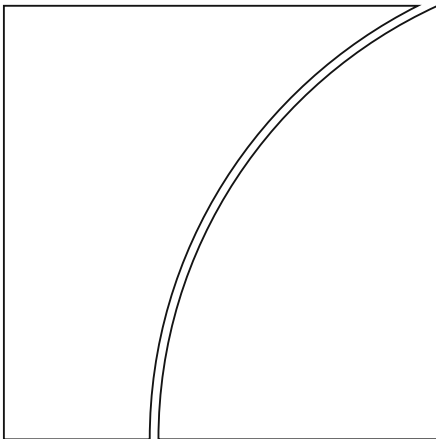BANK FOR INTERNATIONAL SETTLEMENTS

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The dawn of fintech in Latin America: landscape, prospects and challenges

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The dawn of fintech in Latin America: landscape, prospects and challenges[1]

Carlos Cantú[2] and Bárbara Ulloa[3]

Abstract

Fintech in Latin America is greeting the dawn. We take stock of how it is transforming financial services in the region. First, we describe the fintech landscape in terms of investment, firms and services provided. We find that fintech has quickly gained traction in Latin America, mainly in the areas of payments and alternative finance. Second, we evaluate the prospects for fintech by exploring the institutional framework to supervise and regulate it. We show that fintech regulation in the region takes an activity-based approach rather than an entity-based one, except in Mexico. Finally, we present the challenges that fintech faces in becoming a game changer for the region. We conclude that fintech can be a strong catalyst to improve financial and social conditions in Latin America by incorporating the unbanked into the financial system and providing alternative sources of finance to firms.

JEL classification: E58, G18. G23, G28, O30, O38.

Keywords: fintech, financial services, regulation, financial inclusion, crowdfunding, fintech credit, alternative finance.

Contents

"Change, like sunshine, can be a friend or a foe, a blessing or a curse, a dawn or a dusk."

William Arthur Ward

1.   Introduction

Technology has quickly become rooted in our daily lives. *Fintech*, or technology-enabled financial innovation, has changed the way we buy, borrow, spend, invest, save and interact with the financial system. In advanced economies, technology-driven financial firms have risen as powerful challengers to traditional financial institutions and have become economically sizeable in some segments such as lending, asset management and investment (Frost (2020)). In some emerging market economies such as China, India and Kenya, these firms have been responsible for incorporating a large share of the unbanked population into the financial system. They have also led the revolution in payment systems, accelerating the transition from cash to digital payments (Pereira da Silva (2018)). While fintech has been quickly expanding and gaining market power in some regions, in Latin America it is just experiencing the dawn. The objective of this paper is to characterise this new beginning.

The paper takes stock of how fintech is transforming financial services in Latin America. We base our analysis on three sources of information. First, we use answers to a questionnaire sent to central banks in the Americas (Annex).[4] Second, we use information gathered in interviews with fintech representatives in the region from both the industry and the regulatory side. Finally, we complement and substantiate our analysis with industry data. Our paper is the first regional analysis that uses these three integral sources of data.

We proceed in three steps. First, we illustrate the region's fintech landscape by describing the current state of the fintech ecosystem across jurisdictions and the type of services fintech firms provide. Second, we evaluate the prospects for fintech by describing the institutional framework that supervises and regulates fintech activities and firms. In this section, we assess the type and granularity of data related to fintech activities collected by authorities and detail central banks' research agendas and initiatives on fintech. Finally, we present the challenges that fintech firms face to become game changers for the region.

Fintech's dawn in Latin America has been a force to be reckoned with. Fintech investment has quickly gained traction, doubling consistently every year since 2016. Firms offering payment and alternative finance services (eg fintech credit, equity crowdfunding, etc) have dominated the landscape, accounting for more than half the share of fintech firms in the region. For alternative finance, business lending has found a fertile land to grow due to the large number of small and medium firms.

This rapidly evolving landscape has been a challenge for central banks and regulatory authorities. These institutions face a tough balancing act: they need to provide regulatory certainty that lets fintech firms flourish while making sure not to over-regulate and risk stifling innovation. In addition, central banks need to ensure that fintech firms do not pose new or additional risks to financial stability. To

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[4]   The questionnaire was sent to the central banks of Argentina, Brazil, Canada, Chile, Colombia, Costa Rica, Mexico, Peru and Uruguay, as well as the Federal Reserve Board and Federal Reserve Bank of New York. We complemented the questionnaire with answers to a survey on fintech regulation sent by the Financial Stability Institute (FSI; for more details, see Ehrentraud et al (2020)).

understand better the implications of fintech for the financial system, central banks have quickly adapted and expanded their research capabilities on the topic. They have actively engaged in data collection, created technical groups and included fintech as a top research priority.

Fintech, however, faces challenges in the region that will not be simple to overcome. First, low financial inclusion and lack of a digital identity are major barriers for consumers who want to access fintech products and services. Second, more progress is necessary in building the infrastructure that boosts digital payments and digitalises cross-border payments. Finally, as society and technology become increasingly connected and more data are collected, one key challenge is how to protect consumer privacy and use data for consumers' benefit.

2. The dawn of fintech in the world

Fintech refers to technologically enabled innovation in financial services that could result in new business models, applications, processes or products, with an associated material effect on the provision of financial services (FSB (2017a,b)). Put simply, fintech is the application of technology to finance. Although the term is of recent vintage, the use of technology in finance dates back at least to the introduction of the telegraph in 1838 and the laying of the first transatlantic cable in 1866. These two inventions allowed the rapid transmission of financial information, transactions and payments around the world. The introduction of automated teller machines (ATMs) in 1967 marked the start of the modern evolution of fintech (fintech 2.0). This invention allowed clients to access funds without a teller, paving the way for change in financial services from analogue to digital. Finally, fintech's current era (3.0) started with the widespread entry of technology firms into financial services and the introduction of the smartphone. The former increased consumers' choices with regard to financial service providers, while the latter allowed consumers to access financial services anytime and anywhere (Buckley et al (2016)).

Fintech is the application of technology to finance   Graph 1

Technology's development in the Latin America[1]
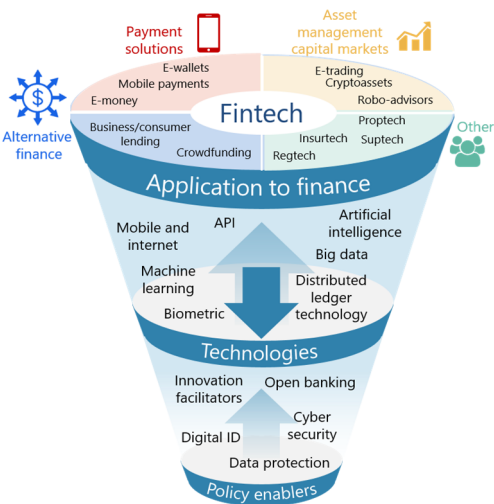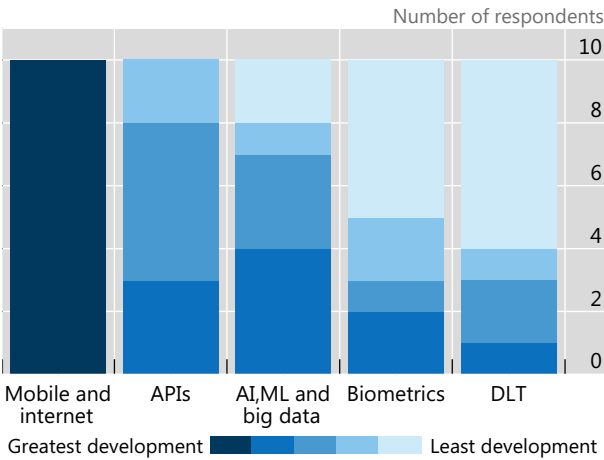
[1] See the annex for definitions of fintech term. Countries that participated in the survey: Argentina, Brazil, Canada, Chile, Colombia, Costa Rica, Mexico, Peru, United States and Uruguay.

Sources: Ehrentraud et al (2020); central bank survey.

Technological development expanded the fintech ecosystem beyond banking services to include payment solutions, alternative finance, asset management, insurance and capital markets. Among technologies applied to finance, mobile and internet technologies have shown the greatest development (Graph 1, left-hand panel). These technologies have allowed universal and round-the-clock access to financial services, bridging the gap between the unbanked and the financial system. Next in terms of development are application programming interfaces (APIs) and advances in artificial intelligence (AI), machine learning (ML) and big data. APIs have streamlined methods of exchanging information between financial providers while AI, ML and big data have refined how financial firms assess risks, allowing them to offer personalised financial products. Finally, biometric technology and distributed ledger technology (DLT) have revolutionised the approach to online security, authentication and cross-validation of information. The profound penetration of these technologies into financial services would not have been possible without the development of policy enablers such as innovator facilitators, digital ID, open banking, data protection and cyber security. These have paved the regulatory and procedural highway to allow these technologies to be applied to finance (Graph 1, right-hand panel). At the same time, technology also supports the development of enhanced policy enablers.

