

ENABLING FINANCIAL INCLUSION IN APAC THROUGH THE CLOUD





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With a presence in London, Singapore, Washington and New York, OMFIF is an independent forum for central banking, economic policy and public investment – a neutral platform for best practice in worldwide public-private sector exchanges.

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FOREWORDS

CLOUD COMPUTING CAN DRIVE ECONOMIC AND SOCIAL CHANGE

THE global financial services industry is undergoing a digital revolution, triggered by the advent of new technologies, changing consumer behaviour, and competition from disruptive fintechs. Cloud computing is at the heart of this shift. The Covid-19 pandemic and the ensuing push towards further digitisation have accelerated cloud adoption in the industry. Cloud provides financial institutions with flexibility, scalability and operational resilience. It enables them to deliver cost-effective digital financial services such as remittances, lending and insurance to underserved and unbanked communities. Around 1.7bn adults are unbanked globally. Of these, nearly 40% are in Asia Pacific. According to the Asian Development Bank, the effect of banking the unbanked could boost gross domestic product by 2–6% in many Southeast Asian markets. By enabling more innovation, cloud computing can support financial inclusion and drive economic and social change.

Amazon Web Services is working with fintechs across the region to support them with their infrastructure requirements. Some offer innovative payment solutions. Others are empowering small and medium enterprises through digitisation and technology, reducing bureaucratic barriers, and creating new growth models.

To further support innovation in digital finance, policy-makers across Asia Pacific are introducing forward-looking policies. Regulators in some countries have implemented principles-based outsourcing frameworks to enable cloud service providers to offer innovative infrastructure services. AWS is a strong advocate and supporter of pragmatic forward-looking policies. We continue to engage with policy-makers and regulators, helping them develop policy frameworks that support innovation and inclusive finance.

This report highlights the potential of cloud in improving financial inclusion. With guidance from policy-makers and regulators, it identifies key policies to bolster financial inclusion through digital finance. ●

Melissa Ingber, Senior Global Manager, AWS Institute and Michael Punke, Vice-President of Global Public Policy, AWS

FLEXIBLE, ACCESSIBLE, SAFE TECHNOLOGY NEEDED MORE THAN EVER

IN September 2019, at a gathering of blockchain specialists in Singapore, I first heard about innovative solutions designed to enable the furthest-flung rural communities in India, Vietnam and Indonesia to access digital payments. These solutions allowed farmers to make and receive payments without a dependency on continuous internet access, reducing payment cycles and risk. Far more 'real' for these farmers, was their ability to travel back to their villages with a diminished fear of robbery on their journeys.

Until that moment, the everyday value of financial inclusion hadn't sunk in. The 290m unbanked in Southeast Asia presented an untapped opportunity for bankers and traders, my professional capacity at the time. Here there was a chance to increase participation and accelerate economic progress. Yet, there was a second perspective. These farmers were unfamiliar with internet technology. They lacked financial and digital literacy, and did not always understand how vulnerable they might be in a more connected world. It was clear that they required protection, but how could this be developed in a manner that didn't deprive them of access to life-changing opportunity?

2020 has been a year of change and opportunity. The acceleration of cloud adoption has enabled many to continue to participate in a widely distributed workforce. In countries with less stable internet availability, workers found themselves using mobile phones to access the tools that their organisations employed. Bandwidth-light mobile applications, hosted on cloud, enabled operations for many organisations to continue.

Flexible, accessible, safe technology is needed now more than ever. Corporations and their providers must work with policy-makers to build a future that enables the participation of urban and rural dwellers alike. By taking a shared responsibility for the development and deployment of emerging technologies, corporations and governments will advance the inclusion of all people.

In this report, OMFIF and the AWS Institute have come together with this shared responsibility in mind. Working with 18 decision-making bodies, we outline key considerations for furthering cloud adoption and financial inclusion. ●

Tamara Singh, Head of Asia Pacific, OMFIF

PREFACE

IN this paper, OMFIF and the AWS Institute look at the state of financial inclusion in Asia Pacific and the role of cloud computing in supporting more accessible, cost-effective and flexible delivery of fintech. People and small businesses throughout the region struggle to quickly access financing and transfer money safely and securely. The accelerating shift of financial services to digital, prompted by Covid-19, presents promising opportunities.

Central banks and regulators acknowledge that cloud computing will be an important technological enabler in extending accessibility to underserved communities. However, applications of cloud computing must address the specific challenges and characteristics of developing markets in the region. Expanding access to appropriate digital financial services will entail applying cloud to key fintech applications, alongside complementary policies. In particular, cloud's ability to deliver streamlined and agile data processing will benefit digital payments and the development of digital identity frameworks.

Cloud implementation will require regulatory reform. The public and private sectors must work together to navigate cloud's opportunities and perceived threats to the financial sector. This report distils views from multiple regulatory bodies charged with pushing responsible financial innovation and ensuring the integrity of financial infrastructures. Contributors' insights are reflected

throughout to give an overview of where work remains to be done to ensure cloud acts as a catalyst for financial inclusion.

In writing this report, the team surveyed and consulted 18 policy-makers, regulators and officials from central banks, supervisory authorities and international organisations. Of these institutions, 16 were from East, South and Southeast Asia.

Although some participants and institutions requested anonymity, we would like to thank the following organisations, individuals and their respective teams for their contributions:

Djauhari Sitorus, Head of Project Management, National Council for Financial Inclusion of Indonesia

Heng Bomakara, Deputy Director General, National Bank of Cambodia

Ippei Shimizu, Deputy Director, Japan Financial Services Agency

Emmanuel San Andres, Analyst, Asia Pacific Economic Co-operation Policy Support Unit

Jisoo Park, Economist, Bank of Korea

Lotte Schou-Zibell, Regional Director, Asian Development Bank

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Myanmar Financial Regulatory Department

Bangko Sentral Ng Pilipinas

Monetary Authority of Singapore

EXECUTIVE SUMMARY

ASIA WAKES UP TO THE POWER OF THE CLOUD

Covid-19 has accelerated the digitisation of financial services. In Asia Pacific, policy-makers are becoming increasingly switched on to the benefits of cloud technology. This may have a profound and positive impact on the development of innovative solutions for financial inclusion.

DECADES of almost unbroken economic growth have made many Asian nations the envy of the rest of the world. Highly sophisticated financial systems, from capital markets to banking and payments, have developed rapidly in these new centres of prosperity.

But that financial infrastructure has often failed to pick up poorer sections of society or smaller businesses. Financial inclusion – or more accurately, the provision of financial services to those excluded from them – has become a key issue for politicians, banks, payment providers and policy-makers in Asia.

Among the latter group, it is certainly one they take seriously. In an OMFIF survey of central banks and financial regulators analysed in detail in this report, 73% of respondents identified financial inclusion as an explicit target or objective for their institution.

According to the same policy-makers, 90% of respondents believe that digital payments will be the core competency in extending basic financial inclusion.

Providing the underbanked with financial services is therefore intertwined with policies related to digital infrastructure reliability and conducive fintech ecosystems. Data management costs, processing and storage issues, and reliability of digital infrastructure are all ubiquitous fundamentals associated with the development of digital financial services. However, legacy infrastructures have offered little to avert the rising barriers for smaller fintechs and new entrants that could potentially provide meaningful solutions to improve financial inclusion, leading to suboptimal outcomes.

Advances in the cloud could provide the impetus which has so far been lacking. Cloud computing can help facilitate the digital shift of incumbent financial institutions and the market entry of new challenger fintechs alike by providing the high-volume, high-intensity computing power that supports digital financial services. It also enables scalability at a lower cost, aligning the provision of affordable products and services to significant populations of underbanked individuals and small businesses.

This report lays out the progress made towards

expanding financial inclusion in the Asia Pacific as well as the underlying policy areas in which cheaper, more streamlined access to financial services can drive the potential for economic development and empowerment among individuals and businesses.

In infrastructure-constrained rural areas, and among small, innovative financial service firms, migration of workloads to the cloud can greatly optimise IT operational costs, benefiting both firms and end-users. In particular, cloud policies that complement fintech applications and government initiatives in basic areas such as digital payments and secure digital identity will be key foundations to catalyse cheaper, more efficient means of providing accounts, transactions, loans and savings to the unbanked.

As these new technologies and business models for financial services emerge, regulatory institutions and central banks will correspondingly need to attain a better understanding of the benefits and challenges of cloud platforms and their utility as inclusive financial service infrastructures. Although cloud can help deliver customised, effective and profitable financial services with tailored products to specific demographics, there are also concerns over data management, exchange and operational resilience linked to regulatory mandates for consumer protection and financial stability.

Despite the challenges from cloud and other new technologies, many central bank and regulator respondents to the survey are confident that improving awareness and promoting effective governance and risk management capabilities will enable central banks and financial institutions to enjoy the advantages of cloud, while minimising its risks.

In line with this, rather than taking a passive approach to cloud regulation, several jurisdictions in Asia Pacific have developed, or are in the process of actively developing, guidelines and rules that clarify regulatory requirements and expectations for compliance and risk management in the adoption of cloud services. As cloud migration and implementation eases and supervisory safeguards improve, the contributions of cloud to financial inclusion in Asia will only increase. ●

KEY REPORT FINDINGS

Financial inclusion is a prominent regional policy priority among governments, regulators and central banks in Asia Pacific

- Although Asia Pacific has made significant progress on financial inclusion, progress remains uneven across advanced and developing economies.
- Of the 27% of central banks and financial regulators that did not identify financial inclusion as an explicit target or objective, all respondents identified financial inclusion as an implicit goal.

Financial inclusion strategies must holistically account for usage, literacy and trust as well as basic access

- Due to low levels of understanding and trust of new technologies, underbanked and unbanked communities may be reluctant to adopt novel fintech innovations. Financial education and literacy policies play a critical role in enhancing awareness of fintech innovations and promote their usage.
- Advanced economies will have to grapple with similar issues as developing counterparts, to ensure that financial innovation is inclusive and can connect with the needs of older consumers.
- Policies that promote awareness, skills improvement and cost-reduction in digital financial services will be increasingly important to reduce the disproportionate vulnerability of the elderly to being left behind amid advancements in fintech innovations.

The capacity for digitisation in transactions and identities will be an intrinsic aspect of safe, convenient, and affordable financial services and products

- Digital payments will be a core foundation for extending basic financial inclusion. More than 90% of respondents consider that innovations in digital payments processes were among the most significant areas in which fintech was improving financial inclusion objectives within their own jurisdiction.
- A well-functioning and inclusive digital payments system will serve as the foundation to provide further access, and gradually build consumer confidence in more sophisticated products and services.
- Creating or mandating inter-functionality among heterogeneous payment infrastructures and mobile money wallets will protect consumers against higher transaction costs, delays or impracticality.

- Central banks and regulators in Asia Pacific emphasise the cardinal role of digital identity and electronic know-your-customer mechanisms in scaling up a secure digital financial system. Among respondents, 69% selected this as an essential feature to increase financial inclusion and migrate customers to digital financial inclusion.

Reliable mobile infrastructure and network connectivity is needed to process data and ensure provision of digital financial services

- 75% of respondents identified mobile network infrastructure as an important foundation for financial inclusion.

Cloud can be a catalyst for developing countries to leapfrog and be the IT backbone for inclusive financial services

- Cloud allows computing demands and data processing requirements to be distributed across borders, thereby allowing consumers and businesses to circumvent domestic digital bottlenecks via cross-border data flows with advanced economies' data infrastructures.
- The lack of reliance or path dependency on legacy IT solutions can work to the advantage of developing country financial institutions and fintechs. These entities can be more receptive to policies incentivising them to leapfrog to potentially cheaper, more effective technologies like cloud.

- According to 80% of survey respondents, the cost savings of IT investment and the resultant increase in market competition were the primary benefits of cloud services to financial inclusion.

Central banks and regulators gaining familiarity with supervising cloud-based financial activities

- Several jurisdictions in Asia Pacific have developed, or are in the process of developing, guidelines and rules that clarify regulatory requirements and expectations for compliance and risk management in the adoption of cloud services.
- Large-scale cloud service providers and private business adoptees of cloud are engaging with regulatory concerns over data management and operational resilience by developing internal precautions, infrastructure redundancies and accountability frameworks delegating shared responsibility between providers and customers.



SECTION 1:

APAC'S FINANCIAL INCLUSION IMPERATIVE

While financial inclusion is improving, stark disparities remain across the region. By providing cheaper and easier access to financial services, technology could help bridge these gaps.

THERE is wide recognition that financial inclusion is necessary for inclusive and sustainable growth, and that technology could play a pivotal role in accelerating its progress. With 1.7bn people still unbanked globally, financial inclusion remains a major challenge for policy-makers and financial institutions.

Financial inclusion is often defined as access to financial services, but a more meaningful view of it should go beyond access. Exclusion can be voluntary, where an individual or business chooses not to use the service, or involuntary, where the cost to use features of the service – such as transaction fees – is too high. The quality of services offered and substantive use of these should also be considered.

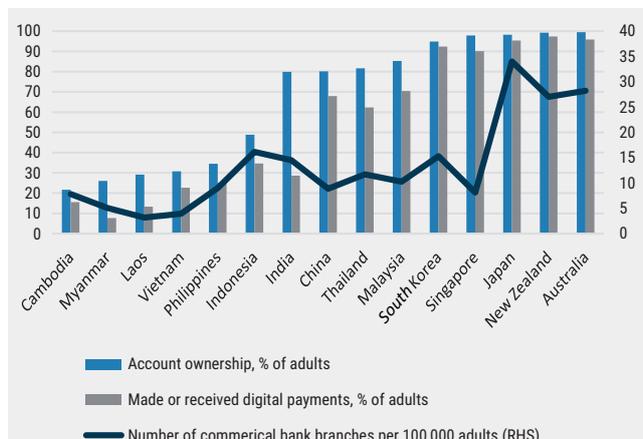
Advancing financial inclusion can boost economic growth by encouraging saving behaviour, promoting entrepreneurial activities and helping households manage risks. Technology-enabled financial innovations, or fintech, can transcend barriers to financial inclusion that

traditional modes of transaction have struggled with. Fintech solutions provide cheaper access through products better tailored to the needs of excluded individuals. Flexible and decentralised service delivery through tech-based platforms expands coverage beyond what physical, brick-and-mortar institutions can reach.

Digital solutions can also enable a more inclusive approach to credit and insurance provision. Advanced data analytics, using artificial intelligence and machine learning algorithms, can help financial services firms serve individuals with no formal credit histories. Alternative data, such as mobile usage or social media patterns, can be used to assess the eligibility of previously unbanked or underbanked applicants. Broadening societal access to credit enables people to invest in long-term goals that uplift quality of life, such as personal health, education and business expansion. Similarly, wider delivery of insurance products protects vulnerable households and businesses from financial risks stemming from

1. Uneven progress for financial inclusion in Asia Pacific

Source: World Bank Global Findex 2017, IMF Financial Access Survey 2018, OMFIF analysis



emergencies and other adverse events.

Cost effectiveness and optimisation in the delivery of digital financial services are critical to their widespread adoption and, ultimately, greater financial inclusion. Cloud computing is an important technological innovation that can reshape digital finance. By allowing more flexibility, scalability and operational resilience than traditional information technology infrastructure, it is an ideal computing resource for fintech solutions that need to respond to growing demand. Cloud services can enable data processing and storage on an as-needed basis, minimising upfront and expansion costs.

