors should promote safety and soundness by requiring that banks adopt appropriate risk management processes and control environments (BCBS 2018). Safety, soundness, and financial stability can be increased by implementing supervisory programs that make sure that banks have effective governance structures and risk management processes that suitably identify, manage, and monitor risks stemming from the use of fintech models, processes, or products (BCBS 2018).

Regarding third-party risk, safety, soundness, and financial stability can be improved by establishing supervisory programs to make sure that banks have suitable risk management practices and processes regarding any operation outsourced to or supported by a third party, including fintech firms, and that controls over outsourced services are maintained at the same level as those for operations that the bank conducts by itself (BCBS 2018). Risk management practices must be in line with portions of the Basel Committee's Principles for sound management of operational risk relevant to fintech developments (BCBS 2018).

Safety, soundness, and financial stability can also be improved by bank supervisors communicating and coordinating with relevant regulators and public authorities, including those responsible for data protection, consumer protection, fair competition, and national security. This is to make sure that banks using innovative technologies comply with the relevant laws and regulations (BCBS 2018). Finally, bank supervisors should review staffing and training programs to make sure that the knowledge,

skills, and tools of staff stay relevant and effective in overseeing the risks of new technologies and innovative business models. Supervisors may need to add staff with specialized skills to complement existing expertise (BCBS 2018).

Money laundering stands out as a key risk to market integrity stemming from fintech. The recommendations by the independent intergovernmental body, the Financial Action Task Force, are regarded as the standard for global AML/CFT activities (Amstad 2019).

Many economies apply existing banking laws and regulations to digital banking. Only a few have implemented specific licensing regimes for digital banks, e.g., Singapore and Hong Kong, China. In June 2019, the Monetary Authority of Singapore (MAS) announced a new digital banking framework with two kinds of licenses: (i) a digital full bank license, which allows the licensee to provide a wide range of financial services and take deposits from retail customers; and (ii) a digital wholesale bank license, which allows the licensee to serve SMEs and other businesses but not accept deposits in Singapore dollars from individuals (except for fixed deposits of at least S\$250,000) (Ehrentraud et al. 2020).

Alternative Finance

P2P lending: Increased access to credit, while benefiting some households and firms in the short term, could lead to excessive borrowing and in turn contribute to financial instability and impose costs on the financial system if the sector becomes sufficiently large. This highlights how important it is to monitor micro- and macrofinancial risks. To the extent that fintech firms carry out activities similar to those of banks, fintech credit platforms could be regarded as benefiting from regulatory arbitrage (FSB 2017).

Regulatory responses to P2P lending have varied greatly among countries. The United Kingdom (UK) and Japan have established regulatory sandboxes to permit innovating firms to experiment without being too burdened by legal constraints in their early-growth stages. However, P2P platforms in the US and the PRC are limited to the role of information intermediary, and therefore platforms in those countries need to depend on banks to originate the loans. Strict regulation in the US has limited the extent to which new entrants can compete with established platforms. The safeguarding of investors through provision funds, i.e., funds provided by the platform to protect investors against losses from nonperforming loans, is common in the UK, less seen in Japan and the US, and, although

formerly widely used in the PRC, is now prohibited there. The main challenge for regulators is to encourage the growth of digital lending to transform small business funding and enhance economic growth, while at the same time protect the financial system against systemic risks and maintain a fair, safe, and competitive market.

Nemoto, Storey, and Huang (2019) proposed eight principles for P2P lending regulatory frameworks:

- (i) P2P lending should provide a safe and effective investment channel for a broad segment of society.
- (ii) P2P lending should allow borrowers access to affordable and reliable capital on fair terms.
- (iii) Lending should differentiate among borrowers based on risk of default.
- (iv) Platforms should provide investors with an accurate understanding of credit risks and investors should hold at least some of the risk to prevent moral hazard.
- (v) Unviable lending platforms should be able to exit the market without causing losses to investors or funding shortfalls for borrowers.
- (vi) Lending should be robust enough during economic downturns to prevent sudden stops in lending, excessive default rates, and problematic failures of lending platforms.
- (vii) A competitive market between P2P platforms should be maintained to promote consumer choice; prevent rent seeking, monopolistic, or oligopolistic practices; and avoid the systemic risk of overreliance on one or a small number of platforms.
- (viii) The sector should be socially useful and serve the real economy.