Fintech firms first emerged to address financial intermediation problems in the formal banking sector (Aaron et al (2017)). These firms expanded rapidly in high-income countries where banking systems were less competitive and banking regulation less stringent (Claessens et al (2018)). However, fintech firms have expanded to encompass a wide range of products, services and functions. Fintech activities can be classified by their economic function: payment solutions (payments, clearing and settlement); alternative finance (credit, loans and fundraising); asset management and capital markets (individual or business account management, trading) and other (regulation, insurance, property, health, cloud, etc).[5]

2.1 Global investment in fintech companies

In 2019, fintech investment globally grew by 16% to $140 billion (Graph 2, left-hand panel). Despite a lower number of deals in 2019, the average deal size was higher than in 2018 (right-hand panel).[6] Massive investment supported the expansion of fintech in three main ways. First, it promoted the consolidation of highly mature areas, like payments. Second, it backed the global expansion of challenger digital banks. Third, it helped sprout new startups across emerging fintech sectors such as insurance ("insurtech"), property ("proptech") and wealth management ("wealthtech"). Fintech firms also rose in value. In 2019, there were 458 fintech firms valued higher than $1 billion (fintech "unicorns"). Their accumulated value exceeded $1.3 trillion, with the top 25 valued at $430 billion. For comparison, fintech unicorns' total value in 2019

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[5]   The "other" category includes the application of technology to other areas and is related to the classification of fintech firms by entity rather than by activity.

[6]   For example, in 2019 two deals drove a significant proportion of investment: the $42.5 billion acquisition of Worldpay by Fidelity National Information Services and the $22 billion acquisition of First Data by Fiserv. In 2018, four deals had a value higher than $100 million: WorldPay, AntFinancial, Refinitiv and Blackhawknetwork (KPMG (2019, 2020).

was equal to Australia's GDP while the value of the top 25 was equal to Norway's GDP.[7]

Investment in fintech has shifted from China to other regions

Graph 2

Capital invested

USD billions

Deal count

Number of deals

Legend:
- Latin America and the Caribbean
- Europe
- Asia
- Canada
- United States
- China
- Other[1]

[1] Includes Africa and Oceania.
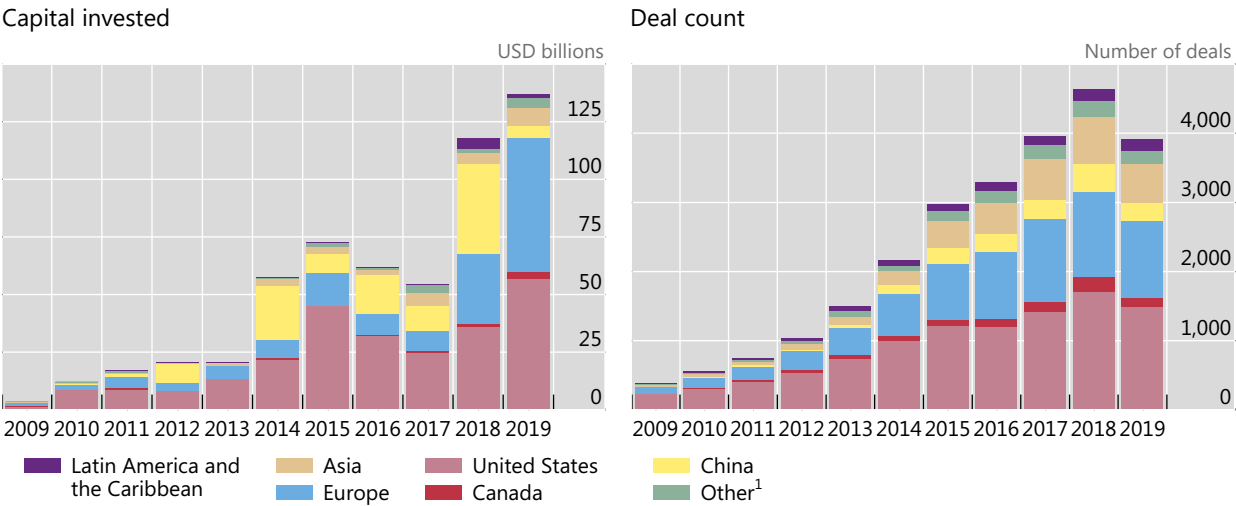
Source: BIS calculations based on data from PitchBook Data.

The main destinations for fintech investment in 2019 were the United States and Europe, where it grew by 60% and 90%, respectively. Fintech investment in these regions represented 80% of the total (40% each), while their share of the number of deals was 40% and 30%, respectively. The US had 225 fintech unicorns valued at $630 billion, while Europe had 55 valued at $115 billion. In 2019, investment shifted away from China, falling from $38 billion to $5 billion. Two reasons were the implementation of stricter regulatory guidelines from the People's Bank of China and a lack of mega-deals in 2019. Still, China held second place in the number of fintech unicorns with 121 firms valued at $430 billion. For other emerging market economies, fintech investment and the number of deals have progressively increased but still represent a small share of the total (10% of investment and 20% of deals).

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[7]   For further details, see the CB Insights website: www.cbinsights.com/research-unicorn-companies.

Fintech has propelled financial inclusion in some emerging market economies

Graph 3

Status of borrowers[1]

Share of total borrowers

Unbanked   Underbanked   Banked
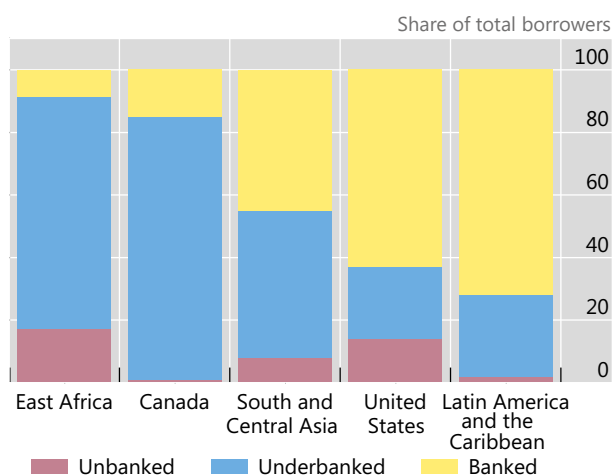
Financial inclusion and technology (2011–17)
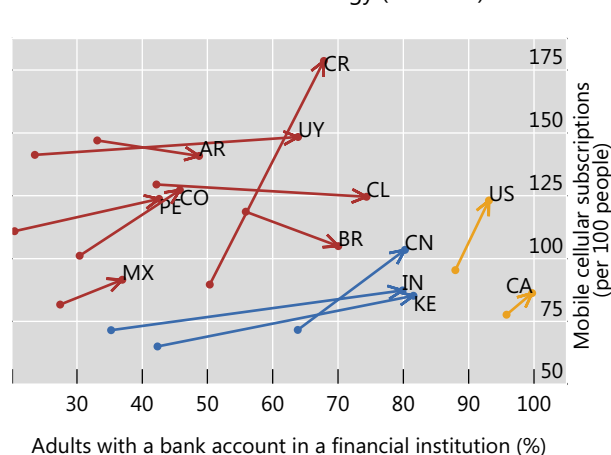
[1] Unbanked are users that are not served by, or do not have access to, any traditional financial service. Underbanked are users that have access to some basic financial services / a bank account but do not have access to a complete suite, and banked are users that have access to a full suite of financial services. Considers only fintech firms that offer alternative finance services.

Sources: Ziegler et al (2020); World Bank Global Findex Database; Global and Regional ICT Database.

The impact of fintech on emerging market economies has been heterogeneous. For example, for the alternative finance market more than 90% of borrowers in East Africa were either unbanked or underbanked, while in South and Central Asia the share was around 50% (Graph 3, left-hand panel). In some countries, such as China, India and Kenya, some fintech firms and initiatives have been game changers in providing access to financial services (Box A). In Kenya, M-Pesa increased access to formal financial services from 26.7% to 82.9% of the population and lifted 2% of Kenyan households out of poverty (Suri and Jack (2016)). In China, where regulations were curbing the prospects of fintech, Alibaba group created Yu'E Bao, which after just nine months became the fourth largest money market fund in the world and eventually the largest (McLoughlin and Meredith (2017)). In India, a government initiative called Aadhaar assigned a unique ID number to all residents and linked it to biometric and demographic data, providing digital identity to 1.2 billion people (D'Silva et al (2019)).