A joint study between Boston Consulting Group and Amazon Web Services estimates that spending on the cloud and related services is growing at a compound annual rate of 25% across Asia Pacific. Cloud adoption will only grow further as businesses reconfigure operations to cope with the challenges and restrictions of Covid-19. In this period of transition, there is an opportunity to use accelerated digitalisation as a means of expanding financial inclusion.

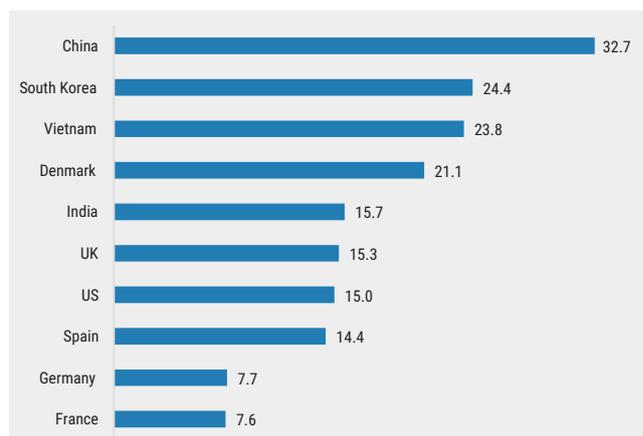
PRONOUNCED DISPARITIES ACROSS ASIA PACIFIC

Financial inclusion has been on an upward trend globally. Bank account ownership rose to 69% in

2017 from 51% in 2011. Progress is largely due to policies emphasising financial inclusion, as well as wider use of mobile phones and the internet. Nonetheless, considerable barriers remain in many parts of the world. Out of the 1.7bn unbanked population, nearly 40% are in Southeast Asia and India, home to rapidly growing and urbanising societies.

There are pronounced disparities across Asia Pacific. South Korea has more than 200 ATM machines per 100,000 adults, significantly higher than the global average of under 50. In stark contrast, Myanmar has less than six. Notably, the disparity in formal account ownership and digital payments activity in countries such as India, Myanmar and Laos demonstrates that there is potential for greater expansion of digital financial services in the region.

There is uneven progress in Asia



2. China leads in mobile payments adoption

Projected user penetration rates of mobile payments applications, by country

Source: World Economic Forum, Statista Digital Market Outlook and OMFIF analysis

Pacific on the number of accounts, their use and physical means to access them (Figure 1). Advanced economies such as South Korea, Singapore, Japan and Australia have high levels of account ownership, digital payments activity, and physical access to brick-and-mortar financial services. However, there are wide gulfs between account ownership, poor physical bank branch presence, and lower levels of digital payments activity in developing economies. In Myanmar, for instance, only 26% of working adults have an account, while 7.7% are engaged in digital payments activity. This suggests innovation and technology could leapfrog traditional infrastructure.

India is an interesting case, with a high number of accounts, but low levels of use. This exemplifies dormant account and inactivity issues, where conventional financial inclusion targets have not been effective in enhancing financial activity. This could be due to demand and supply problems (see p.11).

The private sector has led much of the development of digital financial services in some countries, especially in places where in-app payments services took off. China is a prime example of the mobile payments boom. A projected 32.7% of point-of-sale payments are made via mobile, double the figure in the UK (15.3%) and US (15.0%) (Figure 2). The People's Bank of China reported a 36-fold increase in the volume of mobile transactions to 61bn in 2018



200

South Korea has more than 200 ATM machines per 100,000 adults, significantly higher than the global average of under 50. In stark contrast, Myanmar has less than six.



fast-growing, smartphone-wielding populations.

The digital transformation in these countries, pushed by organic demand for specific digital service platforms, created an ideal landscape for exploring digital financial services. Their progress in developing digital solutions reflects populations' preference for technology, convenience and digitalisation of services. Countries with a greater affinity for technology and mobile solutions could provide models for others in the region.

PANDEMIC-DRIVEN DIGITALISATION

The Covid-19 crisis has placed sharper focus on the importance of digitalisation and financial inclusion. The Bank for International Settlements has noted a precipitous rise of interest in more inclusive, lower cost payment services as new financial technologies align with public health concerns and the efficient disbursement of government relief to households.

One respondent to the OMFIF survey said, 'Part of our response to Covid-19 and natural disasters has been providing fiscal response packages to governments. Quite a few of these comprise cash transfers, but it is difficult to make sure that these cash transfers reach the end users because the basic infrastructure is not in place, such as the basic payment rails. How do you get money, vouchers and cash transfers to these people in an efficient and cost-effective way? Covid-19 has helped facilitate the increased traction of these goals as well.'

One Southeast Asian central bank commented: 'With various public sector initiatives to onboard all segments of the population into the digital economy, the general population is implicitly being prepared for an online banking disruption. These initiatives include personal income tax-refund and various social welfare payments including those for seniors, child support, and Covid-19 relief that are being made available through digital wallets.'

Inclusive access to financial

from 1.7bn in 2013. The country's two dominant mobile payments platforms, Alipay and WeChat Pay, account for 93% of these transactions. Their ubiquity, ease of use and convenience, coupled with their integration with other in-app services, have established them as key players in the Chinese payments system.

Both Alipay and WeChat Pay have sought to expand in neighbouring Southeast Asia, but face stiff competition from local players like GrabPay and GoPay. Mobile wallets succeeded in part because they originated from separate digital services for which there was already a high volume of transactions, providing a natural incentive for adoption. Alipay enabled mobile

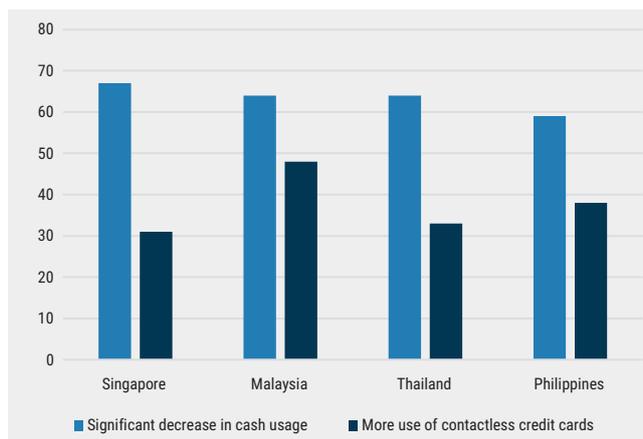
payments for e-commerce giant Alibaba. WeChat Pay facilitated transfers between contacts on a messaging app. GrabPay and GoPay are offshoots of ride-hailing services Grab and Gojek.

Uptake of digital payments and services has accelerated in the last decade alongside improvements in telecommunications infrastructure. China, Japan, Singapore and South Korea, global leaders in 5G deployment, have high-quality digital infrastructure that encourages use of mobile wallets and other digital services. Southeast Asian countries like Indonesia, Malaysia, the Philippines, Thailand and Vietnam are not far behind, having had to scale up telecom infrastructure to connect

3. Covid-19 changing consumer payments preferences

Share of respondents, %

Source: Mastercard Impact Studies (2020), OMFIF analysis



services can shape the social and economic resilience of households and communities. It plays an important role in the success of public health measures. Online and mobile money platforms have enabled continued payment and receipt of wages despite restrictions on physical movement. Contactless transactions help minimise exposure to the virus and reduce risk of community spread.

Digital financial services have played an important role in previous public health crises. During the 2014-16 Ebola outbreak in West Africa, mobile cash transfers allowed frontline workers to continue receiving their correct wages without physical contact. The Bank of Sierra Leone issued mobile money guidelines to promote cash transfers to frontline workers. In China, the 2003 Sars epidemic was partly responsible for the rise of digital payments and e-commerce. Retail companies started to transact online when consumers refused to leave their homes.

Understandably, cash use has declined significantly in Asia Pacific since the start of the Covid-19 pandemic. According to a Mastercard survey in April, cash payments fell 67% in Singapore, 64% in Malaysia and the Philippines, and 59% in Thailand. This was mirrored by an increase in the use of contactless payment methods as Malaysia, the Philippines and Thailand saw an increase in card, mobile and digital wallet transactions (Figure 3).

The pandemic is altering consumers' long-term preferences

in how they pay, save and transfer value. The survey revealed that non-cash payment methods were now the preferred choice for 72% of consumers in Asia Pacific. This preference was strongest in Singapore (76%) and Australia (67%).

Overall, 75% of respondents in the region want to forgo cash in the future.

Incumbent financial institutions of all sizes are being forced to embark on or accelerate digital transformations. As one respondent explained, for Southeast Asian banks, 'Covid has, in the most unintended way, pushed financial institutions to go digital, because there were banks that couldn't acquire a single new customer for three, four months, because there were no branches or agents going on the ground to collect instalments from people and recover costs.'

The accelerated digitalisation of financial services has highlighted the need for regulatory policy frameworks supporting adequate

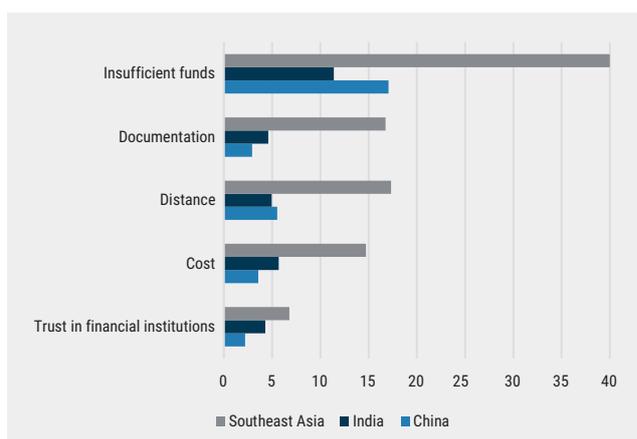
data infrastructure, platform interoperability and cybersecurity. Governments must take action to prepare for the new risks that financial innovation brings. Policy needs include strengthening consumer protection, enhancing financial and digital literacy, upgrading and expanding access to digital infrastructure, and mitigating potential data biases.

CHALLENGES TO INCLUSION

Supply- and demand-side factors constrain financial inclusion. Supply-side barriers represent the limitations on the financial sector's capacity to provide financial services, while demand-side barriers reflect challenges that users face.

On the supply side, high upfront costs, limited credit data and lack of convenient access points are examples of market-side constraints. Physical and economic connectivity challenges are prominent in smaller states in Asia Pacific, especially if they are geographically isolated. Even for bigger countries, delivery of financial services to rural or far-flung towns can be problematic, more so in archipelagic settings. These factors are exacerbated by the region's proximity to the Pacific ring of fire, which is prone to frequent natural disasters. These physical and geographical constraints make clear the importance of digital financial services that can bridge the distance and help facilitate post-disaster response.

Market players also face regulatory challenges, particularly when



4. Lack of funds and documentation prevent individuals from opening bank accounts

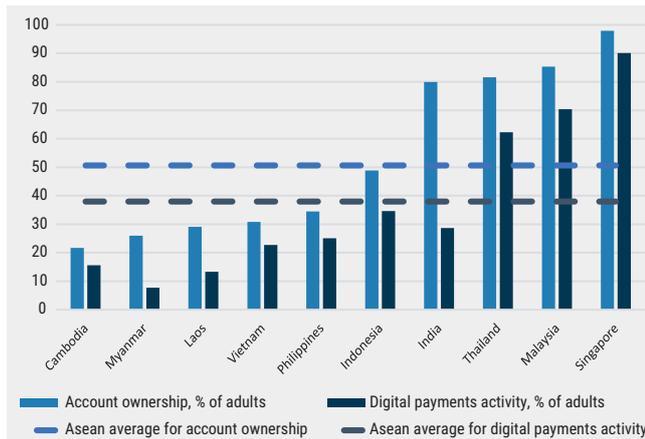
Major barriers to account ownership, share of respondents, %

Source: World Bank Global Findex 2017, OMFIF analysis

5. Wide disparity in account ownership and digital payments across Southeast Asia

Rates of account ownership and digital payments

Source: World Bank Global Findex 2017, OMFIF analysis



they need to comply with capital adequacy and supervisory rules that apply to traditional banking services. Fintech firms that cater to low-income individuals and small businesses do not have the same level of capital as larger institutions, nor are they always able to implement conventional know-your-customer processes. Lotte Schou-Zibell, regional director at the Asian Development Bank, said, ‘Remote areas in Asia Pacific have issues with connectivity and electricity, and people do not always have IDs, which results in them being financially and socially excluded.’

The latter directly relates to a demand-side challenge. Excluded individuals often face identification and documentation requirements that are difficult to obtain due to lack of resources, geographic distance, illiteracy, or some combination of these. Small and medium-sized enterprises, especially microbusinesses and microentrepreneurs, face similar problems.

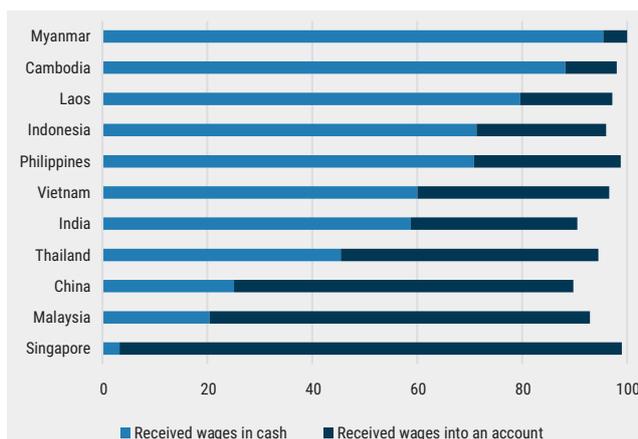
Among Southeast Asia’s unbanked, other demand-side factors contributing to financial exclusion include lack of funds, physical distance, high transaction costs and distrust of financial institutions. There is considerable opportunity for digital financial services that offer affordable, secure and flexibly adjusted services tailored to low-income communities. As Emmanuel San Andres, analyst in the Asia-Pacific Economic Co-operation policy support unit, explained, ‘There are

‘Cloud adoption will only grow further as businesses reconfigure operations to cope with the challenges and restrictions of Covid-19.’

significant disparities in the degree of financial inclusion between the rich and poor, urban and rural dwellers, and men and women in Asia. For instance, only around 10% of adults in Indonesia’s poorest quintile have a formal bank account, compared to an estimated 60% in the richest quintile. Without access to financial services, the poor and unbanked segment of the population misses out on opportunities for socio-economic mobility.

Despite the global increase in bank account ownership, some countries still lag. In Southeast Asia, only Singapore, Malaysia and Thailand are above the regional average percentages for account ownership (51%) and digital payments activity (38%) (Figure 5). In other countries in the region, as well as India, most workers still receive wages in cash (Figure 6).

Social and cultural factors can hinder financial inclusion. Of the world’s 1.7bn unbanked people, 56% are women. Familial obligations and caring duties that often fall on women limit their ability to physically access financial services. In societies where women have restricted access to education and resources, they are unlikely to be able to utilise financial services even when digital platforms are available. Schou-Zibell mentioned harnessing gender-based impacts and data as important next steps to better target financial inclusion programmes in Asia Pacific. ‘There is often not a lot of gender disaggregated financial inclusion data in many places.’ Fintech solutions can be useful in addressing



6. Cash usage remains prominent for daily financial needs

Methods of wage receipt, share of respondents, %

Source: World Bank Global Findex 2017, OMFIF analysis



at least some, if not all, of the constraints that women typically face.