In addition, there should be principles limiting the risk of balance sheet lending.

Balance sheet lending: Most countries do not have specific regulations for fintech balance sheet lending. Many countries have introduced fintech-specific regulations that apply to both loan and equity crowdfunding. Consumer protection has been the policy objective most cited by authorities, followed by the need to establish a level playing field and maintain financial stability. For the most part, regulatory requirements focus on consumer and investor protection, AML/CFT, and operational resilience (Ehrentraud et al. 2020).

Equity crowdfunding: Many regulators have amended or clarified existing rules for equity crowdfunding and for online marketplace lending. This has also been a major focus of the International Organization of Securities Commissions. These changes include defining new licensing requirements and clarifying where existing rules continue to apply (FSB 2017).

4.7 Implications for Design of Monetary Policy

In theory, the overall effect of nonbank finance, including fintech, on monetary policy transmission could be either positive or negative. Although bank leverage is limited by prudential regulation, the increasing role of (potentially) highly leveraged nonbank intermediaries for overall credit supply might strengthen the transmission of monetary policy via the nonbank lending channel. An increasing gap between prudential regulation of banks and nonbanks could reduce the dampening effect of the bank-capital channel for monetary policy transmission. In a comprehensive study analyzing both aggregate and micro-level data on several advanced and emerging economies, IMF (2016) finds that nonbank finance tended to strengthen monetary policy transmission (Bernot, Gebauer, and Schäfer 2020).

The development of fintech poses several risks for monetary policy transmission and financial stability. New financial infrastructure systems may have hidden weaknesses undiscovered in early trials, which could lead to financial disruption and critical episodes such as “flash crashes.” If privately issued cryptoassets become widely used for transactions, this may tend to reduce the use of official currencies and make it harder to track monetary aggregates. This could pose a challenge to obtaining information needed for setting monetary policy (Furche et al. 2017). In the near term, it seems unlikely that cryptoassets will be sufficiently large to have such an impact, but this will require closer monitoring. In particular, if global stablecoins become sufficiently popular, they could compete with domestic fiat currencies, undermining the effectiveness of national monetary policy (IMF 2020).

The introduction of central bank digital currencies (CBDCs) potentially presents the greatest challenges for implementing monetary policy. The features of a CBDC would largely determine its potential attractiveness to investors and hence the potential demand for it. A CBDC that pays interest and is readily transferable could prove attractive to institutional financial market participants and become a substitute for money market

instruments such as government bills, reverse repos, central bank bills, and foreign-exchange swaps. It could also be a liquid and credit-risk-free asset facilitating final settlement. A CBDC of a major currency usable by nonresidents could substitute for internationally used banknotes, bank deposits, and international reserve assets, and thereby become an important component of international capital flows (CPMI-MC 2018).

On the positive side, retail CBDCs could provide individuals with a new, safer, and more liquid asset; improve the effectiveness of monetary policy; and give central banks increased ability to track payment and settlement transactions (Shirai 2020). One possible benefit of a retail CBDC (especially an account-based CBDC) is that helicopter money or monetization of government debt could be implemented more easily if the public can directly hold deposit accounts with a central bank (Shirai 2020). Also, transactions using cryptoassets are traceable, and a positive or negative interest rate can be charged, potentially improving the effectiveness of monetary policies such as a negative interest rate policy (Shirai 2020).

On the negative side, during financial stress, domestic investors may consider a CBDC to be more attractive than private bank deposits, leading to a possible outflow of deposits from the banking system, with consequential implications for banking system stability. Also, central banks may be cautious for fear they would suffer reputational losses if their implementation of retail CBDC would not succeed (Shirai 2020).