Other emerging market economies have failed to emulate the success of these three initiatives. Lack of access to technology does not seem to be a determining factor in these failures, as it did not drive the impact of these firms on financial inclusion (Graph 3, right-hand panel). As a region, Latin America had a greater number of mobile cellular subscribers than China, India or Kenya, but its financial inclusion was lower than in these three countries. In addition, more than 75% of fintech borrowers already had access to financial services. Why are the unbanked not using fintech services? Why has fintech surged late in Latin America compared with other emerging market economies? Will fintech be a game changer for the region? In the next section, we detail the results of a survey carried out by the BIS to shed some light on these issues.
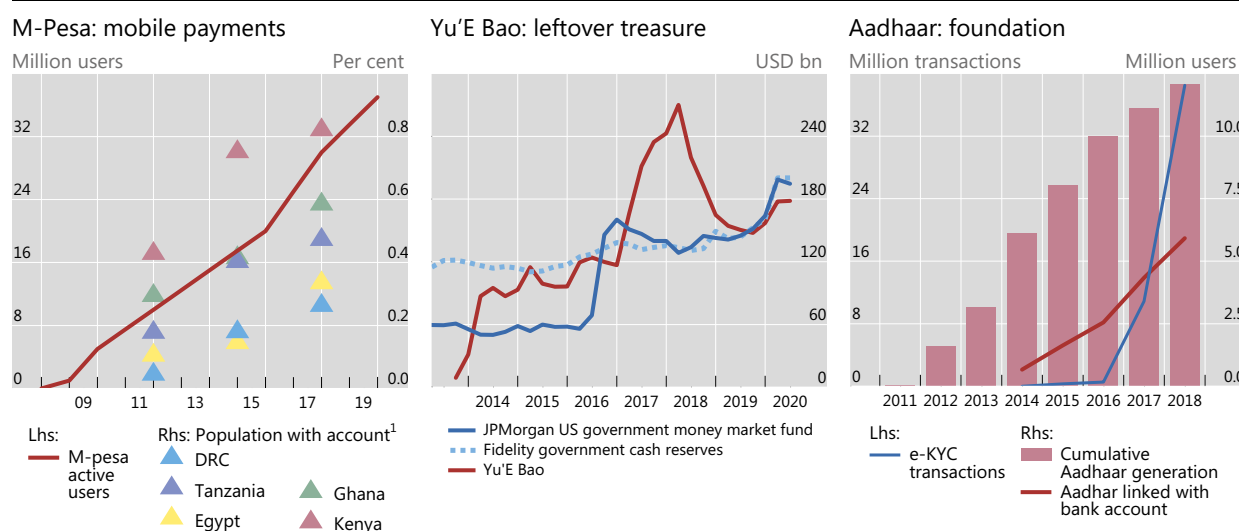
The game changers: M-Pesa, Yu'E Bao and Aadhaar

A game changer is an event or procedure that permanently changes the approach to a situation or activity. Fintech firms and initiatives can be game changers for the way people access and consume financial services. Three examples are the fintech firms M-Pesa and Yu'E Bao and the fintech initiative Aadhaar.

M-Pesa stands for mobile payment in Swahili. Safaricom launched M-Pesa in 2007 in Kenya as a mobile payment system. M-Pesa users have access to a virtual banking system that provides transaction services through a SIM card. Payments and transfers are made through SMS messages and no bank account is needed. A kiosk attendant receives the money that needs to be stored and transfers it in digital form to the user's M-Pesa account. M-Pesa had an unprecedented impact on financial inclusion. By 2019, there were around 37 million users of M-Pesa in Africa, with more than 237 million transactions processed monthly through its system (Graph A.1, left-hand panel). Suri and Jack (2016) estimate that M-Pesa lifted 2% of Kenya's population out of poverty.

Fintech has the potential to transform people's interaction with finance

Graph A.1

M-Pesa: mobile payments

Yu'E Bao: leftover treasure

Aadhaar: foundation

Lhs:
M-pesa active users

Rhs: Population with account[1]
DRC
Tanzania
Egypt
Ghana
Kenya

JPMorgan US government money market fund
Fidelity government cash reserves
Yu'E Bao

Lhs:
e-KYC transactions

Rhs:
Cumulative Aadhaar generation
Aadhar linked with bank account

[1] Percentage of population age 15 or older with an account.

Sources: Unique Identification Authority of India (2019); World Bank; Bloomberg; Viacom; Global Findex Database.

Yu'E Bao means "leftover treasure" in Mandarin. In 2004, Alibaba's Ant Financial launched Yu'E Bao, a digital money market fund platform that allowed Alipay users to invest idle cash sitting in their virtual wallets. Within nine months, Yu'E Bao became the world's fourth largest money market fund. Then it quickly grew to become the largest, with over 600 million users and $238 billion in assets under management. Yu'E Bao achieved in four years what other large funds had done only after decades of building a client base. As the fund became too big to fail, Chinese regulators intervened and enacted policies that reduced its size by one third (Graph A.1, centre panel).

Aadhaar means foundation or base in Hindi. In 2009, the Indian government launched Aadhaar to create a trusted digital identity and eliminate duplicate identities. It is a 12-digit unique identity number based on biometric data (10 fingerprints and two iris scans) and demographic data. Three years after its launch, 200 million people were enrolled in the system, and by 2018 the figure rose to 1.2 billion (99% of the population). In 2013, Aadhaar offered an electronic know-your-customer (e-KYC) service that allowed residents to instantaneously send their proof of identity to their financial service providers. More than 400 million Indians have linked their bank accounts to their Aadhaar numbers (Graph A.1, third panel). It is considered the most sophisticated ID programme in the world.
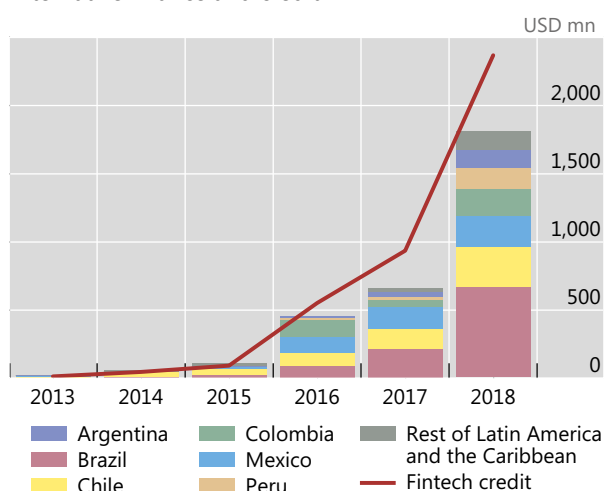
3.   The fintech landscape in Latin America

The growth of fintech in Latin America started later than in other regions but quickly picked up steam. The late development contrasts with the size and rapid adoption of fintech services in the other two major economies in the Americas, namely the US and Canada (Box 2). In 2019, the share of fintech investment and the number of deals in Latin America were, respectively, 1% and 4% of the global total. Still, from 2017 to 2019 fintech investment grew more than 100% while the number of deals increased by 28%. The market for alternative finance (eg fintech credit, equity crowdfunding) in Latin America showed a similar path. In 2018, alternative finance volume and fintech credit in Latin America were, respectively, 1% and 0.5% of the global total. But growth has been exponential: from 2013 to 2018 the average annual growth rate was 147% for total alternative finance and 183% for fintech credit (Graph 4, left-hand panel). Venture capital investment also increased substantially. It more than doubled every year from 2016 and reached $4 billion in 2019. Of these investments, 30% were joint venture deals that involved at least one local and one global investor (LAVCA (2020)).

Latin America is capturing the attention of global fintech investors   Graph 4

Alternative finance and credit

Legend: Argentina, Brazil, Chile, Colombia, Mexico, Peru, Rest of Latin America and the Caribbean, Fintech credit

Investment activity

Colombia
36 deals (**8.2%**)
$1.09 bn

Brazil
222 deals (**50.5%**)
$2.49 bn

Mexico
100 deals (**22.7%**)
$649 mn

Peru
6 deals (**1.4%**)
$3 mn

Chile
40 deals (**9.1%**)
$63 mn

Argentina
29 deals (**6.6%**)
$290 mn

Sources: Cornelli et al (2020); Ziegler et al (2017, 2018, 2020); BIS calculations based on data from PitchBook Data and LAVCA (2020).