MEASURING SUCCESS

Although digital tools are increasingly integrated in financial inclusion strategies, existing metrics typically focus on conventional indicators linked to physical access, such as concentration levels of bank branches and automated teller machines. Measuring progress in financial inclusion should account for technological innovations and their benefits. For instance, while Indonesia’s population might not have a high percentage of account ownership, it is home to many fintech firms – second only to Singapore in the region (Figure 7). Combined with the effects of the Covid -19 pandemic impelling deeper digitalisation of economic activities, success in financial inclusion will increasingly be tied to policies related to digital infrastructure reliability and conducive fintech ecosystems.

The rapid spread of mobile phones can help to realise the economic benefits of digital finance. Globally, almost 90% of people own a mobile phone, while 58% have access to the internet in addition to owning a mobile phone. More should be done to utilise these online networks.

Targeted solutions that consider individuals’ specific needs are required. Blanket solutions are ineffectual, and a key reason why so many accounts remain inactive. A better approach is customised products tailored to disadvantaged demographics: low-income

56%

Of the world’s 1.7bn unbanked people, 56% are women.

households, the elderly, women and first-time users. Irrespective of being digital or brick-and-mortar based, financial services must be customised to the specific needs of different segments of the population.

Encouraging supply-side competition is an effective way to create market-specific solutions. Local vendors and businesses can benefit significantly from digital financial services, especially in economies where account holders are more likely to have mobile phones than debit cards. As more and more retail outlets begin to accept digital payments, consumers benefit from positive network externalities, and the utility of joining the network increases.

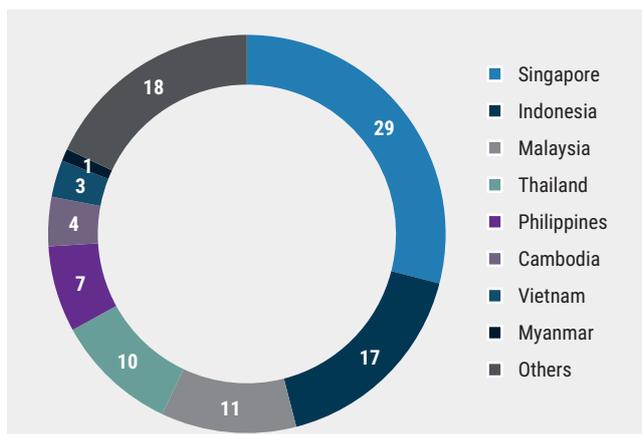
On the demand side, the uptake of digital banking services can grow by improving access quality and service affordability. Partnerships between existing banks and fintech companies could prove fruitful. Banks can

leverage their capital, trust, customer bases and brands to quickly absorb previously unbanked individuals. Fintech companies, in turn, can innovate and modernise banks’ products and processes to better serve the needs of the financially excluded. The heightened demand for digital services has prompted interest in technologies that could streamline data management and processing. Although the expansion of digital finance and mobile banking has reduced many of the associated physical infrastructure challenges, there are corresponding new ones. Data management costs, processing and storage issues, and reliability of digital infrastructure are all ubiquitous concerns in digital financial services.

Even though this is a constantly and rapidly evolving space, there are already technological solutions that help digitalise traditional financial services. Cloud computing allows for the high-volume, high-intensity computing that digital financial services need. It also enables scalability at a lower cost, aligning it with financial inclusion goals. New actors, financial products and technology systems can bring novel opportunities and risks for policy-makers and market players. The next sections explore specific policy implications and technological solutions, including the potentially game-changing role that cloud-based services could play in accelerating financial inclusion. •

7. Singapore and Indonesia have greatest concentration of fintech firms

Fintech firms, by country, %
Source: Cambridge Centre for Alternative Finance, OMFIF analysis



SECTION 2:

CENTRAL BANKS AND THE POLICY PRIORITIES

Financial inclusion can boost small businesses and contribute to higher economic growth, making it a priority for many Asian central banks and governments. To ensure policies are successful, widespread financial literacy is essential.

FINANCIAL inclusion can have a positive impact on policy areas directly linked to economic growth, financial stability and social progress. In the OMFIF survey of central banks and financial regulators carried out for this report, 79% of respondents identified financial inclusion as an explicit target or objective for their institution.

Fintech advances have created promising opportunities to expand financial inclusion, empowering disadvantaged individuals and small businesses. However, the transition from cash-based processes to digital can be overwhelming. As regulators explore new technologies to increase financial inclusion, there is a corresponding impetus to improve financial and digital literacy. Educating the population on basic financial concepts and the use of digital platforms is essential to widespread and effective adoption of digital financial services. One Southeast Asian central bank noted that ‘given the low level of understanding of new technologies,

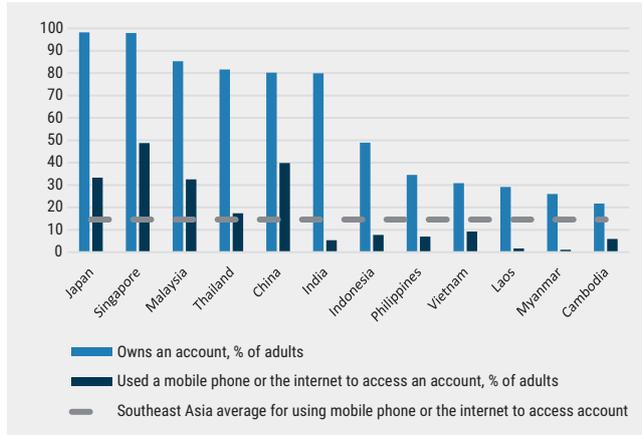
underbanked and unbanked communities may be reluctant to adopt fintech innovations. Financial education plays a critical role in enhancing their awareness of fintech innovation and promote their usage.’

There is a pronounced gap between account ownership and digital usage of accounts in developing Asia (Figure 1). Awareness is one issue, with a survey respondent stating that, ‘Realising the availability of digital financial services and their ease of access is a challenge.’ Digital financial services and tools will have little impact if financially underserved communities and businesses lack the necessary skills and knowledge to exploit them. Policy-makers and payment providers need to integrate literacy and education in the roll-out of digital systems. For one central bank, ‘financial literacy, especially digital financial literacy, must go hand-in-hand’ with progress in fintech. The central bank is closely involved with an awareness campaign on mobile banking cybersecurity in order to ‘promote the readiness and

1. Significant gap between account ownership and use of digital tools in Asia

Share of population

Source: World Bank Global Findex 2017, OMFIF analysis



digital technology can help ‘assess or verify cognitive and decision-making abilities of elderly customers in the process of buying or selling financial products or services’. This is important in economies with aging societies, such as Japan, which scores poorly on financial literacy (Figure 2) despite having a high share of bank account ownership. A relatively small share of its population has used digital means to access accounts (Figure 1). In Japan and elsewhere, the disproportionate vulnerability of the elderly to Covid-19 has reinforced the importance of financial and digital inclusion across demographics.

On the upside, the pandemic has demonstrated how quickly firms and consumers can adapt when compelled to. Even governments, forced to find non-physical means of distributing cash relief and other support mechanisms, have tapped digital platforms to deploy fiscal measures. Policy-makers, financial firms, fintechs and other stakeholders can use strategies – and momentum – from the Covid-19 crisis in their wider financial and digital literacy initiatives.

SME FINANCING AND INVESTMENT

An important aspect of financial inclusion in Asia Pacific is providing small- and medium-sized enterprises with better access to appropriate financial services, especially credit. A survey respondent underlined the importance of ‘widening the scope of

financial immunity of the general public in adopting digital financial services.’

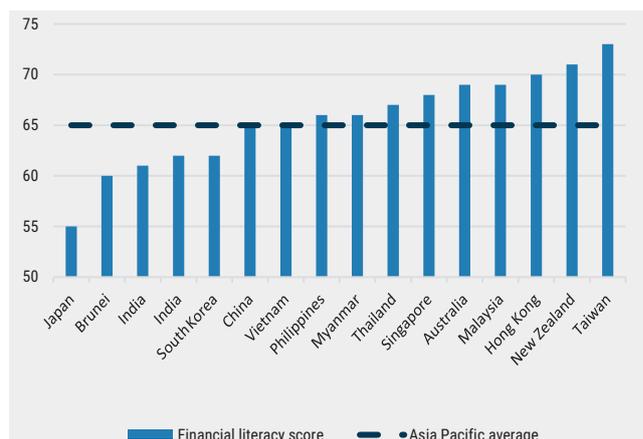
Digital financial services expose consumers to IT risks and could be a source of financial system vulnerability. That is why the Bank of Thailand’s strategic plan for 2020-22 focuses on advancing digital financial literacy. The BoT has been heavily involved in promoting financial literacy among specific demographics such as vocational students and first-time workers, collaborating with organisations including the Asian Development Bank.

The Reserve Bank of India has also worked to improve financial literacy and education among underserved communities. Since 2009, the RBI has been closely involved in running financial literacy and credit counselling centres catered to rural farmer debt. This scheme was further extended to commercial banks in 2012. More recently, as part of its five-year national strategy for financial education, the RBI plans to target both young school children and adults using modern tools such as social media and mobile applications.

Banks and payment platforms introducing digital-based services have a clear incentive to help educate the financially excluded. In 2018, India’s Paytm partnered with the Grameen Foundation for Social Impact to train women in rural areas through literacy camps and livelihood programmes. As these women are

brought into the formal banking system, the skills they gain provide allow them to handle new financial activities and navigate digital systems elsewhere. Inclusive considerations must extend to the core user design principles of fintech applications and services. One South Asian central bank emphasised the importance of ‘services provided in the native language and/or with simple codes/features’ as an essential prerequisite for digital financial service adoption.

Similarly, policy-makers and payment service providers promoting financial inclusion should ensure that other vulnerable and at-risk demographics are not left behind in the digital transition. One financial regulator noted that financial inclusion policies sought ‘to enable the elderly to enjoy appropriate financial services against the backdrop of an aging society’. The same respondent highlighted how



2. Japan scores below regional average financial literacy

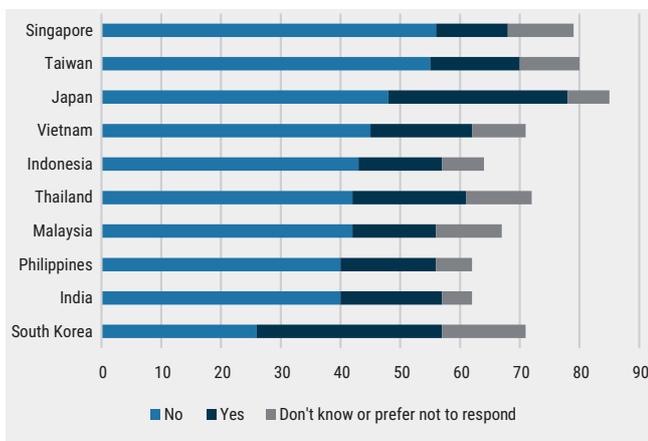
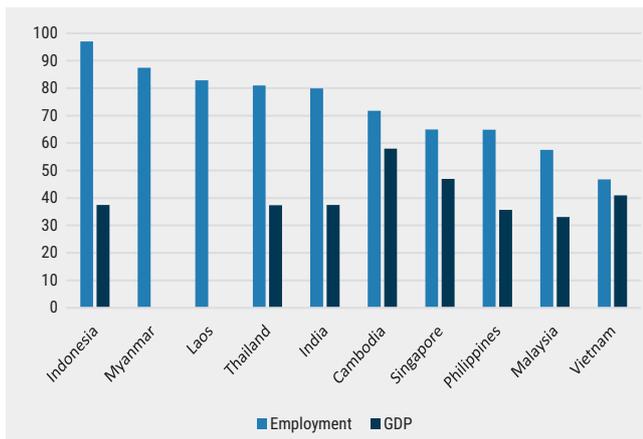
Financial literacy scores by country
Source: Mastercard Index of Financial Literacy, OMFIF analysis

3. SMEs play crucial role in Asian economies

% share of employment and GDP

Source: ADB, UNESCAP, APEC, OMFIF analysis

*No data on SME share of GDP for Laos and Myanmar



4. SMEs struggle to access finance, even in advanced economies

'Does your business have a line of credit or a loan from a financial institution or bank?', share of respondents, %

Source: World Bank, OECD and Facebook Future of Business survey, OMFIF analysis

banking services to capture as many individuals and [SMEs] as possible, especially women and the rural population'.

SMEs contribute significantly to economic growth and employment (Figure 3), but considerable borrowing constraints limit their ability to access capital, develop their business potential and participate in wider trade. Overall, SMEs in Asia Pacific make up more than 95% of all enterprises and employ approximately half of the workforce. They contribute to around 20% of low-income countries' GDP while accounting for 50% of economic activity in high-income countries.

Despite their importance to the regional economy, SMEs face credit challenges due to their size. They struggle with accessing other financial products and services for their business operating needs, such as payments, cash flow, inventory and customer relationship management systems.

SMEs in Asia Pacific struggle to

access suitable financial services, even in advanced economies like Singapore or Japan. The World Bank estimates that the credit gap for SMEs globally is \$2.6tn. With SMEs contributing significantly to the economy, their financial exclusion is a missed opportunity for more inclusive growth in many countries.

Limited access to credit hinders SMEs' participation to national and regional trade. Cultivating a more inclusive environment for small businesses could bring greater socio-economic progress and development, especially in lower-income countries and developing regions. Veerathai Santiprabhob, governor of the Bank of Thailand, stated, 'Financial inclusion is not only about access to credit. With rapid developments in e-commerce platforms, access to electronic payment infrastructure is equally important. E-commerce platforms would broaden SMEs' markets from their local community or province to the global level.'

The Association of Southeast

Asian Nations recognises the regional importance of SMEs. Asean's strategic action plan for SME development aims to introduce policy reforms and enhance small companies' technological competencies and access to financial services. Governor Santiprabhob noted, 'Fintech would be very helpful in improving financial access and inclusion. For instance, it would allow SMEs to access financing for working capital, through supply chain financing or factoring. SMEs would benefit substantially from technology advances by lowering transaction costs from invoice processing and ensuring that those invoices are authentic and transferable.'

In Vietnam, the national strategy for financial inclusion approved this year lays out targets to expand cashless transactions by 20-25% annually, with at least 250,000 Vietnamese SMEs having access to credit lines for business loans by 2025. The State Bank of Vietnam has partnered with the World Bank Group on a comprehensive approach to improving financial inclusion that focuses on digital finance, financial service provision to rural and agricultural and ethnic communities and strengthening consumer protection and financial education.

Several fintech innovations have been breaking down the barriers for financial inclusion for SMEs. Instead of lengthy and uncertain loan application processes, alternative financing solutions like crowdfunding could channel capital to promising enterprises without formal credit records. According to the International Monetary Fund, digital lending to SMEs increased in 2019 to \$166bn from \$96bn in 2017. In Indonesia, peer-to-peer lending provides an opportunity to small firms that are unable to secure credit lines from banks and conventional financial institutions. Entities such as the Malaysian Securities Commission and Indonesia's Financial Services Authority have updated their regulatory frameworks to support the responsible development of equity crowd funding and lending platforms for businesses.

Case study
AMARTHA, Indonesia

Amartha is a peer-to-peer lending platform serving entrepreneurs in rural areas of Indonesia. It focuses on extending financial services to small and microbusinesses, mainly targeting working-age mothers with dependents.