On the whole, CPMI-MC (2018) concludes that the introduction of a CBDC would only have a minor impact on central banks' monetary policy implementation, i.e., how they carry out operations on their balance sheets to affect short-term interest rates. While a central bank would need to accommodate demand for a CBDC, flows into a CBDC would drain reserves in the system in the same way as flows into other assets such as banknotes and central bank deposits held by nonmonetary counterparties currently do (e.g., the treasury, foreign central banks, or financial market infrastructure).

CPMI-MC (2018) also concludes that the net effects of CBDC on the term structure of interest rates are difficult to predict, since they would depend on many factors. Depending on the specific assets held by the central bank to accommodate the issued CBDC, it would need to carry out various kinds of maturity, liquidity, and credit risk transformations. It is hard to predict

how these effects would balance out in terms of the structure of interest rates across asset classes and maturities. The implications of a CBDC relative to other instruments most probably will depend on each country's specific circumstances.

Fintech could potentially lead to new forms of cross-border financial flows. New instruments are being developed for transactions in capital markets, including international transactions, such as tokenized securities and blockchain bonds. Crowdfunding transactions may also occur cross-border. These developments could gradually hinder the role of traditional centralized financial intermediaries, with possible negative implications for the global financial system (IMF 2019). Both global stablecoins and CBDCs could pose financial stability risks for emerging market economies. For example, if residents of countries with high inflation or monetary policy systems with low credibility can invest in global stablecoins or CBDCs of a low-inflation country, this currency substitution effect could trigger capital outflows and weaken the domestic currency, as well as impair the effectiveness of monetary policy (CPMI-MC 2018, IMF 2020).

4.8 Role of Regional Cooperation

Regional financial cooperation in ASEAN+3 has tended to proceed cautiously, due to differences in economic and financial systems, levels of economic and financial development, concerns about the negative impacts of volatile capital flows, and the desire of countries to maintain sovereignty. Even within ASEAN, the principle of voluntary cooperation has been maintained. Liberalization of loan and equity flows has been substantial, but allowing direct investment in the financial sector, such as establishment of branches of one country's bank in another, has proceeded more slowly. In ASEAN, this is now encouraged through the so-called Qualified ASEAN Banks (QABs) program. Nonetheless, these qualified banks need to comply with both international standards and those prescribed by specific ASEAN country authorities, and the number of allowed cases is still small. The question is whether the common challenges posed by fintech can provide a lever to promote further cooperation in financial stability, financial integration, cooperation in cross-border payments and settlement, and harmonization of regulations and fintech practices, as well as learning from each other's fintech experiences.

Increased Focus on Fintech Risks

According to the Financial Stability Board (FSB), international bodies and national authorities need to increase their focus on fintech when making regular risk assessments and developing micro- and macroprudential regulatory frameworks in the following areas:

- Managing operational risks from third-party service providers
- Mitigating cyber risks
- Monitoring macrofinancial risks
- Cross-border legal issues and regulatory arrangements
- Governance and disclosure frameworks for big data analytics (FSB 2017)

Countries have called for greater international cooperation in many areas, including cybersecurity; AML/CFT; development of legal, regulatory, and supervisory frameworks; payment and securities settlement systems; and cross-border payments and capital flows. Standard-setting bodies also need to revise or develop international standards (IMF 2019).

The ASEAN+3 Macroeconomic Research Office is the logical body to assess these risks and propose coordination measures. However, this may require a substantial increase in staff since coverage of these issues will require expertise in new areas. These issues can also be taken up at the ASEAN and ASEAN+3 finance ministers' and central bank governors' meetings. A logical starting point would be to hold comprehensive policy dialogue for a wide range of issues on fintech within the ASEAN+3 finance group. More concretely, the ASEAN+3 finance ministers and central bank governors may launch a high-level working group on regional cooperation in fintech, discuss key issues, explore areas of cooperation, and implement cooperative initiatives step by step.