In 2019, six countries dominated the fintech landscape in Latin America: Argentina, Brazil, Chile, Colombia, Mexico and Peru (Graph 4, right-hand panel). Brazil was the largest fintech market in terms of investment, volume of alternative finance and number of deals. The majority of fintech investment in Brazil was in digital banks and payment services firms. Second place was different for each of the categories. Colombia had the second highest volume of investment while Mexico had the second highest number of deals. Chile held second place in the volume of alternative finance. Major deals in 2019 included the $1 billion investment in Colombia's Rappi (logistics and distribution), the $725 million investment in Argentina's Prisma Medios de Pago (payments), the $400 million investment in Brazil's Nubank (payments institution) and the $100 million investment in Mexico's Konfio (lending) (KPMG (2020), LAVCA (2020)).

The fintech landscape in the United States and Canada

In 2019, the US was the main destination for fintech investment in the world. The large financial system, use of expertise in innovative technologies and regulatory clarity contributed to its growth. Fintech investment reached an all-time record of $40 billion during the second half of 2019, mainly due to three mega-deals valued at $22 billion, $6.9 billion and $3.5 billion, respectively. Strong participation from a wide range of investors and high company valuations fuelled the growth of the US fintech industry.

The volume of alternative finance also increased substantially, placing the US in second place in terms of size, surpassed only by China (Graph B.1, left-hand panel). In 2019, fintech credit increased by $13 billion, reaching $70 billion (Cornelli et al (2020)). Part of this increase can be explained by lending by big tech firms (eg Amazon and Apple), which accounted for 10% of total alternative credit. Fintech firms have collaborated with big tech to obtain collective benefits. Fintech gained access to big tech's customer base, while big tech provided a more integrated experience across the customer value chain.① One last development in 2019 was the move of fintech firms beyond the payment and alternative finance industry towards business-to-business-focused companies, insurtechs and cyber security-fintech related solutions (KPMG (2020)).

Fintech's supply of alternative finance continues to grow in the US and Canada

Graph B.1
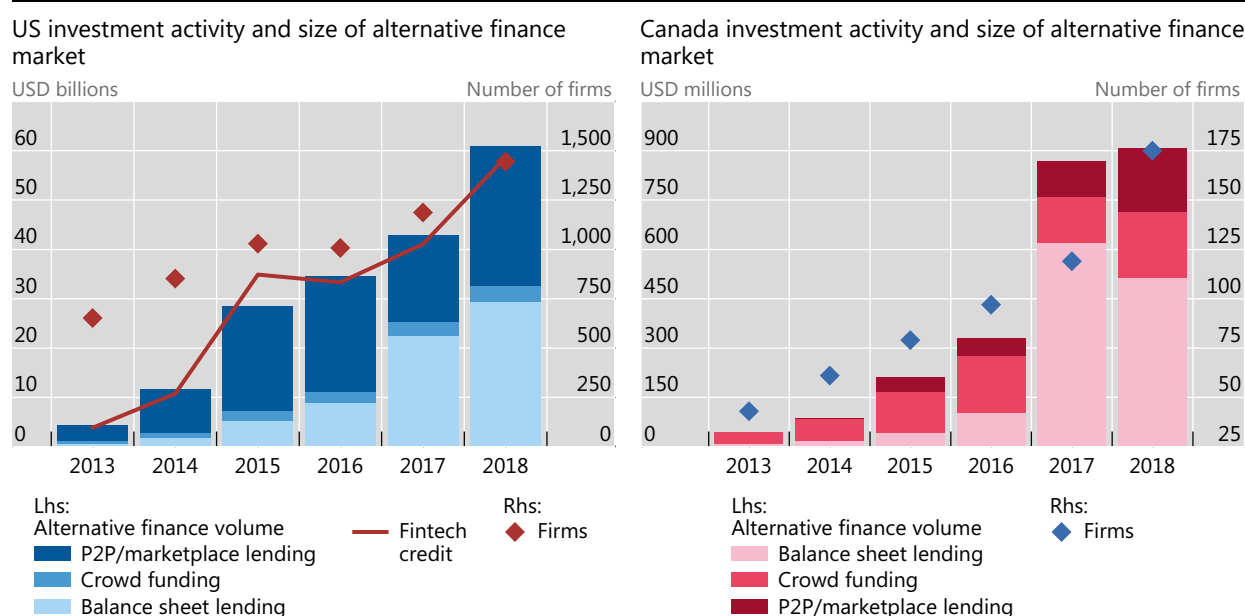
Sources: Cornelli et al (2020); Ziegler et al (2017, 2018, 2020); BIS calculations based on data from PitchBook Data.

Canada has lagged behind the US in investment activity and the size of the finance market, but the adoption rate accelerated after 2016 (Graph B.1, right-hand panel). In 2019, the largest investment was the early-year acquisition of Calgary-based Solium by Morgan Stanley for $821.5 million (KPMG (2020)). The dominant focus of fintech investment has been on artificial intelligence (AI). Canada has been a global leader in AI innovation, with highly regarded specialists in Toronto, Montreal and Edmonton attracting significant investments to those cities (Watson and LaPlante (2018)). From 2017 to 2018, there was a 28% increase in the number of active AI-related startups, which reached 650 firms. The second area of major progress was open banking. As part of its financial sector review, the Canadian federal government updated the Bank Act with new legislation and regulation that mandated a level of open banking similar to Europe. In addition, Canada undertook a multi-year payment system modernisation initiative aimed at upgrading critical infrastructure, creating a real-time payment rail and providing greater access to the country's clearing system.

① For more information on the data, network and activities (DNA) of big techs, see BIS (2019).

One major problem in describing the region's fintech landscape is that there is no official database or registry of fintech firms.[8] But data on the number and type of first financing deals proxy the number of firms entering the ecosystem, while data on the number and type of last financing deals describe how the landscape has matured and evolved (Graph 5, left-hand panel). From 2015 to 2019, the number of first financing deals remained around 50, with half funded through accelerators or incubators.[9] According to Crunchbase,[10] there were 79 accelerators and 36 incubators in Latin America in 2019. The second most common type of first-round financing was venture capital (20%). This source is essential for firms lacking access to capital markets, bank loans or debt instruments. After 2018, the number of last financing deals surpassed the number of first financing deals, showing growth and consolidation in the fintech ecosystem. The types of last financing deals were different from the types of first financing deals. On average, 30% were venture capital deals, while 25% were incubator/accelerator deals. Finally, on average, 10% of fintech firms went out of business or declared bankruptcy.

The fintech ecosystem in Latin America is maturing rapidly

Graph 5

Financing deal type[1]

Number of fintech firms

Financing status

Share of fintech firms

First round / Last round

- Early stage VC[2]
- Later stage VC[2]
- Accelerator/incubator
- PE growth/expansion[3]
- Angel (individual)

First round / Last round

- Buyout/merger/acquisition
- Seed round
- Other[4]
- Out of business

- Corporate backed or acquired
- Angel-backed
- Private equity-backed
- Accelerator/incubator backed
- Venture capital-backed

[1] For all firms in the sample the graph shows the year and type of its first and last financing deal.
[2] VC= venture capital. [3] PE= private equity. [4] Includes capitalisation, debt, corporate, IPO, PIPE, reverse merger, undetermined, joint venture, secondary transaction, grant and product crowdfunding.

Source: BIS calculations with data from PitchBook Data.

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[8] In some countries, fintech firms are required to obtain a licence or register to provide certain services. Finnovista gathers information on fintech startups through the events it organises as well as scouting. It identified 1,166 fintech startups in Latin America in 2018.