Substantial data analytics and processing workloads are needed to identify potential non-performing loans in its customer base. Amartha had to restructure its database for detailed analytics, but could not do so without it impeding the performance of its loan application system. Building an on-premises analytics infrastructure was too expensive, so the company opted for a cloud-based solution. By using AWS Cloud Services, Amartha's infrastructure costs were reduced by 20% compared to on-premises infrastructure. The increased data analytic capacity enabled it to keep its NPL ratio below 3%.

Case study
WARUNG PINTAR, Indonesia

Warung Pintar, which translates to 'smart kiosks', is a fintech startup in Indonesia aiming to use technology to bolster the capabilities of traditional micro-businesses. As of 2019, Warung Pintar had 1,150 kiosks in Jakarta, with plans to grow to 5,000. Through their kiosks, vendors are able to sell food and daily essentials in accessible locations.

In addition to providing kiosks to vendors, Warung Pintar uses cloud technology to manage POS transactions and analyse supply chain performance. On the AWS Cloud, this backend infrastructure allows micro-enterprises to record sales, analyse their data and monitor their business performance. The use of innovative technology has helped boost vendors' average monthly revenue by 41%. Around 22% of vendor kiosks have recorded at least 10% monthly growth. The adoption of cloud technology aligns with Warung Pintar's aim of spreading financial and technology literacy to promote economic independence and mobility.

Apart from broadening loan accessibility, IT tools that help manage data can enhance SME competitiveness. As a recent World Bank, Organisation for Economic Co-operation and Development, and Facebook survey showed, SMEs across Asian economies lack sophisticated digital competencies and literacy (Figure 5).

Nonetheless, in the light of the pandemic, regulators in several countries are prioritising helping SMEs acquire digital skills. For instance, in line with the Indonesian government's objective to digitise

'Financial instruments tied to remittances, such as diaspora bonds or diaspora funds, help maximise economic gains from migrant wages while bringing workers into the formal financial system.'

the operations of up to 10m small firms by year's end, Bank Indonesia has eliminated transaction fees for the country's QR-code payment gateway, QRIS, and supported digital education via door-to-door initiatives instructing small businesses on its usage.

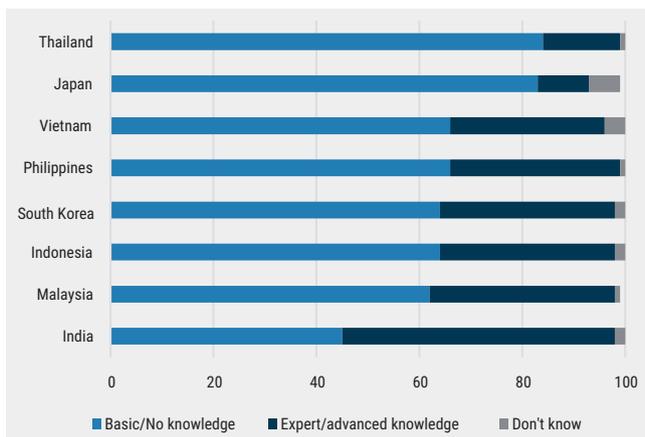
SMEs are often at the losing end of the digital divide, but their lack of reliance on legacy technology systems can work to their advantage. It can make them more receptive to policies incentivising them to leapfrog to potentially cheaper, more effective technologies.

Several policies and technology options can help boost financial inclusion. The simplicity and customisability of cloud infrastructure make it particularly well-suited for driving digital innovation, productivity, and competitiveness among SMEs. The inherent flexibility offered by cloud computing allows smaller businesses to avoid high upfront costs. With cloud infrastructure, they can start small and progressively expand their operations on a pay-per-use basis mirroring the volume of their business activities.

5. Many SMEs lack skills to take advantage of digital tools and applications

'How would you rate your level of knowledge of managing information digitally (incl. data storage, using cloud solutions)?', share of respondents, %

Source: World Bank, OECD and Facebook Future of Business survey, OMFIF analysis

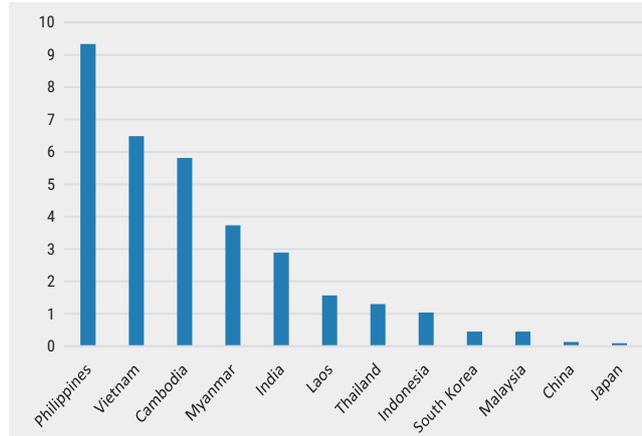


The case of Indonesian fintech startup Warung Pintar illustrates how traditional SMEs could pivot to cloud-based systems and enhance their business processes. Employing cloud-based infrastructure helps traditional shopfront merchants quickly establish mobile point-of-sale systems that provide valuable analytics and inventory management services. The technology enables small businesses to create customised, effective and profitable financial services with tailored products they usually do not have access to, such as working-capital lines, merchant and e-commerce finance, invoice discounting, supply chain finance and trade finance.

Governments and regulators could support SMEs by implementing regulatory reforms and co-funding schemes to promote financial inclusion and technology-driven business models. As a South Asian central bank detailed, improving SME competitiveness depends on numerous factors such as ‘physical infrastructure, tax frameworks, technology adoption, capacity building, backward and forward linkages, and availability of skilled manpower’. Central banks could focus on ‘framing credit policies to ensure timely and smooth flow of credit to such enterprises, minimising the incidence of stress and enhancing the competitiveness’ of SMEs. However, incentives and subsidies for digital adoption are not enough. There is a need to improve small businesses’ financial and digital literacy, so that they can fully reap the benefits of new fintech applications and cloud computing infrastructure.

REMITTANCE FLOWS AND CROSS-BORDER PAYMENTS

Remittances from migrant workers are an important part of economic growth, especially in developing Asia (Figure 6). The ADB reports that remittance flows to Asia in 2018 were \$302.1bn, 44% of the global figure. Migrant labour from the region represents 20.4% of the world total, suggesting that Asian overseas workers transmit more

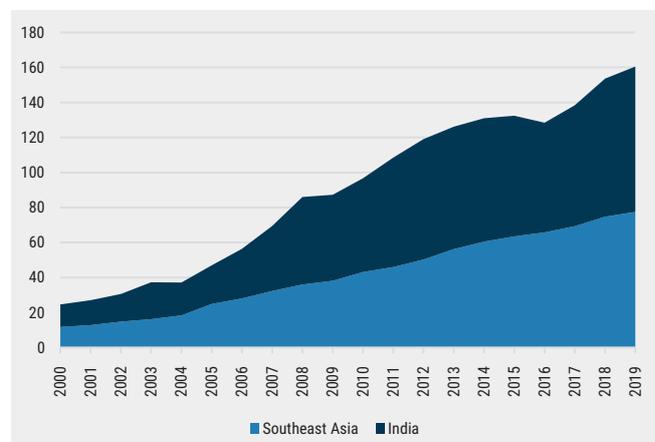


6. Remittance flows significant to many Asian economies

Personal remittances as % of GDP
 Source: World Bank, OMFIF analysis

7. Steady increase in remittance inflows to Southeast Asia and India

Migrant remittance inflows, \$bn
 Source: World Bank, OMFIF analysis



‘The simplicity and customisability of cloud infrastructure make it particularly well-suited for driving digital innovation, productivity, and competitiveness among SMEs.’

money than those from other regions. Remittances to India and Southeast Asia have also grown rapidly in recent years (Figure 7).

Lowering transaction costs in cross-border remittance and payment processes can help international payment inflows to developing communities further reduce poverty. Promoting financial inclusion, especially in rural areas, ensures that hard-earned wages are channelled to their intended recipients in the quickest and most cost-efficient manner. Research by the World Bank and IMF found positive correlations between remittance flows, financial inclusion and poverty reduction.

Traditional methods of remitting income or payments for trade transactions are often costly and inefficient. Correspondent banking processes relying on nostro-vostro accounts are generally more cumbersome and expensive than domestic payments due to the number of financial intermediaries involved in the process. Smaller

Case study
RAPYD, UK

Rapyd is a fintech startup operating as a ‘fintech as a service’. Starting off as a mobile payments company, Rapyd built an e-wallet that allows consumers to withdraw cash from any ATM in any country without a bank account. The Rapyd Global Payment Network gives businesses access to the world’s largest local payment network with over 900 locally preferred payment methods in more than 100 countries, reaching more than 2bn people.

Operating fully on AWS Cloud Services, Rapyd’s financial management, payment and money movement services function on a single, global, scalable application programming interface. With a single centralised platform, they are able to adopt a user-centric approach while eliminating the need to invest in traditional back end infrastructure.

financial institutions in developing countries that have not established correspondent relationships with foreign counterparts may be disadvantaged as major international banks de-risk and shrink their international payment corridors.

While the cost of remittance services sending money to the East Asia and Pacific region has moderately declined to 7.0% in 2020 from 8.1% in 2015, this is still higher than the global average of 6.7% (Figure 8). In comparison, while remittance corridors to South Asia are less costly than the global average, their average costs have remained largely stable. These show that there is plenty of room for improving the payments infrastructure in Asian economies. Reflecting this, one South Asian central bank shared its view that ‘one of the most important aspects of

inclusion is to ensure that consumers can afford the services offered. [We] envisage payments services to be not only accessible but also affordable. To this end, service providers should set up pricing structures that are transparent, affordable and do not restrict the public from accessing payment system services.’ Innovations in fintech and digital payments can be one avenue to help streamline payment rails. The value of digital remittances in Asia Pacific was estimated to be \$49.85bn in 2018 and is projected to reach \$269.78bn by 2026.

Financial regulators and central banks require adequate know-your-customer and anti-money laundering processes for international money transfers. Innovative technologies and tailored policies that complement communal practices linked to savings and remittances could help bring

down costs while maintaining the necessary regulatory accountability and transparency in financial services.

The benefits from remittance and payments reform are considerable. The ADB estimates that a 5% decline in remittance costs could generate \$15bn in additional savings in Asia. Innovations to payment processes from fintech and cloud computing can help address opaque remittance business models and reduce IT costs. For instance, the Unique Identification Authority of India and National Payments Corporation of India have collaborated to launch an Aadhaar-based remittance service.

Financial instruments tied to remittances, such as diaspora bonds or diaspora funds, help maximise economic gains from migrant wages while bringing workers into the formal financial system. Tax and credit-linked remittance relief can likewise help channel funds to more productive uses.

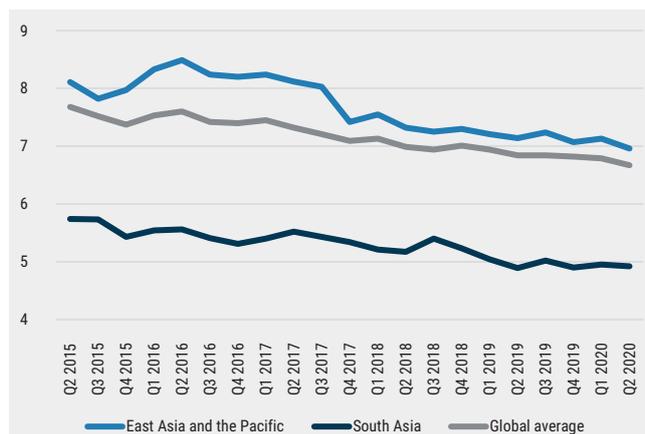
Remittance flows present another promising use case for cloud technologies to reduce costs and promote interoperability across different payment rails. The UK-based fintech startup Rapyd recently obtained a remittance license from the Monetary Authority of Singapore to scale its digital remittance services in Asia Pacific. The cloud-based platform covers all stages of remittance flow, eliminating the need for serviced businesses to build their own remittance infrastructure.

Investing resources and effort in financial inclusion will have a lasting impact on other policy areas that contribute to strengthening economic fundamentals and promoting inclusive growth. Digital tools can help improve literacy, support SME growth and lower the cost of remittance payments. These policy areas interact with each other, as greater financial and digital literacy are necessary to harness the benefits of using technology in SME financing and remittance payment flows. The next section sets out in greater detail how technology facilitates financial inclusion and provides an overview of different fintech approaches. •

8. Workers remitting to East Asia still face higher transfer costs despite downward trend

Cost by region, % of remittance amount

Source: World Bank, OMFIF analysis





SECTION 3:

DIGITAL FOOTPRINTS MARK THE ROAD TO BETTER FINANCIAL INFRASTRUCTURE

Fintechs and financial institutions operating in developing countries often face resource constraints and a lack of appropriate digital infrastructure. Cloud computing could help break down barriers to innovation and services.

FINTECH innovations are transforming the ways in which financial services can reach underserved communities. As a central bank noted to OMFIF, ‘Fintech firms have contributed to financial inclusion objectives by the way they run their businesses, utilising new technologies and innovating new business models, to capture the deeper markets of unserved and underserved people.’

Many central banks are adjusting their regulatory frameworks to better integrate emerging foundational technologies into financial services. Among these is cloud computing, which central banks and regulators believe could ‘improve operational efficiency, particularly in terms of data storage and processing, eventually reducing the cost of digital financial services’.

CLOUD-ENABLED TRANSFORMATION

According to a respondent from a Southeast Asian central bank,

‘Cloud computing can enable financial institutions to procure system resources in a low-cost, flexible manner, expedite the development of new IT infrastructure and facilitate access to the latest technology provided through the software-as-a-service model. This will deliver a competitive advantage in providing more effective and competitive customer service if used appropriately.’

As financial institutions increasingly migrate to cloud platforms, several central banks are noticing opportunity for lower operational costs and greater customisability of product offerings. Cloud technology offers modularity, ease of integration and flexible data management, which can help companies offer cheaper and more adaptable financial services. As one respondent elaborated, cloud computing could ‘allow financial institutions greater flexibility and agility to explore and test new products and services as compared

to using their legacy in-house IT infrastructure. They could launch new products more quickly and adapt them to better suit their customers’.

LEGACY IT COSTS

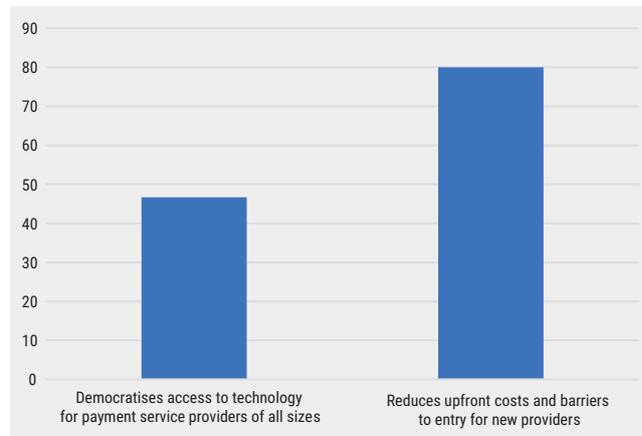
Traditionally, financial institutions have provided their services via proprietary or internal IT infrastructures, such as in-house mainframes. However, the proliferation of innovative digital financial services has coincided with a surge in data collection, analysis and storage generated by activities such as account openings, credit assessments and transactions. Having adequate IT infrastructure to manage these computationally intensive processes can make it prohibitively costly for smaller firms to provide affordable financial services at scale.