Work in this area has already started. Under the auspices of the ASEAN finance ministers and central bank governors, the ASEAN Working Committee on Financial Inclusion together with the World Bank carried out a broad assessment of activities relating to digital financial inclusion in the region. Given disparate rates of development of digital financial services, they emphasize the need for regional cooperation. "The broad spectrum of digital financial services development calls for greater intraregional knowledge exchange and cross-border investment. Aligning or standardizing regulatory frameworks throughout the ASEAN region, or

at least among the largest economies in the region with similar levels of financial development, would facilitate such exchanges” (Aviles, Sitorus, and Trujillo Tejada 2019).

They singled out cyber risks as an area that “... would even benefit from a coordinated regional approach” (Aviles, Sitorus, and Trujillo Tejada 2019). Finally, they noted that “... the ASEAN region’s broad digitization strategies and cooperation agreements should complement and be coordinated with [national financial inclusion strategies] and other strategies specific to the financial sector” (Aviles, Sitorus, and Trujillo Tejada 2019). The ASEAN Working Committee on Financial Inclusion report identifies the ASEAN Bankers Association and the ASEAN Financial Innovation Network as promising forums to advance public–private cooperation in these areas.

For cross-border banking, a pivotal regional mechanism is the ASEAN Banking Integration Framework (ABIF) endorsed in 2014. The framework, part of the commitment under the ASEAN Framework Agreement on Services, allows designation of QABs to banking institutions that meet the criteria subject to assessment and bilateral agreement. The designation will give the banks greater access to the other ASEAN economies (ASEAN 2015). Under the scheme, two Malaysian banks were granted the qualification to operate in Indonesia (ASEAN 2020, ASEAN Secretariat 2020). However, the overall pace of designating QABs in the region has been measured despite the willingness expressed by the national authorities.

ASEAN authorities have backed a study on the changing financial landscape in the region brought about by digitalization in preparation for the review of the ABIF Guidelines (ASEAN 2021). The initiative is arguably relevant and timely as ASEAN has made some progress in cross-border investment in digital banking. In December 2020, the MAS awarded digital banking licenses to four entities, including a consortium of Singapore Telecommunications Ltd (Singtel) and Grab Holding Inc (Grab); a consortium of Greenland Financial Holdings Group Co. Ltd, Linklogis Hong Kong Ltd and Ant Financial; and Beijing Co-operative Equity Investment Fund Management Co. Ltd. Among these, the first two got digital full bank licenses while the latter two PRC-based firms obtained digital wholesale bank licenses. The Philippines awarded its first digital bank license to Neobank Tonik in March 2021 (Tonik 2021). This could provide a boost to encouraging cross-border investment by more traditional banks as well.

Standardization and harmonization of systems in the area of capital markets are another important area for cooperation. At the level of ASEAN+3, the ASEAN+3 Bond Market Forum and the Cross-Border Settlement Infrastructure Forum are currently discussing the role of standardization to ensure interoperability of different systems.

In view of the current and potential global growth of fintech and bigtech firms, global financial stability can be improved by increased supervisory coordination and information-sharing for cross-border fintech that may affect banks, including the activities of bigtech firms (BCBS 2018).

The emergence of global stablecoins also poses new risks that make it desirable for authorities to coordinate on both the national and international level. Introduction of CBDCs should also be reviewed for possible side-effects on other member countries. The lack of harmonized standards and interoperability in some enabling technologies such as DLT represents another major challenge for authorities to overcome (Ehrentraud et al. 2020).

Supervisors can learn from each other's approaches and practices (BCBS 2018). Safety, soundness, and financial stability could be improved by supervisors studying the potential of new technologies to improve their methods and processes, and they share their practices and experiences with each other (BCBS 2018). The ASEAN Working Committee on Financial Inclusion report notes that "... intraregional knowledge exchanges, facilitation of cross-border payment systems based on country readiness, and partnerships between the private and public sectors to support innovation could greatly enhance development and use of digital financial services. In particular, countries in the region with more advanced digital financial services systems could continue regional and bilateral initiatives to share their experience and expertise with less developed neighbors" (Aviles, Sitorus, and Trujillo Tejada 2019).