[9] Accelerators are organisations that provide education, mentorship and financing to startups, and are usually created by experienced entrepreneurs. Incubators are companies that help startups to develop by providing services such as management training or office space.
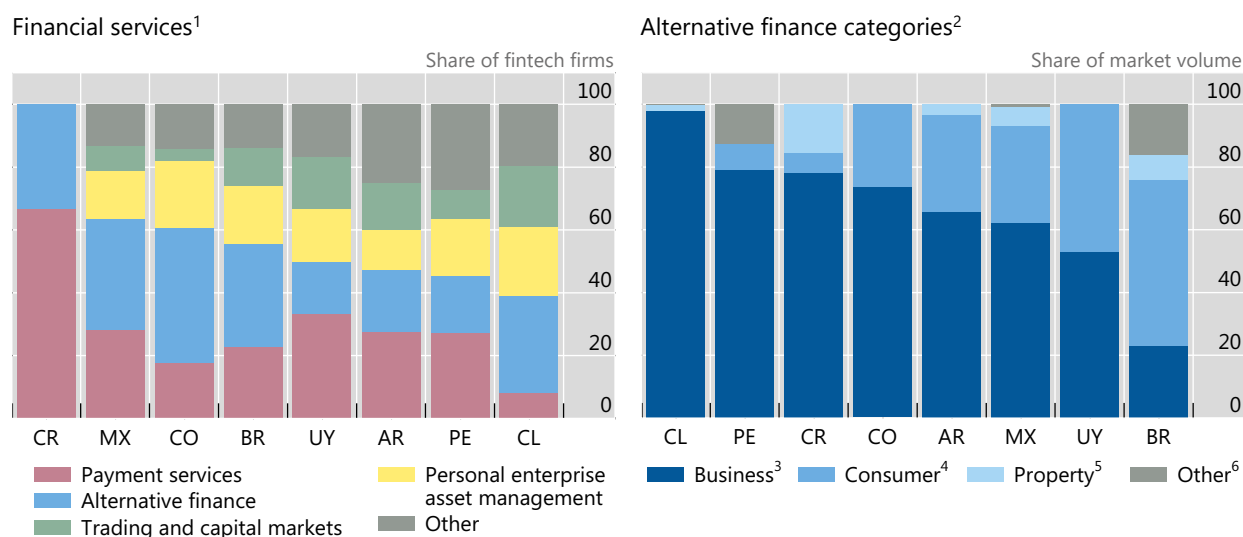
[10] www.crunchbase.com/hub/south-america-accelerators.

Fintech firms' current financing status is another way to assess the degree of maturity of the ecosystem (Graph 5, right-hand panel). In 2019, Brazil and Mexico were the most mature markets, with over 50% of fintech firms backed by venture capital. These countries dominated the region in terms of market size, availability of capital across all growth stages, co-investment partners and regulatory frameworks. The rest of the region was not far behind. In Chile, Colombia and Argentina, the share of fintech firms backed by venture capital was between 40% and 50%. Finally, in Peru, Costa Rica and Uruguay, the ecosystem was somewhat less developed. In Peru, over 60% of fintech firms were backed by accelerators or incubators. In Uruguay, despite the high share of venture capital-backed firms, the total number of fintech firms was less than 50. In Costa Rica, there are less than 30 fintech firms, mainly due to limited funding mechanisms.

Low banking penetration and underutilisation of formal financial services drove the surge and development of fintech firms in Latin America. The banking systems in the region are highly concentrated, resulting in elevated fees and transaction costs, cumbersome procedures to open a bank account and high interest rates. Institutional weakness and low competition between banks leaves little incentive to improve services or offer lower rates to customers (Rojas-Suárez (2016)). In 2019, more than half of Latin Americans had no access to any type of financial service, while banking costs for the other half were high. Fintech firms in Latin America had their sights set on those segments which were left behind or not properly attended to by the traditional financial system.

Payments and alternative finance services dominate the landscape

Graph 6

Financial services[1]

Alternative finance categories[2]

Legend:
- Payment services
- Alternative finance
- Trading and capital markets
- Personal enterprise asset management
- Other

- Business[3]
- Consumer[4]
- Property[5]
- Other[6]

[1] Alternative scoring platforms are included in the alternative finance category. "Other" includes enterprise technologies for financial institutions, insurance and digital banks. [2] Data for Uruguay and Costa Rica as of 2017; for the rest of the countries, as of 2018. [3] Sum of balance sheet business lending, equity-based crowdfunding, invoice trading, P2P/marketplace business lending, community shares, revenue/profit-sharing crowdfunding, reward-based crowdfunding. [4] Sum of balance sheet consumer lending, donation-based crowdfunding, P2P/marketplace consumer lending. [5] Sum of balance sheet real estate lending and P2P/marketplace real estate lending. [6] Sum of debentures, mini-bonds and other.

Source: BIS calculations with data from PitchBook Data and Ziegler et al (2020).

Services related to alternative finance and payment solutions accounted for around half the share of total services offered (Graph 6, left-hand panel). In 2019, 30% of fintech firms provided alternative finance services, 30% payment services, 20%

personal, enterprise or asset management services and 10% trading and capital market services. There is some heterogeneity across countries. In Brazil, Chile, Colombia and Mexico, the largest share of fintech firms offered alternative finance services, while in Argentina, Costa Rica, Peru and Uruguay the largest share offered payment services. In Colombia and Chile, there were more fintech firms that offered personal, enterprise or asset management services than payment services. Finally, Uruguay and Chile had the largest number of firms that offered trading and capital market services. Looking closer at the recipients of alternative finance, business lending captured the highest share of market volume in all countries except Uruguay and Brazil (right-hand panel). In Chile, over 97% of the alternative finance volume was business lending. Chile's business finance volume accounted for 27% of the total in Latin America. In contrast to the rest of the countries in the region, consumer lending in Brazil dominated the alternative finance market, which was explained by the rapid growth and development of digital banks.

4. The prospects for fintech in Latin America

We now evaluate the prospects for fintech in the region based on its potential risks and benefits.[11] Fintech can offer low-cost financial services and reach millions of people who do not have access to the formal financial sector. It can drive private consumption and support other sectors by increasing development, which can be critical in driving productivity growth and attracting foreign direct investment into the economy (Finnovista and Lendit Fintech (2019)). There are also opportunities for collaboration between fledgling fintech firms and established financial institutions. For instance, several financial institutions and fintech firms are open to "fintegration", that is, bank-fintech partnerships or acquisition by a bank. Through fintech, banks can adopt new technologies and fintech firms can achieve scale, meet regulatory standards and build their brands. Fintech firms are also third-party tech providers for many financial institutions.

Graph 7 summarises the main risks and benefits of fintech in Latin America from the perspective of the central banks covered in this paper. The main benefit mentioned was financial inclusion. Other benefits included lower costs, greater efficiency and more competition. By contrast, financial stability risks of fintech are closely associated with general risks involving the use of technology, for example, cyber risks and data protection. Other risks are not particular to fintech but relate to all financial institutions such as those pertaining to anti-money laundering and combating the financing of terrorism (AML/CFT), operational risk and consumer protection.

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[11]   For a broader discussion of financial risks and benefits of fintech, see FSB (2017b).

The aim of regulation is to balance financial stability benefits and risks

Graph 7

Financial stability benefits | Financial stability risks

Source: Central bank survey.

Based on recent reports on the fintech industry, it might be too early to observe a substantial effect of fintech on financial inclusion in the region. On the one hand, 41% of fintech startups in the region report serving unbanked or under-banked consumers or small and medium-sized enterprises (SMEs) as their main clients (IDB (2018)). On the other hand, limitations from the supply side and the demand side prevent fintech from strongly increasing financial inclusion. In order of importance from the point of view of central banks, the supply side limitations are: (i) uncertainty in contract resolution and a lack of good governance; (ii) market concentration in urban areas; (iii) high costs; (iv) complicated contracts and convoluted information; (v) complex and inadequate services relative to their demand; and (vi) insufficient infrastructure and reduced connectivity. These limitations can be particularly harmful to the development of the fintech industry in Latin America considering that the business models behind current fintech initiatives are in most cases no different from those observed in advanced economies where such limitations have been overcome. From the demand side, the limitations are: (i) low levels of financial education; (ii) informality and poverty; (iii) geographical complexity; (iv) limited access to information; (v) lack of trust in financial institutions; and (vi) fear of technology.[12] Another limitation not widely mentioned by central banks but evident in Latin American economies is the availability of needed technology across the jurisdictions. In some countries, having the latest technology makes the massification of fintech products much easier. In other countries, however, even when the level of education is higher and the demand for certain fintech products exists, the required technology is not yet available, due either to the lack of devices that are compatible with the technology (eg smart watches) or to the fact that the implementation of the technology is not straightforward (eg the latest versions of certain software that require more advanced technological infrastructure nationwide). Another issue is informality in the labour market. Although central banks mentioned this as a limitation to demand, in some cases fintech firms have targeted informal workers as their clients. For instance, fintech firms offer payment solutions for small transactions between individuals at lower or no cost.

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[12]   These limitations can also apply to financial inclusion in general.

The aim of fintech regulation is to balance the related financial stability risks and benefits. Lack of proper regulation could lead to a rise in vulnerabilities and risks in the financial system. Fintechs can easily jump from "too-small-to-care" to too-big-to-fail in just a few years (Buckley et al (2016)). That said, over-regulation could stifle innovation and perpetuate banks' monopoly in financial services.

4.1 Current regulatory frameworks

Regulatory and supervisory authorities had to act fast in response to the sudden rise of fintech in the region to provide the appropriate environment for these firms to operate. Our overview of the regulatory responses to fintech relies on the results of a survey of central banks and supervisory authorities in 31 jurisdictions conducted by the Financial Stability Institute (FSI).[13] We integrated the FSI survey into our own to include the regulatory aspects of fintech in Latin America.