Critical infrastructures are usually made up of complex IT systems and hardware that are expensive for financial institutions to maintain. These must be capable of comfortably supporting large data volumes. Cloud-based infrastructures could solve this issue.

For 80% of respondents, the main benefits of cloud are the cost-savings and enhanced market competition it could bring, as the technology would allow more fintech actors to service end-users at a reduced price.

A lower number of respondents (47%) identified increased levels of innovation and technology upgrading as an immediate benefit of cloud to financial inclusion. Several felt that while cloud permits a greater variety of financial actors, products and services, further policies or incentives are needed to ensure cost-savings for consumers and lower market barriers to digital financial services. To have the most impact on financial inclusion, cloud adoption must ‘translate to greater access to and affordability of financial services’, said one respondent.

One central bank participant argued that migrations to the cloud should be seen as a catalyst facilitating broader internal capability



‘Cloud computing can enable financial institutions to procure system resources in a low-cost, flexible manner, expedite the development of new IT infrastructure and facilitate access to the latest technology provided through SaaS. This will deliver a competitive advantage in providing more effective and competitive customer service if used appropriately.’

Southeast Asian central bank

and service upgrading rather than a goal in and of itself. They noted, ‘Currently, there is not much difference in terms of competitiveness or innovativeness on incumbent traditional financial institutions whether they use cloud or in-house IT infrastructure. It is their willingness to further develop their internal capabilities that is more likely to drive competition and innovation.’

Stimulating improvements in traditional financial institutions and banking services requires effective partnerships with new fintechs pioneering innovative tools and services. In the case of challenger fintechs, cloud computing can be a powerful tool allowing new financial service providers to field more nimble and adaptable business models than incumbents. For instance, the Thai-based insurance technology firm, Sunday Insurance, uses machine learning algorithms to provide highly tailored premiums. This allows it to better customise cheaper and fairer insurance products to specific lower-risk demographics. Using the AWS infrastructure has allowed Sunday to avoid the fixed-costs of a data centre. Instead, it uses an asset-lite business model enabling it to prioritise research and investment on its core machine learning technologies and customer services.

CHEAPER AND SCALABLE SERVICES

A central bank official stated, ‘As cloud makes the [financial services] market more competitive and vibrant, service providers are bound to serve the poor people at the lowest cost.’ Another central bank concurred, saying, ‘Improvements in back-end technology will bring down costs and improve the operations of financial service providers. This will give providers a stronger business case to continue offering financial services

1. Cloud unlocks payments provision market

‘What role does cloud play in facilitating financial inclusion?’, share of respondents, %

Source: OMFIF-AWS Financial Inclusion Survey

in remote areas and increase their ability to offer more bespoke products. End-users can enjoy lower transaction costs and more relevant services.’

Zerodha, India’s largest retail stock brokerage, has benefited from cloud migration with AWS to provide competitive, low-cost trading in capital markets for more than 1m investors. The company’s accounting and settlement services have become swifter as post-trade processing has been reduced to minutes from several hours.

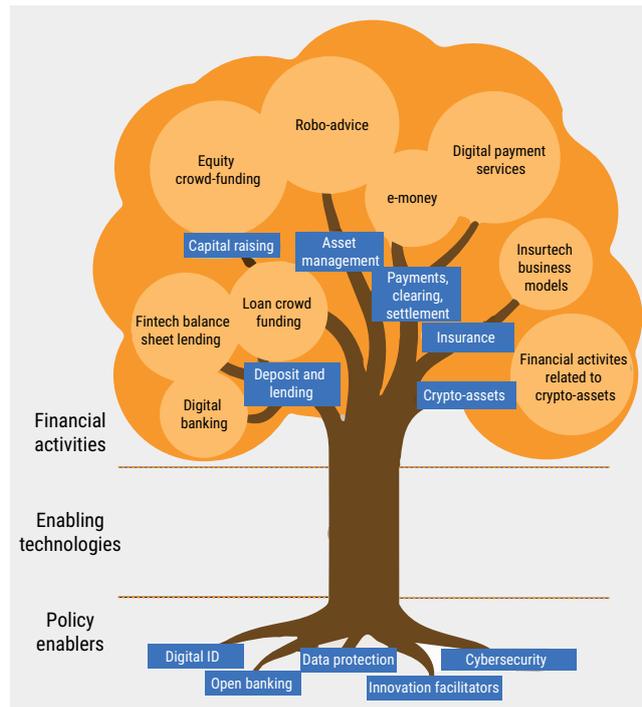
Pooled, flexible systems offer small businesses the infrastructure and computational resources they might not otherwise be able to afford while operating independently. This helps extend financial services to under- or unbanked individuals. Some digital infrastructures, such as data servers, which might be expensive or time consuming to develop locally in developing countries, can thus be provided on a remote and pay-per-use basis, adapting to changing demand.

The Indian payments fintech Easy Pay, which operates in six cities, allows its 6m customers to settle payments to more than 60 service providers and retailers at a single point-of-sale terminal in neighbourhood shops. Using Amazon Elastic Compute Cloud, the company is able to process more retail payments data and reduce transaction times.

MANAGING LOCAL BOTTLENECKS

Several central banks identified access to shared infrastructure as another benefit of cloud services. One respondent explained, ‘Cloud computing can increase the competitiveness of our smaller banks, especially those that lack the capital needed to invest in expensive IT systems such as data servers and related infrastructure. Through cloud computing, smaller banks can maintain accurate data and improve operations, at potentially lower cost for the bank and its customers. This is especially helpful for banks serving remote areas as it would make it easier to operate in these regions.’

Cloud offers smaller companies



2. The three-tiered fintech environment

Source: Bank for International Settlements

and fintechs in developing countries the means to overcome infrastructure limitations to support wider digitalisation of financial services. These businesses may struggle to meet prohibitive IT and labour costs. These include ensuring redundant servers, networking gear, internet connections, uninterruptible power supplies, server cooling as well as the need to maintain backup locations. The off-site, distributed nature of cloud computing can solve several of these local limitations as it facilitates greater versatility for financial institutions’ and fintechs’ business models.

FOSTERING COMPETITION AND OTHER BENEFITS

For traditional banks in developing countries, one of the main barriers to providing reliable and affordable digital financial services is inadequate local digital infrastructure, such as data centres. Another issue is the lack of local expertise to integrate up-to-date analytics into their business decisions.

As new fintech players complement the traditional banking and insurance activities of incumbent financial institutions, the use of cloud technology could make more room for innovation and help firms adapt

swiftly to changing business demands and process sophisticated analytics in real time. This would result in a cheaper, more competitive and ultimately, more inclusive, fintech ecosystem. Respondents identified several policy initiatives that would maximise the technology’s impact on financial inclusion. Most said there was a need to establish an affordable and interoperable digital payments infrastructure. Participants also cited the development of secure digital identities for on-boarding customers and verifying transactions as important measures.

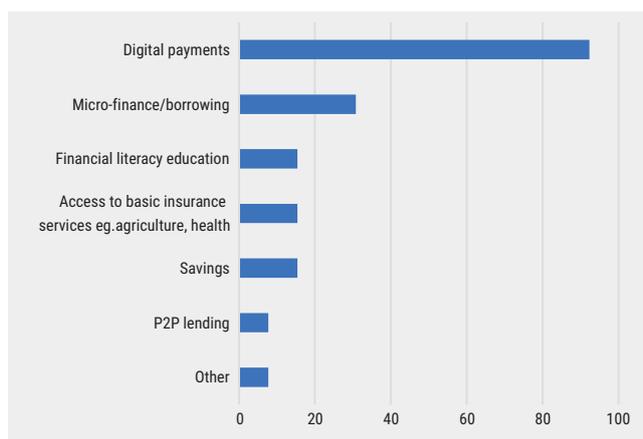
Cloud technology can serve as an important tool to ensure policy changes lead to the creation of useful systems for inclusive fintech products and services. The Bank for International Settlements compares a fintech ecosystem to a tree with three tiers: fintech activities like digital banking, robo-advisory and peer-to-peer lending; enabling technologies such as cloud computing, artificial intelligence and machine learning; and finally, policy enablers or measures that support the two other elements (Figure 2).

Several survey respondents emphasised the important role of fintech in allowing financial services firms to better cater to low-income

3. Digital payments stand to benefit from fintech the most

'In which area does fintech have the greatest impact on financial inclusion in your country?', share of respondents, %

Source: OMFIF-AWS Financial Inclusion Survey



groups, who tend to make frequent, small transactions. One central bank said, 'Fintechs – the innovative business models, players, and technologies – have made serving the traditionally ignored low-income markets more viable, if not compelling. We now see products that are inherently designed for small transactors.'

Most central banks and regulators in the survey highlighted digital payments as the best practical illustration of fintech's ability to drive financial inclusion. A central bank respondent noted, 'Digital payments are the first transactional frontier that brings customers to digital finance and many fintechs are penetrating this market. Other products like lending are also being developed.' A Southeast Asian central bank noted that within its jurisdiction, 'fintech has been observed mainly in payments and remittance'. A recent study on the fintech landscape in Southeast Asia found that 26% of the region's fintech firms were engaged in digital payments activities.

Digital payments are central to basic financial inclusion. More than 90% of respondents agreed that innovation in digital payments processes was one of the key ways in which fintech has helped advance financial inclusion in their jurisdiction.

Digital payments are an entry point for digital financial services. Payments and transactions are ubiquitous, daily activities for people who have access to financial services.

'Survey respondents emphasised the important role of fintech in allowing financial services firms to better cater to low-income groups, who tend to make frequent, small transactions.'

Several respondents felt that a well-functioning and inclusive digital payments system would serve as the foundation to provide further access, and gradually build consumer confidence in more sophisticated products and services. One fintech professional shared, 'The closest that you come to digital banking [in developing communities], is in terms of digitising a transaction. Payments in many parts of the world are still cash-driven. If we are able to move some of the 10 to five transactions that an average person carries out in a day from cash to digital, that will demonstrate what digital payments can bring in the overall ecosystem of digitising financial services.'

The BIS notes that payments systems can be improved through industry or central bank-driven initiatives, or a combination of the two. However, to prevent fragmentation of payment gateways among specialised entities, several developing country central banks and regulators see compelling reasons to be closely involved in coordinating policies that promote innovation in financial and payment infrastructures. For several survey respondents, creating or mandating inter-functionality among different payment infrastructures and mobile money wallets will protect consumers

Case study: Digital payments TRUEMONEY, THAILAND

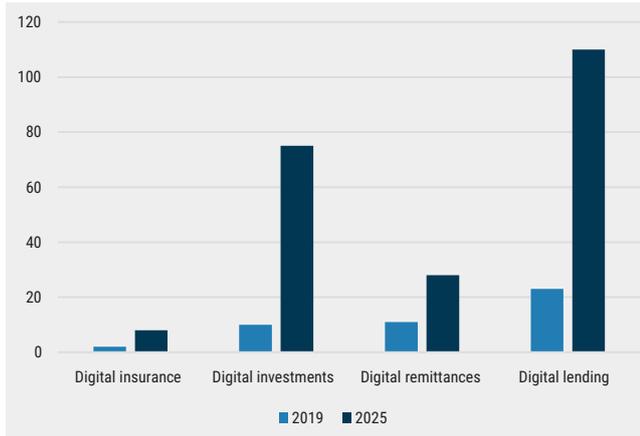
TrueMoney operates in six Asia Pacific countries, Thailand, Myanmar, Cambodia, Vietnam, Indonesia and the Philippines, providing digital payments services. Its digital smart wallet allows consumers to store value and spend on e-commerce and digital products. TrueMoney reaches out to individuals without bank accounts and equips them with full access to financial services to undertake transactions such as bill payments.

TrueMoney runs on a hybrid cloud infrastructure due to the different banking regulations across its countries of operation. To offer cost-effective, quicker and more adaptable customer service, the company uses AWS Cloud to set up an e-wallet engine and bill payment systems that run on a physical infrastructure in an on-premises data centre. TrueMoney's websites, e-wallet web application and payment gateways function on a single AWS platform. This centralised infrastructure allows TrueMoney to continuously expand to other markets in Southeast Asia and reach out to more underbanked individuals.

4. Digital financial services in non-payment areas projected to multiply

Estimated growth in digital financial services, \$bn

Source: Google, Bain, Temasek, OMFIF analysis



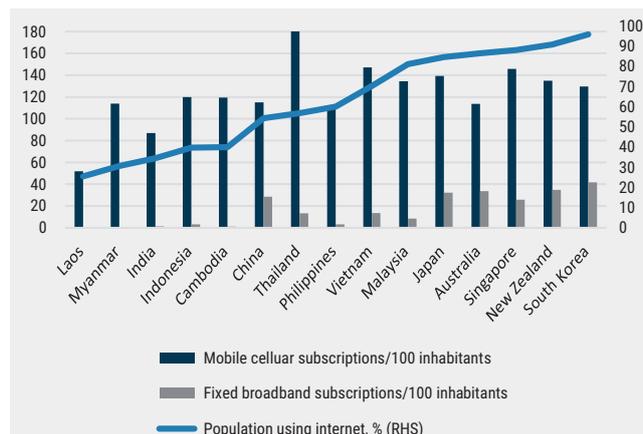
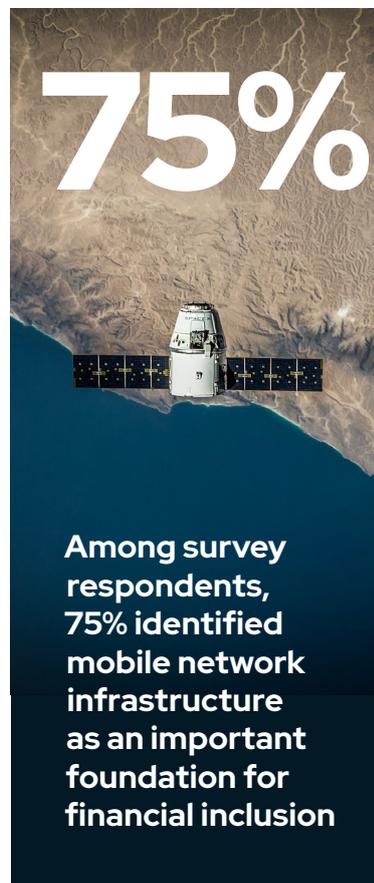
Central bankers and regulators note that ‘in other sectors like credit and insurance, fintech adoption is still limited’. Nonetheless, as digital financial services take further root in Southeast Asia and the fintech ecosystem matures, other fintech applications are expected to grow rapidly. In 2019, joint research from Google, Temasek and Bain projected that by 2025, the loan book for digital lending will expand to \$110bn (Figure 4). Already, many fintechs and consumer technology platforms that initially provided digital payment and e-wallet services are widening their offering by applying for digital banking licenses in different jurisdictions, often partnering with established financial institutions. As fintechs accumulate more data on spending habits and through the use of analytical tools such as machine learning, payments services can evolve into lending, insurance and investment via new ways of analysing credit worthiness.

However, access to credit, insurance and other more sophisticated forms of financial services is highly contingent on having secure and trustworthy markers of digital identity. As one central banker noted, the potential to ‘generate customers’ digital footprints’ would be an invaluable facet to the financial inclusion of customers from both the retail and SME sectors into the digital ecosystem. Collecting, storing and analysing data related to digital ID markers and spending habits requires a robust digital infrastructure to handle significant volumes of data, as

against higher transaction costs, delays or impracticality. This is especially important for people in rural areas who may only be served by a limited range of payment service providers and financial institutions. One Southeast Asian central bank mentioned that ‘an interoperable retail payment system is also important so funds can be transferred among different accounts in an efficient and less costly manner.’