Data sharing: Sharing of data for regulatory purposes is an important but controversial area. The use of digital financial data not only increases the amount of data, but makes it easier to share. Nonetheless, countries are likely to be reluctant to share sensitive private data. At least, the issue should be added to the agenda of areas for possible cooperative action. This also ties in with the possible use of big data for regulatory purposes, i.e., regulatory technology or regtech. Financial regulators can use big data to monitor systemic risk, with potential benefits for regional stability from sharing that information.

Trade finance: Fintech has shown great potential in utilizing big data, reducing the cost of delivering finance, and speeding up transaction processes. However, many institutional and legal barriers confronting fintech need to be solved through regional cooperation. Trade finance for SMEs is one important example. SME exporters are innovative, often young, and competitive. Yet, globally, banks reject 52% of their applications for trade finance, resulting in a very large global trade finance gap of \$1.5 trillion. As the main driver of world trade, Asia and the Pacific accounts for 77% of global export letters of credit, reflecting the region's high dependence on traditional documentary credits. Consequently, 40% of the global gap in trade finance is estimated to occur in this region, especially in developing economies such as the PRC (Di Caprio, Beck, and Kim 2017). Both banks and firms have high expectations that fintech, in particular blockchain-based transactions, will fill this gap. However, digital solutions have yet to be widely applied and traditional problems associated with providing financial support to SMEs in trade persist.

To reduce financing gaps for trade, fintech approaches need to address due diligence challenges associated with performance and compliance (AML/CFT) risks. For example, SMEs should be encouraged to use a Legal Entity Identifier, a standardized and globally harmonized identification number that can make the transaction visible; reduce the cost of conducting due diligence; facilitate collection; and track credit, performance, and commercial dispute data. Mutual recognition of individual digital identification would help as well. Regional or global cooperation is needed to achieve this. Moreover, establishing digital standards in trade, both technical and regulatory, would address the difficulties of creating metadata needed to underpin due diligence on performance and other risks that inhibit financial institutions or fintech platforms from providing more support to SMEs (Dicaprio, Beck, and Kim 2017). The ASEAN Free Trade Area Council would be one entity to guide this cooperation.

Central bank digital currency: The development of CBDCs is another potential area for regional cooperation. Perhaps, the main challenge is to develop mechanisms for carrying out foreign exchange transactions between CBDCs. This holds out the promise of substantially reducing the cost of foreign exchange transactions and increasing transparency. Multiple CBDC Bridge is one such development. First, initiated bilaterally by the Hong Kong Monetary Authority and the Bank of Thailand under the name Inthanon-LionRock, the project was renamed Multiple CBDC Bridge when the PBOC and the Central Bank of the United Arab Emirates joined. The project explores the capabilities of DLT and studies the application of

CBDC in enhancing multicurrency cross-border payments. By tackling pain points such as inefficiencies, high cost, low transparency, and complexities related to achieving regulatory compliance, Multiple CBDC is expected to build a real-time, 24-hour payment bridge between Asia and the Middle East (Auer, Haene, and Holden 2021).

The Singapore–Canada (Ubin–Jasper Project) effort is another example. It handles transactions between tokenized depositary receipts of the respective currencies. It has tested cross-border payments with DLT systems under different models including wholesale CBDC, and has proved a prototype commercial blockchain network for multicurrency payments to improve cross-border payment functionality (KPMG 2018). Also, Phase 3 of Project Stella involving the Bank of Japan (BOJ) and European Central Bank (ECB) investigated the feasibility of a ledger-agnostic protocol that synchronizes payments across different types of ledgers. It also assessed the safety and efficiency implications of a variety of payment methods which could be used in the cross-ledger payment. It found that such systems were feasible, but that various legal, compliance, technology, and cost/benefit analysis issues would need to be addressed before such a system could be implemented (BOJ and ECB 2019).