Regulation in Latin America[1]   Table 1

Financial area	Fintech activities	Law	Regulation	Minimum standard	Guideline, recommendation	Public statement
Payments, clearing and settlement services	Mobile/web payment	MX	AR, CL, MX, **PE**, UY	CL, CO, PE, UY		
	e-money	MX, PE	AR, CL, MX, PE	CL		PE
	Mobile wallets		AR, CL, PE	CL, PE		
Alternative finance and deposits	Fintech credit		AR, BR, MX			
	Peer-to-peer lending	**PE**	BR, MX, **PE**, UY	**PE**, UY	**PE**	
	Electronic deposits	CO	CO			
Crowdfunding	Equity crowdfunding	AR, **CL**, CO, **PE**, MX	AR, BR, **CL**, CO, MX, **PE**	**PE**	**PE**	
	Loan-based crowdfunding	**CL**, CO, **PE**	BR, **CL**, CO, MX, **PE**	**PE**	**PE**	
Asset management, trading services	e-trading and high frequency trading	**CL**				
	Robo-advice	**CL**				
Cryptoassets	Advising				BR	BR, CL
	Initial coin offerings				BR	BR
	General services	MX	MX, **PE**		AR	AR

[1] Countries that have not yet issued rules about each specific financial area or innovation but are developing them or considering doing so are in bold.

Source: Prepared by BIS based on FSI survey of central banks and supervisory entities.

The regulatory response varies across jurisdictions in both content and approach. The primary objective was to balance the preservation of financial stability, market and financial integrity, competition and consumer protection (Ehrentraud et al (2020)). Table 1 summarises the financial areas regulated in each Latin American country considered in this study.[14] Efforts to establish a law or regulation have been focused on mobile and web payments, e-money, peer-to-peer (P2P) lending and crowdfunding. This is consistent with our findings on the activities that dominate the fintech environment in the region.

[13]   The results of the survey are summarised in Ehrentraud et al (2020).

[14]   Note that the sample used in Ehrentraud et al (2020) does not include Costa Rica and Uruguay, as their authorities answered this survey later than the other countries.

To complement the FSI survey, we conducted bilateral meetings with officials of the selected Latin American central banks with additional and more general questions. From the meetings, we gathered that regulatory authorities have opted, in most cases, to regulate based on the activity of fintech firms rather than on the type of firms providing fintech services or the technology used for these services. Mexico is the only jurisdiction that applies entity-based regulation to fintech, as licenses are granted to financial technology institutions (Box C). Other jurisdictions apply an activity-based approach where existing regulation is being adapted to consider activities that are somewhat new to the financial sector. For instance, Argentina, Brazil and Colombia have published acts or amendments specific to credit and payments; Argentina, Brazil and Colombia to crowdfunding; and Argentina to insurance and wealth management.

Whenever there is no specific fintech regulatory framework, fintech activities are regulated according to existing regulations for each activity. In some cases, there is no existing regulatory framework for certain activities. This is, for instance, the case in Chile and Peru, where cryptoasset trading is still not regulated. In Chile crowdfunding is not regulated, either. Only some of the fintech activities that fall within the regulatory perimeter require a licence to operate. In Brazil, Colombia and Uruguay, the activities that require a license are fintech credit, P2P lending, crowdfunding, and mobile and web-based payments.[15] In Peru, crowdfunding fintech firms require a licence to operate, while in Argentina they require a legal form. Finally, in Chile companies engaging in payments, clearing and settlements require a special legal form to be submitted to the supervisory entity.

Besides the different types of authorisation to operate, fintech firms usually have to comply with other regulatory requirements on firm structure and initial capital. The latter vary across countries and activities. For example, crowdfunding in Argentina requires a minimum initial capital of around $3,000, while deposits and lending services in Brazil and Colombia require initial capital ranging between $260,000 and $2.5 million. Electronic money issuers require initial capital of $680,000 in Peru, while prepaid card issuers require nearly $1 million in Chile. Other stringent requirements are placed on potential owners, such as limits on the investment of gross income and revenues, background checks for ongoing criminal proceedings and restrictions on participation in other companies. In all jurisdictions, data protection and AML/CFT provisions are strictly required.

As mentioned in the first section, fintech relies on policy enablers to provide the regulatory highways through which it can develop. Most Latin American authorities do not have plans to issue regulations or amend existing ones to oversee the activities of market participants using enabling technologies (Graph 8, left-hand panel). The same trend was reported in establishing innovation policy enablers. Those areas where jurisdictions are more focused on making progress are related to data protection and cyber security, consistent with the regulatory requirements for firms to perform fintech activities mentioned above (right-hand panel).

From the point of view of fintech firms, fraud, malpractice and cyber security are greater risks for fintech's development than changes in regulation (Ziegler et al

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[15]   In Brazil, crowdfunding requires only registration, not a licence.

(2020)).[16] This contrasts with the regulatory gap observed in the area of policy enablers, as shown in Graph 8. Less than 50% of countries surveyed have enacted regulations related to digital ID frameworks, open architectures and data residency requirements. In turn, more than 50% of countries have adopted regulations aimed at protecting consumers and their data as well as requiring minimum standards for cyber security.

Plans to oversee the use of enabling technologies or innovation policy enablers   Graph 8

Policy instrument applied to market participants in activities using enabling technologies
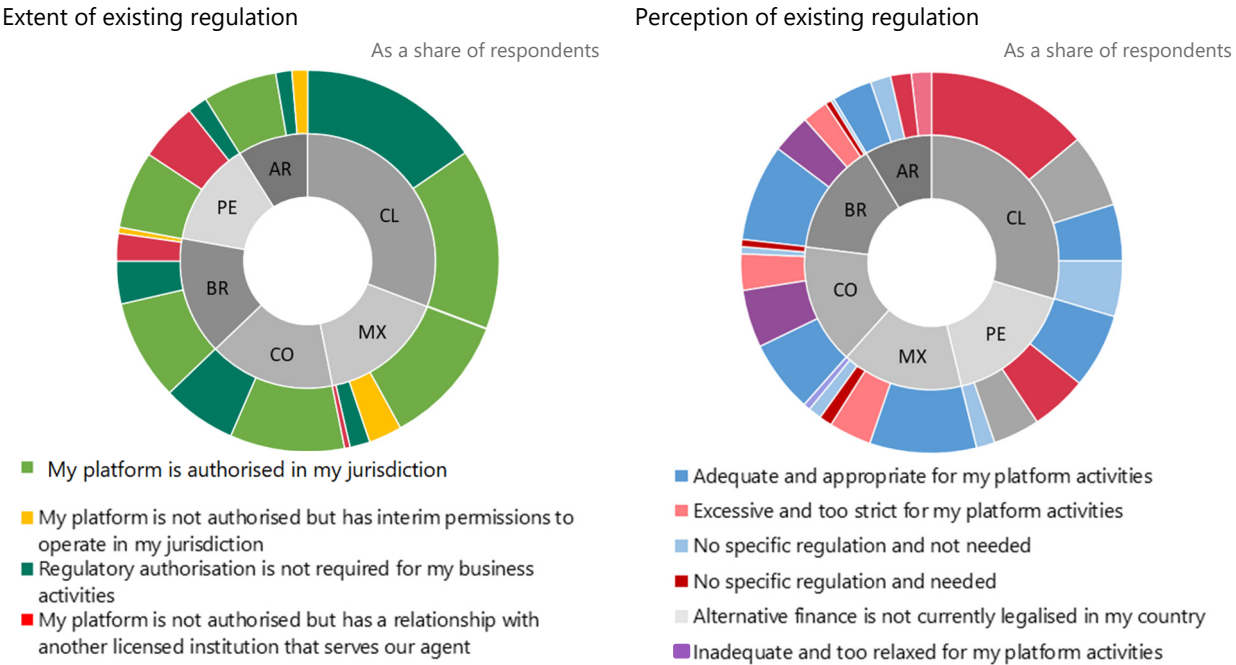
Establishing innovation policy enablers
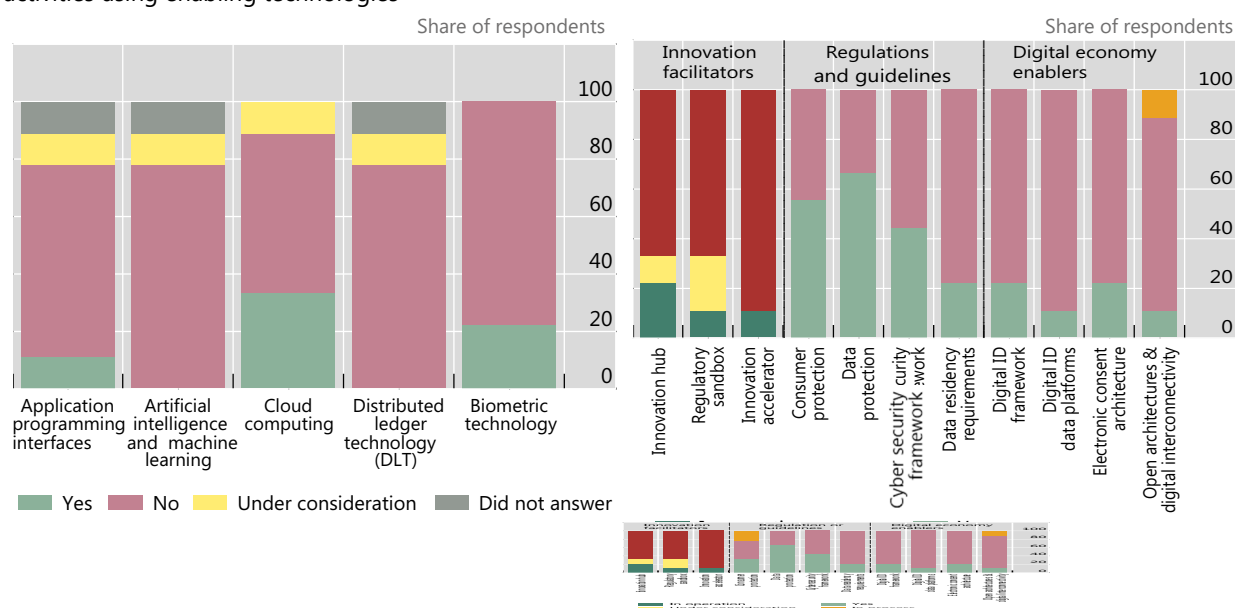
Source: BIS calculations based on FSI survey of central banks and supervisory entities.