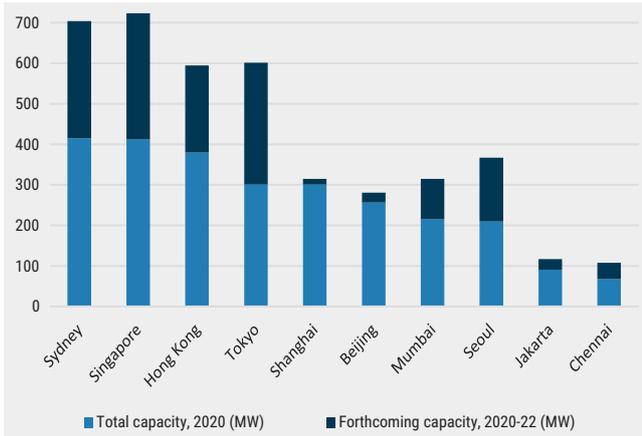
The National Bank of Cambodia, for instance, is developing the Bakong system, a retail payments infrastructure based on blockchain technology to facilitate interbank transactions with real-time fund transfer, and enable individuals to transact with businesses via a universal application and standardised QR codes.

TrueMoney, a subsidiary of the Thailand-based communications conglomerate, True Corporation, is an example of an industry-driven effort to provide digital payments services. As the company expands to other Southeast Asian markets, the migration to cloud computing services has allowed it to overcome several of the expenses and challenges associated with digital infrastructure constraints in developing Asian countries. Cloud migration could allow cross-border and regional payments service providers to allocate computing resources, IT expertise and digital infrastructure from more advanced Asia Pacific countries, and have tangible benefits for financial inclusion when deployed for financial services across the region.



5. Uneven mobile and digital penetration in the Asia Pacific

User statistics
Source: OMFIF analysis, International Telecommunications Union World Telecoms/ICT Indicators 2018



6. Concentrated data centre expansion in the Asia Pacific

Data centre capacity, megawatts
Source: CBRE 2020, OMFIF analysis

well as the ability to interface with secure national ID systems.’

TECHNOLOGICAL PREREQUISITES

Most central bank and regulator respondents noted that for fintechs to further bolster financial inclusion in developing countries, these must have robust foundational technologies or infrastructures. As financial services increasingly rely on data to function properly, digital infrastructure systems that permit secure storage and sharing are essential. One respondent stated that, ‘Infrastructure needs to be developed to address the causes of financial exclusion. In a situation where financial services are increasingly being offered, combined with the widespread use of application programming interface technology, the infrastructure to secure access points to those services is crucial for ensuring financial inclusion.’ As central banks and regulators push forward with competitive open banking regimes, interoperability and scalability in data processing between banks and third-party fintechs will be key. This could be achieved through the provision of API access, and cloud-native services and products.

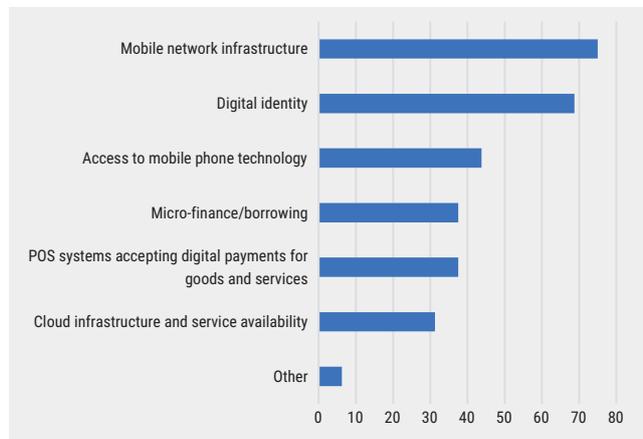
In developing countries, another central bank highlighted that the quality of ‘mobile network infrastructure and access to mobile phone technology are important elements as digital financial services are largely processed on mobile devices’. Another Southeast Asian central bank pointed out that thanks to increased mobile penetration, there had been an uptick in mobile banking and digital payments.

Digital infrastructure gaps can constrain the scalability of different fintech solutions (Figure 5). As one Southeast Asian central bank stated, ‘There is a need to establish physical and virtual facilities to ensure connectivity across the country. This can be in the form of additional telecommunication towers and the use of technologies such as cloud and satellites.’ Fintech solutions, which are designed for resilient operation in rural areas with low density of digital

7. Infrastructure and e-identity systems are needed to scale digital financial inclusion

‘What are the technological prerequisites/complements needed to facilitate adoption of digital financial services?’, share of respondents, %

Source: OMFIF-AWS Financial Inclusion survey



Case study: Financing and credit
NIRA, INDIA

NIRA is a consumer finance start-up that provides small loans to lower-income groups across large metropolitan (Tier 1) and rapidly developing (Tier 2) cities in India. The company targets an underserved market segment, individuals who struggle to obtain loans for urgent personal and family needs. Many of them lack the proper identification documents required to obtain lines of finance. NIRA provides pre-approved credit limits, free of any fees, and requests less documentation than other players in the market.

NIRA uses Amazon Rekognition services to verify images and customers’ Aadhaar cards (government-issued ID). The start-up reduces costs by taking traditional banking processes online using AWS Cloud Services. This has allowed NIRA to grow its customer base to 200,000 monthly active users without the need for any major infrastructure or configuration changes. By adopting cloud technology, NIRA can monitor applications, respond to system-wide performance changes, optimise resource utilisation and store data in highly secured servers.

INTEGRATING DIGITAL ID WITH INCLUSIVE FINTECH

As part of its Smart Nation initiative, the Singapore government has introduced several regulations and schemes to help the country transition to a digital economy. One of these was the creation of an inclusive national digital identity system. Singapore Personal Access, known as SingPass, allows Singaporeans and permanent residents to access more than 300 digital services. Along with MyInfo, SingPass pre-fills digital forms with users' personal data. Singapore's Government Technology Agency built MyInfo on a developer platform using AWS Cloud Services.

MyInfo came into operation this year. UK-based fintech TransferWise, which allows its customers to store and remit money of different currencies overseas, was one of the first international money transfer companies to adopt MyInfo. The platform enhances and speeds up personal verification processes, taking only two minutes to complete a transaction.

infrastructure, can be powerful enablers for financial inclusion. For instance, UBX, the fintech arm of the Union Bank of the Philippines, has crafted mobile banking applications that can operate even with only 2G network coverage.

Cloud technology can help overcome local infrastructure constraints. While many developing countries lack sufficient digital infrastructure and fixed broadband capacity to support domestic data centres, cloud allows computing demands and data processing requirements to be distributed across borders. This way, consumers and businesses can circumvent domestic digital bottlenecks via cross-border data flows with advanced economies' data infrastructures. For instance, CBRE views Singapore, the second largest data centre market in the Asia Pacific, as an ideal base to scale regional cloud deployment thanks to its strong connectivity, reliable power network and stable business environment (Figure 6).

Among survey respondents, 75% identified mobile network infrastructure as an important foundation for financial inclusion. Apart from the fundamental infrastructures to exchange and store data, other technological prerequisites need to be in place in

order to insure increased adoption of fintech and digital financial services.

DIGITAL IDENTITY CREATION

Digital financial transactions require proper identification systems. Digital identity and know-your-customer mechanisms are key to scaling up a secure digital finance system. Among central banks in developing Asia, 69% selected this as an essential feature to increase financial inclusion. One central bank mentioned that digital identity was among 'the most important technological prerequisites' due to its role in facilitating customer registration and account opening without the need for costly and complex physical verification processes.

A digital identity system would also enhance the ability of payment providers to meet compliance requirements while catering to a wider customer base. As one regulator noted, 'The development of a digital identity system will refine and improve the efficiency of KYC, anti-money laundering and combating the financing of terrorism measures, making it possible to provide financial services to people, companies, and communities that have so far been excluded from financial services due to excessive risk aversion taken by financial institutions.'

The establishment of a trustworthy digital ID system is likely to be a long-term effort spearheaded by governments. As one respondent explained, the development of digital ID invariably 'requires a lot of stakeholders to come together and find value in doing something at such large scale. For it to percolate into the economic and financial system is a drawn-out process, unless the government decides that it must happen quickly.' In Singapore, the government introduced MyInfo, a platform that automatically fills out official forms online. This helps fintechs and financial institutions streamline KYC processes.

STRENGTHENING FINANCIAL INCLUSION WITH CLOUD

This section has shown how many central banks and regulators in Asia Pacific recognise cloud technology's potential to develop a more inclusive financial system. While the provision of sophisticated digital financial services is still limited, cheaper and greater ease of data sharing and interoperability can help basic digital payment platforms provide a wider range of products and services. At the same time, digital ID systems being developed by various governments will unlock further confidence and versatility in the fintech landscape.

Cloud infrastructure will be an important bridging technology allowing for the seamless exchange and sharing of data and computing power. Many fintechs and financial institutions in developing Asia Pacific countries lack resources. Cloud-based services can deliver affordable and simplified yet highly customisable and adaptable IT infrastructures.

While these technological innovations bolster financial inclusion, central banks and other regulators face distinct challenges to execute their mandates in a fast-moving and complex landscape. New actors, financial products and services and technology systems can bring novel opportunities and risks. The next section looks at how central banks and regulators are crafting effective regulations and risk mitigation guidelines for cloud adoption in the financial sector. ●



SECTION 4:

WHICH WAY NEXT FOR CLOUD TECHNOLOGY?

To make the most of the cloud, regulators must constructively engage with the private sector and develop policies that cultivate innovation while protecting consumer interests and financial integrity.

POLICY-MAKERS recognise the potential of cloud and other technological innovations to support financial inclusion goals, but stress the need to mitigate risks. ‘Fintech innovation is an effective tool for accelerating financial inclusion. However, it should be adopted with caution as it could bring new risks if not well-regulated and supervised,’ said one central banker. Fintech can strengthen financial development and inclusion. But it can also jeopardise financial stability and integrity, as well as consumer and investor protection. To reap maximum benefits and minimise risks, financial systems and regulators must be well-prepared to manage technological change without hampering innovation and competition. Countries have different approaches to fintech regulation. Some prioritise traditional prudential and conduct objectives. Others give more weight to innovation, inclusion, competition and development.

Respondents to OMFIF’s survey stressed the need to ensure consumer protection, privacy and cybersecurity.

One central bank stated that while innovation ‘plays a very important role in supporting financial inclusion’, it ‘brings new risks that could impact the stability and sustainability of the financial system. Thus, balancing innovation and financial stability is critical’. New technologies should ‘serve financial inclusion with minimal consequence’ on other policy objectives. Another regulator said, ‘The evolution of technology could be harmful to financial institutions if they are not able to mitigate the risks effectively.’ Managing these threats requires supervisors and regulators to ‘assess financial institutions’ readiness in terms of controls and oversight’.

TECHNOLOGY RISK, RESILIENCY AND CYBERSECURITY

As the financial industry moves towards cloud adoption, central banks and regulators must take into account important financial stability and operational considerations. Among these, most respondents identified cross-border data control,

integrity and systemic operational vulnerabilities arising from financial institutions’ dependence on third-party providers.

Cloud services entail a global, multi-tenant business model, with computing infrastructure and customers across multiple countries. Regulatory divergence could lead to uncertainty and lack of clarity, hindering cloud adoption.

Central banks stressed that guidelines on outsourcing, clarifying legal responsibility for data management, are essential

to avoid regulatory ambiguities or contradictions. One South Asian regulator noted the importance of establishing clear parameters and procedures for responsibility over the management of IT infrastructure, data security and potential data loss between cloud service providers and customers. In the AWS model of cloud provision, customers are responsible for operational resilience in the cloud environment and managing risks. They understand that financial institutions control and own the data under a shared responsibility model,

including meeting all compliance and regulatory obligations.

In cases where cloud computing involves cross-border data exchange, other central bank respondents highlighted that financial institutions should consider how the location of data storage servers could impact regulations and privacy. Data flows across multiple locations may encounter overlapping compliance requirements. Consolidating jurisdictions’ data regulations to streamline cross-border data flows will be an important aspect of creating an enabling environment for cloud. One method is via bottom-up, principles-based regimes such as the Asia Pacific Economic Co-operation cross-border privacy rules system, a set of internationally recognised data protection standards.

Central banks caution that cloud usage could create ‘a risk that the stability of a financial institution’s operations may be compromised due to a cloud computing system failure’. The industry is becoming more interconnected and more financial institutions are embracing hyperscale cloud – including for mission critical workloads. Financial services regulators are paying attention to how this transformation may affect the operational resiliency of individual institutions as well as financial systems as a whole.

There is a growing concern among regulators about potential overreliance on technology providers, though at this stage it is largely theoretical. The Financial Stability Board report, ‘Third party dependencies in cloud services’, notes that cloud adoption (in particular used for mission critical systems), is still in its nascency. The FSB points out the security and resiliency benefits of cloud services, adding that financial institutions and communications service providers have effective controls and risk management procedures in place.

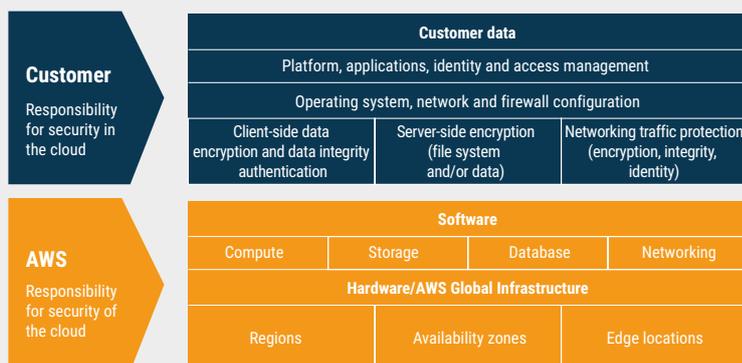
Cloud offers better operational resilience than legacy IT systems. By helping reduce individual financial institutions’ operational risk and address and manage potential threats, it could contribute to the stability of

OPERATIONAL RESILIENCE AND SHARED RESPONSIBILITY IN THE AWS CLOUD

For cloud service providers, ensuring operational resilience should be a real-time, execution-oriented practice. It differs from traditional approaches in business continuity, disaster recovery and crisis management. These rely primarily on centralised, hierarchical programmes focused on documentation development and maintenance. Large-scale CSPs supply financial institutions with a variety of tools to help test business continuity plans and deliver critical operations through disruption.

AWS provides a secure and resilient cloud infrastructure, as well as guidance on the interdependencies of the shared responsibility model of cloud computing. By using AWS, financial institutions can boost their capacity to support increasing transaction volumes. They can track and manage changes to maintain all their deployments with the same, up-to-date capacity and architecture. Additionally, they can maintain backups on the cloud.

Shared responsibility means that an application’s security relies on both AWS and its customers. The former manages the cloud’s security, protecting its infrastructure and services, upholding operational performance, and complying with legal and regulatory requirements. Customers must manage the security of their content, applications, systems and networks.



the financial system.

As one respondent noted, ‘All financial institutions should fully understand the inherent risks of adopting cloud services and their responsibility in managing these risks in order to protect customers and themselves from any financial loss arising from [service disruption] incidents or threats.’