4.9 Conclusion

Fintech has been recognized as a promising tool to promote financial inclusion, allowing excluded households and small firms to gain access to financial products and services. Its use is increasing rapidly in ASEAN+3 economies, especially where financial systems are more traditional and less developed. However, it presents many challenges as well. First, left by itself, fintech may actually tend to widen gaps in financial inclusion, income, and wealth. Second, it potentially has positive and negative implications for financial stability. Fintech potentially poses both microfinancial and macrofinancial financial stability risks. COVID-19 has accelerated the shift toward fintech use by firms and individuals, underscoring the need for adequate regulatory frameworks. Among fintech segments, digital payments and alternative finance are most likely to pose risks for financial stability, which can be addressed by enhanced regulation and supervision and potentially by greater regional cooperation.

Digital payments are expanding rapidly and will likely play the most important role in promoting financial inclusion among the unbanked and underbanked. Payment systems which bypass the legacy channels of

bank deposits and credit cards, such as e-wallets and agent systems, are expanding the options and lowering costs for the financially underserved. The size of cryptoassets is very small, and they face various barriers to widespread use as stores of value or means of exchange, especially their high price volatility. Stablecoins could mount a more sustained challenge to legacy payment systems, however, and this trend needs to be monitored closely by G7 and G20 authorities. CBDCs could be implemented by central banks to stave off the challenge of stablecoins, but they also face difficulties in their implementation and potential limits to their usefulness.

Alternative finance is growing fast, but the scale remains very small relative to more traditional bank-centered finance. This reflects the small size of transactions, which are used mainly for working capital rather than investment, and perhaps basic limitations of the model, such as the lack of collateral or collection mechanism in case of default. However, if alternative finance models evolve to handle larger transactions, they may pose a more sustained threat to traditional banking.

Regulatory frameworks for fintech must address a complex intersection of issues. First, they need to balance the positive aspects of financial innovation against the needs for financial stability, consumer protection, cybersecurity, data protection, and AML/CFT efforts. Second, they must take account of the increasing role of bigtech firms and telecommunication firms not normally within the regulatory perimeter. The development of alternative lending platforms and digital currencies, either private or central bank, could have negative implications for the stability of the banking sector. Regulators must also work hard to upgrade their expertise and stay on top of rapidly evolving technologies and markets.

Fintech also has potential implications for the effectiveness of monetary policy and its operation. The development of alternative payment systems and digital currencies may make it more difficult for central banks to track developments of liquidity in the economy. The large presence of alternative forms of liquidity may also hinder the transmission of monetary policy. Fortunately, at this stage, the magnitude of such alternative instruments is judged too small to be a significant hindrance, although this could change. Regarding cryptoassets, stablecoins are more likely to pose a challenge than traditional cryptoassets such as Bitcoin, whose prices are very volatile, but even stablecoins face important limitations in scalability, congestion, and finality of transactions. On the other hand, if alternative currencies are interest-bearing, they could actually aid the transmission of monetary

policy. CBDCs would compete with other financial assets as substitutes for central bank reserves. However, it does not seem that their existence would significantly alter the ways central banks use their balance sheets to operate monetary policy.

Fintech offers many fruitful areas for international cooperation, including cybersecurity; AML/CFT; development of legal, regulatory, and supervisory frameworks; sharing of data; payment and securities settlement systems; cross-border payments and capital flows; and trade finance. If CBDCs develop in the region, mechanisms for enabling foreign exchange transactions involving them need to be implemented. Increased supervisory coordination and information-sharing is appropriate for cross-border fintech that affects banks, bigtech firms, and capital flows. Fintech may also provide a wedge for banking integration by permitting greater direct investment by fintech banks in other regional markets. Other cross-border challenges include dealing with the emergence of global stablecoins and harmonizing standards. In doing so, supervisors and regulators will find it useful to compare experiences and best practices in dealing with rapidly developing technologies and markets. These issues can be addressed by regional institutions such as ASEAN+3 Macroeconomic Research Office, the ASEAN and ASEAN+3 finance ministers' and central bank governors' meetings, the ASEAN+3 Bond Market Forum, the ASEAN+3 Cross-Border Settlement Infrastructure Forum, the ASEAN Free Trade Area Council, the ASEAN Bankers Association, the ASEAN Financial Innovation Network, and the ASEAN Working Committee on Financial Inclusion.

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