Ziegler et al (2020) provide some additional insights into the perception of alternative finance fintech firms on regulation in Latin America. First, in each jurisdiction the majority of platforms are authorised to operate, either because they have the authorisation to do so or the authorisation is not required (Graph 9, left-hand panel). This trend is also seen in other regions. Second, the perception of the adequacy of the existing regulation in each jurisdiction is similar. In most countries, alternative finance fintech firms indicate that regulation is adequate and appropriate for their platform activities. In Brazil and Colombia, around 20% of these firms consider that regulation is too relaxed or inadequate for their platform needs. Finally,

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[16]   Interestingly, in the 2016 report by the Inter-American Development Bank, a survey indicated that 46% of fintech startups did not believe it necessary to have specific regulation in Latin America, while 30% did find it necessary (IDB (2018)). These 30% were startups dedicated to crowdfunding, payments and lending, and were mostly based in Chile, Mexico and Peru. Meanwhile, those that believe that regulation is excessive are based in Argentina and Colombia.

in Chile and Peru a large share of fintech firms indicate that there is no specific regulation or alternative finance is not currently legalised (right-hand panel).[17]

Alternative finance fintech firms' perception of existing regulation

Graph 9

Extent of existing regulation

As a share of respondents

Perception of existing regulation

As a share of respondents

- My platform is authorised in my jurisdiction
- My platform is not authorised but has interim permissions to operate in my jurisdiction
- Regulatory authorisation is not required for my business activities
- My platform is not authorised but has a relationship with another licensed institution that serves our agent

- Adequate and appropriate for my platform activities
- Excessive and too strict for my platform activities
- No specific regulation and not needed
- No specific regulation and needed
- Alternative finance is not currently legalised in my country
- Inadequate and too relaxed for my platform activities

Source: Ziegler et al (2020).

Central banks have limited scope regarding their role in fintech regulation and supervision. In most cases, their financial stability mandates (whether implicit or explicit) and the supervisory architecture limit their legal powers within the regulatory perimeter. Only in Argentina, Brazil and Uruguay are regulation and supervision conducted by the central bank. That said, several central banks indicated they have some form of fintech market surveillance in place. But the information obtained from this surveillance is still not granular enough to capture the risks associated with new fintech developments. Information reporting is required by law in several countries, but requirements differ. For example, the Central Bank of Argentina monitors fintech developments through public information. The reason is that there is no legal requirement for fintech firms to report to the central bank. Typically, regulatory authorities require firms to report the amount and sources of funding, total financial costs, profits and the number of employees. Disaggregated data are usually not public. The granularity of the information that central banks can obtain from agreements with regulatory authorities for monitoring purposes is usually not an issue, but its representativeness may be in some cases.

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[17]   Ziegler et al (2020) note, however, that whenever regulation is perceived as adequate, "[i]t remains unclear whether this is a reflection of the efforts regulators have put in to developing an appropriate regulatory system for alternative finance, or is this just reflecting the fact that most platforms reporting this information are indeed those that meet regulatory requirements and are hence operational". The report also notes that equity-based models are relatively less satisfied with existing regulation.

Box C

The first of its kind: the fintech law in Mexico

Mexico was the first country in Latin America to enact an exclusive and comprehensive law on fintech. The law's main objective was to provide regulatory certainty to investors, consumers and participants in the fintech industry. It also addressed issues regarding consumer data protection, cyber security, privacy concerns, money laundering and illicit operation financing. The law was a joint effort between the Ministry of Finance, the Bank of Mexico, financial supervisory authorities (Comisión Nacional Bancaria y de Valores (CNBV), Comisión Nacional de Seguros y Fianzas (CNSF), Comisión Nacional del Sistema de Ahorro para el Retiro (CONSAR)) and members of the fintech industry. It came into effect on 1 March 2018.

The fintech law establishes the regulatory framework of two main types of financial technology institutions (FTIs): electronic payment institutions and collective finance institutions (also known as crowdfunding institutions). Electronic payment institutions are authorised to engage in the issuance, administration and transmission of electronic payment funds through digital applications. Collective finance institutions are authorised to offer services like debt crowdfunding, equity crowdfunding, joint ownership and royalties crowdfunding. Both types of FTI are required to apply for a licence with the CNBV to operate. Potential FTIs are subject to a variety of compliance checks in the areas of cyber security, transparency, service availability, data privacy, customer protection, KYC (know-your-customer), transaction monitoring, customer profiling, screening obligations, anti-money laundering reporting and fraud prevention.
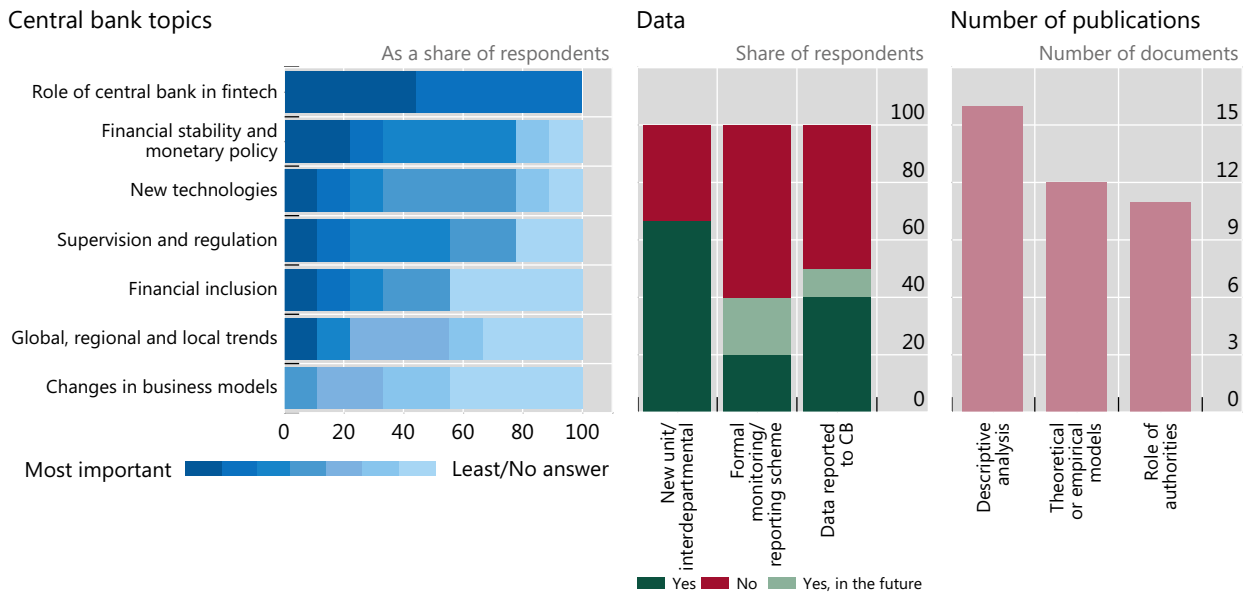
In addition, the fintech law establishes a regulatory sandbox and provisions for open banking. The regulatory sandbox is available for both licensed and non-licensed companies and allows the limited test of innovative financial services under the surveillance of the financial authorities. The provisions on open banking establish the development of APIs for sharing data with other financial entities. This will allow financial institutions to share their clients' financial and transactional information with other institutions (only by explicit consent of the data owner).[1] To support the fintech law, an enabling secondary regulation came into effect on 10 September 2018. It established the requirements and documentation necessary to operate as an FTI.[2]