Some regulators raised concerns that if a cloud service provider served several major financial institutions, it could lead to potential systemic risks of service outage. Recognising the importance of operational resilience and service consistency for key economic activities such as financial services, cloud service providers have constructed their cloud architecture based on mechanisms that ensure wider availability, more fault tolerance, and swifter scalability than would be possible from a single data centre. The AWS global infrastructure, for instance, minimises the risk of service outages or disruption risk contagion through its expanding system of 77 availability zones across 24 geographic regions.

These zones consist of one or more data centres, each with power, networking facility and connectivity, housed in separate autonomous facilities. They help businesses comply with local data usage and storage regulations, by ensuring that data reside only in pre-determined geographical regions.

New technologies and cross-border IT infrastructures in financial services present legitimate concerns. However, the regulatory response to cloud should be well-balanced, risk-based and outcome-oriented. Imposing rigid data requirements and limiting cloud systems to specific countries or regions could result in higher costs. It could inadvertently generate concentrated points of vulnerability that make it more difficult for cloud users to meet risk management and compliance protocols. Regulators, cloud service providers and end-users must work together so that all sides are aware of the technology’s benefits and risks.

Overall, survey respondents believed that greater knowledge of cloud, as well as in-built security

measures for cloud-based fintech services, will help to gradually increase regulatory confidence in cloud reliability. The Asian Development Bank’s Lotte Schou-Zibell noted that the regulatory landscape was defined by ‘many countries that prefer data to be hosted domestically’. As such, there is a clear opportunity to improve ‘understanding of what cloud is and how it can be much safer and more secure than a server’.

These precautions are important to promote wider usage of fintech products and services. As one South Asian central bank respondent explained, ‘With appropriate digital literacy campaigns, the underbanked and unbanked communities are receptive to new fintech innovations. However, the safety and security of the innovations are of prime importance as any news/incidence of fraud has a negative impact on adoption of such innovations.’

RESPONSIBLE INNOVATION

Several Asia Pacific central banks and financial regulators placed great

1. AWS builds a worldwide footprint

Source: AWS

AWS Global Infrastructure

24 geographical regions, 77 availability zones, 200+ POPs

Region & Number of Availability Zones (AZs)

GovCloud (US)
US-East (3), US-West (3)

US West
Oregon (4)
Northern California (3)

US East
N. Virginia (6), Ohio (3)

Canada
Central (3)

South America
São Paulo (3)

Africa
Cape Town (3)

Europe
Frankfurt (3), Paris (3),
Ireland (3), Stockholm (3),
London (3), Milan (3)

Middle East
Bahrain (3)

Asia Pacific
Singapore (3), Sydney (3),
Tokyo (4), Osaka-Local (1)*

Seoul (4), Mumbai (3),
Hong Kong (3)

China
Beijing (2), Ningxia (3)



Announced Regions

Three Regions and 9 AZs in Indonesia, Japan, and Spain

* Available to select AWS customers who request access. Customers wishing to use the Asia Pacific (Osaka) Local Region should speak with their sales representative.



emphasis on ensuring that new fintech innovations were sufficiently robust from a market conduct and consumer protection standpoint. One central bank noted that ‘ensuring consumer protection is important in balancing innovation and financial stability as consumers’ best interest is a key priority when developing new products and services’.

Central banks and regulators are carefully studying the risks and opportunities arising from cloud technology in order to set appropriate common standards for new financial service providers. One central bank shared that the main regulatory approach ‘tries to

‘Central banks stressed that guidelines on outsourcing, clarifying legal responsibility for data management, are essential to avoid regulatory ambiguities or contradictions.’

balance development of fintech and financial stability by putting in place technical standard requirements in new services that fintech companies provide’.

Another official shared, ‘Financial institutions need to consider various issues before moving to using cloud service to make sure it provides positive outcomes to the institution. A quick move to cloud migration may cause unsecured operations resulting in operational risk in terms of cybersecurity, technical issues, loss of control and legal risk.’

CENTRAL BANKS REALISE CLOUD BENEFITS

Many respondents were confident that effective governance and risk management would help central banks and financial institutions overcome the challenges that cloud and other new technologies pose. As one central bank shared, ‘There will always be risks to outsourcing such as data privacy, availability, cybersecurity and other operational issues and concerns, including legal and compliance and counterparty or vendor management risks. Nonetheless, financial institutions can always find the right balance between risks and benefits when migrating to the cloud environment. Risk management capabilities could play a vital role in identifying these risks and assessing whether financial institutions can effectively manage them.’

Another supervisor added, ‘In some situations, promoting innovative fintech development and financial inclusion may lead to the enhancement of financial stability. We are not to be trapped in a fixed concept, but will remain open and flexible in considering positive and appropriate approaches to address issues respectively.’

Some central banks were unconvinced that cloud computing could enhance their regulatory and supervisory function. One respondent said the technology could instead prove useful for reporting and data management. In particular, cloud ‘may allow for greater flexibility in storage and mobility capacity and

Case study

CANTILAN BANK AND UNION BANK, PHILIPPINES

Almost 77% of the Philippines population do not own a bank account. To reach out to unbanked and underbanked communities, Union Bank and Cantilan Bank have migrated their operations to cloud services. Both are working with Bangko Sentral ng Pilipinas to promote financial inclusion and digital banks.

In 2019, Cantilan Bank became the first rural bank in the Philippines to adopt cloud technology to promote financial inclusion. Regulated by BSP and with the financial support of the Asian Development Bank, it digitised all of its operations using Oradian’s SaaS cloud services. This improved its security, reduced costs, and helped it expand its outreach across 12 provinces.

The transition to a cloud-based core banking technology occurred in four stages between 2017-19. First, pilot branches migrated to the cloud. Second, mobile applications linked to the cloud platform were used for transactions made by account officers in remote areas. Third, Cantilan Bank’s network of ATMs, remittance and mobile money were integrated into the new system. Finally, customers were given direct digital access to Cantilan Bank’s services using mobile phones.

Alongside this process, the central bank provided a regulatory sandbox for companies to test new technology, innovation and services. This way, BSP created a controlled environment that encouraged innovation while maintaining oversight over the overall financial system.

Like Cantilan Bank, Union Bank has embarked on a digital transformation, launching its own technology entity, UBX. It has adopted several strategies to improve ‘prosperity inclusion’, to attract 50m customers by 2020. The bank plans to continue migrating its operations to cloud services in the next two to three years.

Using Amazon’s Simple Storage Service, Union Bank has transferred 15 terabytes of data to cloud and eliminated tape storage, saving up to Php20m (\$380,500) annually. Migrating to cloud services has reduced processing times to two hours from eight.

Union Bank has partnered with Microsoft and Temenos to integrate its core banking software on a cloud computing platform, with the similar aim of improving financial inclusion and innovation in the Philippines.

gain from the ease in processing large data volumes. Considering this, cloud computing could be a low-cost option which increases the storage capacity and data processing ability of supervisory agencies.'

Another central bank noted, 'It may be premature to render an assessment on whether the perceived advantages of cloud can truly be realised, particularly in the context of [enhancing] regulatory capacities.' However, they recognised that cloud computing could help the financial sector better meet compliance requirements. It could afford financial institutions the ability to 'simplify controls, streamline reporting, scale securely, and stay ahead of developing standards and regulations'. Nonetheless, this was contingent on the financial industry conducting the 'necessary due diligence and having robust risk management and security controls' in place.

A South Asian central bank cautioned that it was too early to reach a conclusion on cloud. Still, it saw potential via 'some improvement in data collection and analytics and further research'. One example the central bank suggested was in the case of multi-tenant cloud adoption. 'If multiple entities adopt a common cloud infrastructure, then, to that extent, the supervisory capacity requirements would be optimised.' Regulators would need to be equipped to oversee these new arrangements as 'the risk, complexity and nuances of cloud computing would require strengthened supervisory and regulatory capacities'. Regulatory approaches to cloud should be based on risk considerations rather than tailored to specific technologies. One Southeast Asian central bank noted that a radically different or separate regulatory approach would be unwarranted, as 'the types of risks in cloud services are not distinct from that of other forms of outsourcing arrangements'.

APPROACHES TO CLOUD REGULATION

As established financial institutions and new fintechs turn to the cloud

'Rather than taking a passive approach to cloud regulation, several jurisdictions in Asia Pacific have developed, or are in the process of actively developing, guidelines and rules that clarify regulatory requirements and expectations for compliance and risk management.'

for more efficient and cheaper data management, concerns remain over cloud data security and the question of legal responsibility for outsourced services. Many organisations and regulators are seeking to clarify accountability over data and resources stored on shared systems. Regulatory approaches differ across financial sector activities. One South Asian monetary authority explained, 'From an organisational perspective, the type of data that can be hosted on cloud may vary across different organisations or regulators. In terms of assessing the risks associated with migrating these different types of data to cloud – such as public data, private data, confidential data – the willingness of different organisations to host these data on cloud may well be dependent on their respective risk appetite.'

For some respondents, cloud technology and the emergence of cloud-native financial service providers will probably require a fundamental evolution in regulatory frameworks. Lotte Schou-Zibell said, 'Wider adoption of cloud requires changes in people's mindset and behaviour, as well as a cultural shift among staff. Many existing mentalities are compliance- rather than risk-based.' Despite the need to adjust outdated regulations to new cloud-based services, some central banks emphasised that this should be technology-neutral. One respondent noted, 'Our assessment of risk management capabilities or compliance with regulations should be the same whether or not a particular activity or function is outsourced.'

Rather than taking a passive approach to cloud regulation, several jurisdictions in Asia Pacific have developed, or are in the process of actively developing, guidelines and rules that clarify regulatory

requirements and expectations for compliance and risk management. Effective regulation often involves close collaboration between regulators, financial institutions and cloud service providers. Regulatory frameworks have established clear channels for dynamically adapting to changing business models, opportunities and risks from cloud migration and outsourcing.

Policy-makers must develop measures that support innovation while protecting consumer interests. To promote cloud adoption, they should take a principles- and risk-based approach that allows financial institutions to manage risks effectively. They should support initiatives for cross-border data flows for all types of data. There is need for clearly defined audit requirements appropriate for cloud, based on global standards and certifications. Regulators should pro-actively raise awareness, promote cloud and clarify misconceptions in the industry. They should also develop supervisory frameworks and internal expertise to empirically assess potential concentration risks that could emerge. Finally, there is a need to account for internal risk mitigation systems that cloud service providers already have in place to ensure operational resilience and continuity.

Positive regulatory outcomes require a diverse, layered compliance strategy. To maintain oversight, regulators must engage with cloud service providers and customers throughout the outsourcing process. Public-private dialogue is essential to developing sound regulatory and risk management frameworks for cloud in the financial sector. One respondent pointed out the importance of central banks and regulators collaborating with industry associations on implementation guides for financial institutions entering into cloud outsourcing arrangements. ●

REGULATORY OVERVIEW BY JURISDICTION

SINGAPORE

Several respondents identified the Monetary Authority of Singapore as one of the most progressive financial regulators promoting the adoption of novel technologies such as cloud computing. It adheres to a risk-based, outcome-oriented approach to manage risk. MAS and the Association of Banks in Singapore co-created an implementation guide for financial institutions to use when entering into cloud outsourcing arrangements. The ABS cloud computing implementation guide 2.0 is an updated version of a framework released in 2016 to support greater integration of material workloads on cloud.

The new guide aims to further strengthen the technology and operations resilience of individual institutions as demand for cloud infrastructure grows. It includes frameworks for governing, designing, securing and running cloud services. It also contains guidelines for categorising material and non-material cloud outsourcing arrangements. In addition, it outlines procedures for cloud service providers to follow alongside due diligence for cloud outsourcing arrangements. Separately, the MAS' [outsourcing guidelines](#) and [technology risk management guidelines](#) set out principles and best practices on managing risk in outsourcing arrangements.

AUSTRALIA

Although the Australian Prudential Regulatory Authority expressed reservations over the risks and safety of cloud computing services in 2015, its regulatory approach has since changed. APRA has published several prudential standards, practice guidelines and information papers on the requirements and supervisory expectations that financial institutions should be aware of when using cloud services.

APRA's September 2018 guide adopts a more open stance to cloud usage. It provides financial institutions with materiality assessments and risk classification on cloud outsourcing, helping institutions identify the level of risks associated with cloud outsourcing. The framework lays out the management and mitigation procedures that

should be in place when transitioning to cloud computing services. This includes rules in relation to risk assessment, security, disaster recovery and contingency planning, data audit and access rights.

NEW ZEALAND

The Reserve Bank of New Zealand has adopted a largely cloud-friendly policy framework in line with the government's 'cloud-first' strategy. In February 2017, the RBNZ released a [revised outsourcing policy](#) for local banks that reduced regulatory ambiguities by introducing a formal definition of outsourcing. This was further amended in September that year to strengthen the contractual provisions for outsourcing arrangements. The updated policy outlined a formal engagement process with the central bank on new areas that can be affected via outsourcing arrangements.

JAPAN

The Japan Financial Services Agency, Centre for Financial Industry Information Systems and Bank of Japan have jointly established FISC security guidelines on computer systems for banking and related financial institutions. These provide specific requirements regarding termination of cloud services. FISC guidelines mandate that outsourcing contracts must address exit procedures and responsibilities for data management and allocate the costs of data transfer in different scenarios.

SOUTH KOREA

In October 2016, the Financial Security Institute issued [guidelines on the use of cloud services in the financial industry](#) which allowed financial institutions to adopt cloud computing only for non-critical processing systems. This banned the use of cloud for handling unique identification information and personal credit information. Prior to that, guidelines were released in June

2015 aimed to relax conditions placed on financial institutions when outsourcing their IT and data processing services.

Since January 2019, the Korea Financial Services Commission's amended regulation on supervision of electronic financial transactions allows financial institutions to use cloud services for all workloads. However, services processing data deemed to carry unique identity and personal credit information must be stored in-country. Financial institutions using cloud for workloads that are internally deemed significant in nature must notify regulators before using the cloud service.

MALAYSIA

The Bank Negara Malaysia has issued guidelines to reflect technological advances in the financial industry and the need for financial institutions to fully understand the inherent risks of adopting cloud services. These are stipulated in the country's [outsourcing and risk management in technology guidelines](#), which were updated in 2019 and 2020 respectively. The former set out the requirements on managing outsourcing processes and risks. Both documents mandate that financial institutions must seek the central bank's written approval prior to using cloud for material outsourcing arrangements and for critical systems.

The BNM released the financial technology regulatory sandbox framework in October 2016. Future plans for the BNM include regulations for virtual bank licenses in hopes to expand and bring in new market entrants and innovative products for the financial industry.

However, forthcoming regulations could hinder efforts to promote the use of innovative technologies in the financial industry. BNM's new outsourcing draft presents more stringent standards of governance and outsourcing risk management measures. It imposes restrictive measures such as the need for financial institutions to seek prior regulatory approval on all outsourcing arrangements, data locations and the rights to conduct audits on their data centre facilities.

PHILIPPINES

Financial institutions must seek approval from Bangko Sentral ng Pilipinas before adopting cloud services. BSP has introduced several regulations to support the use of cloud and a 'cash-light' economy. In particular, circular 808 guides all banks and other BSP-supervised institutions on IT risk management, and opens up the adoption of cloud-based technical solutions for the financial sector. Examples of cloud-favourable policies include regulatory frameworks such as the [revised outsourcing framework for banks \(BSP 899\)](#), [guidelines on information technology risk management \(BSP 808\)](#), and [enhanced guidelines on information security management \(BSP 982\)](#). These frameworks promote cloud computing as the preferred ICT deployment strategy. They allow banks to store customer data in private clouds abroad.

INDIA

No prior approval from the Reserve Bank of India is needed for the use cloud services. However, financial institutions under the RBI's jurisdiction may be required to store certain forms of data, such as payment-related information, in-country.

The RBI has laid out frameworks for the outsourcing of financial services such as the [guidelines on managing risks and code of conduct in outsourcing of financial services by banks \(2006\)](#), [guidelines on information security, electronic banking, technology risk management and cyber fraud \(2011\)](#) and [cybersecurity frameworks in banks \(2016\)](#). The Institute for Development and Research in Banking Technology, an arm of RBI, released a document on cloud adoption for Indian banks in 2017 that lists the benefits of cloud and sets out a guide to help financial institutions adopt the technology. Addressing cybersecurity and other risks, the RBI set up the Reserve Bank Information Technology Private Limited. The RBI issued [basic and comprehensive cybersecurity frameworks for urban co-operative banks in 2018 and 2020](#), respectively.



SECTION 5:

WHY ASIA'S UNBANKED CAN LOOK TO A BRIGHTER FUTURE

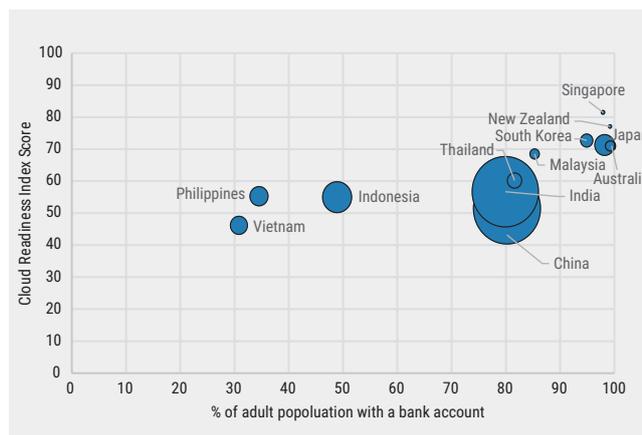
Countries across Asia Pacific have an opportunity to bolster financial inclusion through the cloud. But to reap the benefits of innovative finance, policy-makers must ensure the appropriate regulatory frameworks and digital infrastructures are in place.

CLOUD computing can be a powerful catalyst for financial inclusion. As regulators and central banks develop their understanding of cloud platforms and implement appropriate safeguards, the benefits to financial inclusion will only grow.

Asia Pacific economies with high levels of financial inclusion, as measured by account ownership (Figure 1), are best prepared for widespread cloud adoption. The Asia Cloud Computing Association

scores countries on cloud readiness based on quantitative and qualitative indicators that assess connectivity, infrastructure quality, regulatory environment and business sector sophistication. High marks for Singapore, Japan, South Korea and Australia imply that countries with robust and inclusive financial sectors are better prepared for widespread cloud migration.

By developing a cloud-ready regulatory environment alongside



1. Financial inclusion and cloud readiness goals align

*Size of bubbles represent population size
 Source: Asia Cloud Computing Association 2020, World Bank Global Findex 2017, OMFIF analysis

reliable, high-quality digital infrastructures, policy-makers can ensure that the financially underserved can access cheaper, customisable digital financial services.

This report highlights the main areas in which digital financial services can improve financial inclusion in Asia Pacific. While developing economies face basic physical and digital infrastructure issues, the Covid-19 pandemic has created new opportunities for fintechs to provide safe and affordable financial services. The use of mobile devices in low-income and unbanked communities in Southeast Asia, India and elsewhere is accelerating. This offers great promise for the provision of digital inclusive financial services and products.

Individuals and small businesses with limited credit histories stand to benefit from alternative services and products tailored to their needs. This also applies to those with constrained access to affordable funding, cross-payments and remittances.

A fintech ecosystem that can service these underbanked communities must be built upon several key foundations. First, in Asia Pacific, governments must push forward the development of biometric identification systems, with support from private enterprises and fintechs. Establishing a quick and efficient means of ascribing identity and ownership will be a fundamental enabler for virtual administrative processes and financial transactions. Second, progressively onboarding less digitally-literate communities will require familiarising communities with intuitive digital financial services, such as digital payments infrastructure permitting everyday transactions for basic goods and services.

Cloud services are increasingly becoming a core back-end infrastructure to support massive data generation, advances in computer algorithms, and improvements in computer processing

Case study: Digital payments

CLIK, CAMBODIA

Expanding financial inclusion in Southeast Asia increasingly depends on fintechs leveraging the rising rates of smartphone ownership across the region. Clik is a Cambodia-based payments aggregator that facilitates mobile consumer payments linked from cards, e-wallets and bank accounts. It acts as a mobile and software point of sale merchant acquirer. Almost 2,500 merchants and five financial institutions use Clik. The firm is developing integrated capabilities with the National Bank of Cambodia's blockchain-powered digital currency system, Bakong, which went live in October 2020.

Cambodia's payments infrastructure is fragmented and made up of numerous licensed payment service providers and banks. Clik aims to harmonise the payments landscape and provide convenient, interoperable ways for users to transact. Clik has collaborated with both commercial banks and the National Bank of Cambodia to develop interoperability and use its eKYC capabilities to help underbanked Cambodians open bank accounts. Clik's eKYC processes use machine learning and biometrics to ensure they meet regulatory standards and reduce risks of identity fraud, AML and CFT.

Clik's use of cloud infrastructure has enabled it to provide reliable and consistent services. At the same time, it can quickly and cost-efficiently scale IT capacity as it expands its user base.

'While developing economies face basic physical and digital infrastructure issues, the Covid-19 pandemic has created new opportunities for fintechs to provide safe and affordable financial services.'

power. Most central banks and regulators agree that cloud services are transforming work and business models in the financial sector, and supporting a vibrant industry in developing countries.

For incumbent banks servicing customers in rural areas, cloud migration can substantially reduce fixed operating costs and configuration and system administration delays. Nimble start-ups providing digital financial services that migrate or are cloud natives can easily and rapidly scale their operations to serve more people without being constrained by prohibitive up-front investments in IT infrastructure.

For the technology to contribute most effectively to financial inclusion in developing economies, there must be clearly defined and harmonised regulatory frameworks on cloud service usage. Because the technology operates across borders and between businesses, individual regulations and laws may diverge. Cloud service

‘Establishing a quick and efficient means of ascribing identity and ownership will be a fundamental enabler for virtual administrative processes and financial transactions.’

providers, end-users and financial regulators must find ways to balance emerging regulatory risks and legal ambiguities with opportunities for improved efficiency and lower IT costs.

As cloud becomes a critical component of financial market infrastructures, the need for a balanced approach to the technology will grow. Central banks, in adapting compliance and risk management requirements, should determine which aspects of financial institutions’ activities can be securely migrated or developed on the cloud. Many jurisdictions are still exploring the opportunities that the technology presents. As central banks and regulators learn more about it, they may decide that it is possible to realise the supervisory, regulatory and financial inclusion benefits of cloud without sacrificing security, resilience and data privacy. Cloud fintechs could complement central bank efforts to upgrade and expand the inclusiveness of payment infrastructures. Clik, a Cambodian payments aggregator operating on the cloud, for instance, will integrate with the National Bank of Cambodia’s own innovations in retail payments.

Developing economies in Asia Pacific have a major opportunity to replace path-dependent legacy technology infrastructures with more flexible cloud-based models. Creating the appropriate regulatory frameworks, strengthening basic digital infrastructures, and fostering inclusive fintech solutions can serve as the technological foundation for businesses and individuals in these countries to be financially resilient. ●

ANNEX:

FINANCIAL INCLUSION AND FINTECH FOR AGING POPULATIONS



ADVANCED economies face their own set of financial inclusion challenges due to aging populations. While the financial services industry has broadly adapted to technology by changing the way it delivers products and services to suit younger, tech-savvy customers, the same agility is necessary to ensure that innovation is inclusive and can connect with the needs of older consumers. Policy-makers, financial institutions and fintechs must anticipate and plan for future technological and demographic transitions that could fundamentally alter the way consumers access and use financial products.

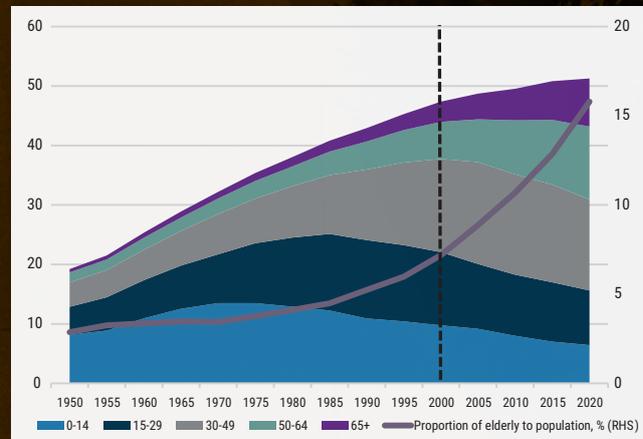
In 2000, 7% of South Korea's population was aged above 65. A quarter of South Koreans will be

above 65 years old by 2030, rising to 40% by 2050.

As life expectancy increases, so do financial pressures arising from insufficient savings and higher expenditures on healthcare and insurance. This calls for more services suited to elderly financial planning. It may be difficult for these customers to travel to bank branches, and they may struggle to understand and use financial services, particularly online banking. They are also more vulnerable to fraud.

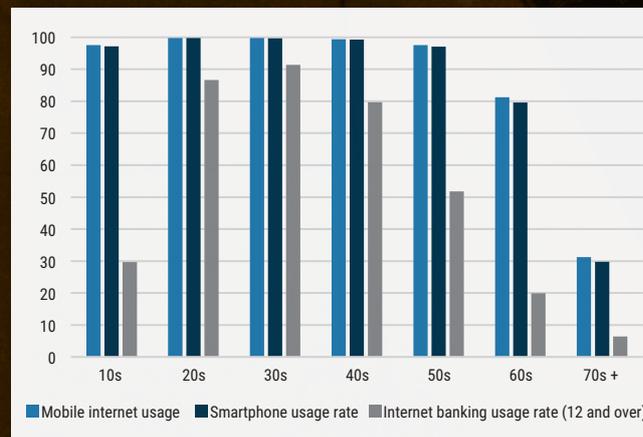
In South Korea, the effects of an age-based digital divide in accessing financial services are apparent in several areas.

According to the Korea Internet and Security Agency, use of mobile internet and smartphone technology among



1. South Korean population aging rapidly

Population by age group, millions
Source: UN World Population Prospects, OMFIF analysis



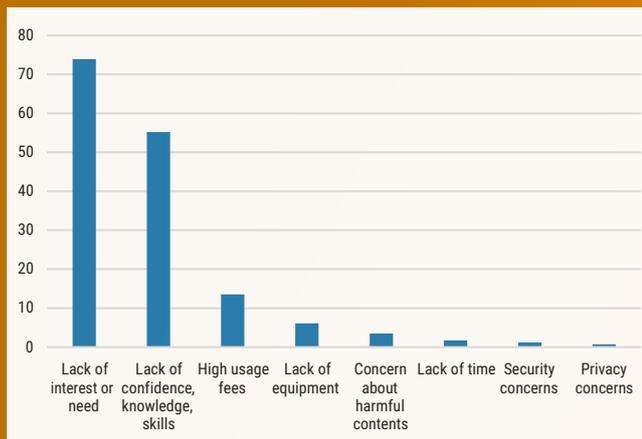
2. Older South Koreans trail behind in online banking

ICT and digital financial service usage by age group, %
Source: Korea Internet and Security Agency 2017 Survey on Internet Usage, OMFIF analysis

3. Awareness, literacy and cost are major barriers to internet use

Reasons for not using the internet, share of respondents, %

Source: Korea Internet and Security Agency 2017 Survey on Internet Usage, OMFIF analysis



South Koreans aged 60 and over is very low compared to the rest of the population. The Bank of Korea says, ‘There is certainly a need for financial inclusion for the elderly in Korea, as Korea’s technological changes are one of the fastest in the world. The ratio of online banking service usage is 74% for transactions, 47% for deposits and 59% for loans for all customers, however for the elderly who are more than 80 years old, the numbers are much lower (42% for transactions, 3% for deposits and 2% for loans).’

When KISA asked respondents why they did not use the internet, the most commonly cited reasons were lack of interest, insufficient digital literacy and expensive usage fees (Figure 3).

In 2013, South Korea launched the financial education activation plan. Led by the Financial Services Commission, the plan initially focused on mapping financial literacy via student and household surveys, as well as partnerships with public organisations, financial industry associations, and other private and not-for-profit organisations. This sought to improve the provision of financial education, lay the foundations for customised financial education programmes and establish a follow-up management and evaluation system.

There is growing recognition of the need to promote senior-friendly financial services and education initiatives. As South Korea grapples

with the Covid-19 pandemic, daily economic activities and transactions are increasingly based on the concept on ‘untact’ – an economy in which face-to-face interactions are unnecessary. Online and remote technologies are embedded across manufacturing, logistics and payments. Elderly South Koreans who are unable to adapt risk being left out of the new contact-free economy. The Bank of Korea observed that brick-and-mortar financial services and banks were ‘closing down their branches due to increased online banking’.

In Japan, the Financial Services Agency said that Covid-19 had ‘caused an increase in the number of customers, especially the elderly, who want to avoid face-to-face meetings that are traditionally practiced in marketing or sales consultative activities’. In its view, digitisation and contactless financial services will ‘become available on many more occasions in the future’.

In May 2020, the FSC announced that it would lead research on the digital banking and financial services needs and demands of seniors. The FSC is establishing guidelines for banks on helping elderly customers access mobile and internet services.

Policy-makers in other advanced economies and international organisations are also recognising the importance of crafting dedicated technological solutions for the elderly. In 2019, the G20 Fukuoka policy priorities on aging and financial inclusion outlined policy priorities associated with

aging populations, including strengthening digital and financial literacy, lifetime financial planning, customising services to the diverse needs of older people and creating safeguards against financial abuse and fraud. Various fintech solutions could be versatile means of addressing these challenges. The Japan FSA noted its keen interest in ‘offering easily accessible financial services using digital technologies which will further enable, for example, a flexible (and swift) response to service the needs of elderly users depending on their respective cognitive decision-making abilities, and detect inappropriate transactions based on each individual situation.’

Cloud-enabled fintech applications such as robo-advisers are examples of how new digital technologies could enhance the financial resilience of customers in aging societies. Highly customisable financial services and products can help bridge the digital divide. In Southeast Asia, StashAway, a digital wealth management platform launched in 2017, provides automated algorithm-driven investment and financial planning services. It offers personalised data-driven portfolios according to customers’ assets, time horizons and risk preferences. StashAway’s products include a retirement plan to promote greater financial health for their clients. By January 2020, StashAway had processed over 2.5m buy/sell transactions, 80,000 deposit verifications, 30,000 bank records, and created 25,000 savings goals for its clients.

By using AWS cloud infrastructure, StashAway is able to keep costs down and ensure its service runs smoothly. AWS facilitated StashAway’s expansion into Malaysia, particularly in terms of compliance with data privacy and regulatory requirements. The services provided by AWS, such as Amazon Elastic Kubernetes Services, has helped the fintech bolster its cybersecurity arrangements to protect against external intrusions and unauthorised access. ●





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