From the point of view of fintech firms, the law has some restrictions that could curb entrepreneurship and innovation in the country. One example is the challenging requirement of minimum capital that fintech firms need to meet to start operating (between MXN 3 million and MXN 4.2 million ($140,000–$200,000) depending on the type of firm). In addition, fintech firms note that the law does not change the rules regarding their relationship with banks, which they consider to be stringent. In 2019, according to Finnovista's fintech radar, 441 fintech startups were operating in Mexico, of which 117 belong to one of the categories established by the fintech law.[3] However, only 85 fintech companies applied for a licence: 60 electronic payment institutions and 25 collective finance institutions. As of July 2020, only NVIO Pagos Mexico, an e-money institution, has been issued an FTI licence.

[1] Diario Oficial de la Federación (2018a). [2] Diario Oficial de la Federación (2018b). [3] Finnovista (2020).

4.2 Research priorities and data collection

The rise of fintech has been followed by an increase in research on the topic, by both policymakers and the private sector. So far, the fintech literature has mainly focused on those regions where the rise of fintech has been more prominent. But recently the number of articles focusing on emerging market economies has been slowly growing. Central banks, for example, have started to include fintech-related issues in their agendas, and almost all of them have produced some type of publication on fintech or related topics. According to our survey, the topics with the highest relevance for central banks are the central bank's role in fintech and fintech's implications for monetary policy and financial stability (Graph 10, left-hand panel).

Central banks and fintech

Graph 10

Central bank topics — As a share of respondents

Role of central bank in fintech
Financial stability and monetary policy
New technologies
Supervision and regulation
Financial inclusion
Global, regional and local trends
Changes in business models

0 20 40 60 80 100

Most important ▇▇▇▇ Least/No answer

Data — Share of respondents

100
80
60
40
20
0

New unit/interdepartmental
Formal monitoring/reporting scheme
Data reported to CB

■ Yes ■ No ■ Yes, in the future

Number of publications — Number of documents

15
12
9
6
3
0

Descriptive analysis
Theoretical or empirical models
Role of authorities

Source: Central bank survey

In addition to being more prominently included in all central banks' research agendas, fintech issues are also becoming a more frequent topic of periodic analysis and monitoring. Most central banks changed their organisation to support the research and analysis of fintech issues by creating new units or departments, interdepartmental working groups or committees (Graph 10, centre panel). However, there are several roadblocks to the proper development of fintech research. The main one is the lack of data. In 50% of the countries surveyed, fintech firms do not report data to the central bank.[18] Other roadblocks are the lack of a specialised group (around 30%) or a formal monitoring scheme (more than 50%) for fintech-related issues. These downsides have directly impacted central banks' fintech-related research output. On average, central banks have produced around four research documents on the topic since 2016 (right-hand panel). Some of the topics covered in this research include technical research on distributed ledger technology in Brazil, the development of crowdfunding in Chile, digital payments in Colombia, cryptoassets in Costa Rica, the effect of automation technologies in Mexico, telecommunications and agricultural profitability in Peru and information technologies and productivity in Uruguay.[19]

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[18]   As mentioned above, central banks are usually not the regulatory authority for certain activities. In such cases, they do not always have the powers to request data. The Irving Fisher Committee on Central Bank Statistics established a working group to investigate a number of issues surrounding fintech data and outlined a targeted roadmap to construct fintech statistics (IFC (2020)).

[19]   See Abarca (2018), Arango and Suarez (2019), Beuermann (2011), Burgos et al (2017), Cebreros et al (2020) and Mello (2018).

5. Challenges of fintech in Latin America

Latin America is fertile ground for fintech to expand and develop. Still, several challenges in the region have not allowed fintech to reach its full potential. One clear challenge relates to regulation. On the one hand, a lack of regulation prevents fintech firms from operating with legal certainty and presents a roadblock for securing finance. On the other hand, regulating fintech firms with the same stringency as other financial institutions could undermine progress in the industry. In addition, central banks need to ensure that fintech firms do not pose new or additional risks to financial stability. The previous section discussed progress in each country's regulatory frameworks.

This section focuses on three other challenges for the region. The first is how to bring the unbanked population into the financial system. The second is how to build an infrastructure that retains the unbanked in the system and provides a bridge for fintech firms across countries in the region. The third is how to empower the use of data without compromising privacy. The solution to each challenge forms a base for promoting financial inclusion and fostering stronger development of fintech in Latin America (D'Silva et al (2019)).

5.1. The unbanked

A large pool of potential fintech customers remains outside the financial system. The World Bank estimated that, in 2017, 1.7 billion people – around one third of the world's population – were excluded from the formal financial system (Demirgüç-Kunt et al (2018)). In Latin America, only 50% of the population over 15 years of age had a financial account. Other financial inclusion indicators are also low (Graph 11, left-hand panel). In most countries in the region, cash dependence is high, alternative payment options are scarce and regulatory and institutional support is weak.
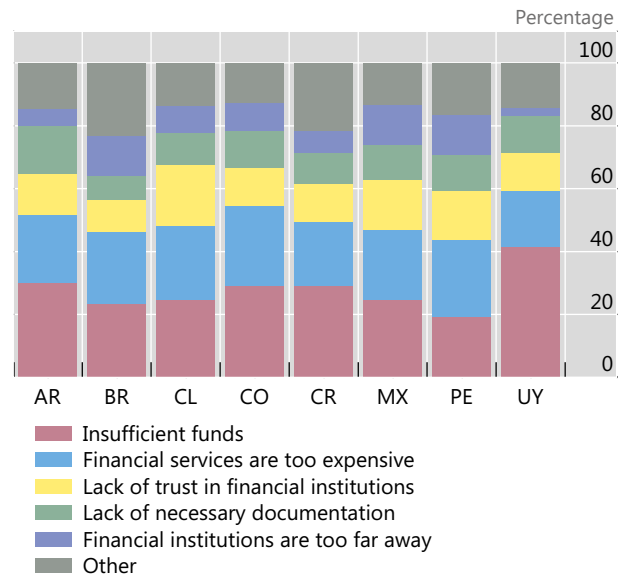
Low financial inclusion is a critical problem for Latin America

Graph 11

Financial inclusion indicators[1]
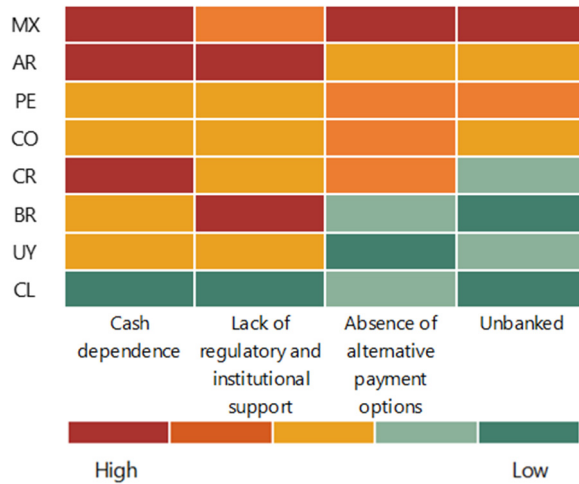
Reasons for not having a bank account[2]

[1] Cash dependence is measured as the ratio of the monetary base to broad money; unbanked is the share of the population over 15 without a financial account; absence of alternative payment options is the share of the population over 15 without a credit card; lack of regulatory and institutional support is the World Bank regulatory quality index.   [2] Responses by population over 15 without a financial account.

Sources: Central bank data; World Bank, Global Findex Database and Regulatory Quality index.

Another contributing factor is that costs for financial services in the region are high. Over 20% of people without a bank account gave as a reason for not having one the lack of resources to cover minimum deposit requirements or annual costs of maintaining the account (Graph 11, right-hand panel). Around 20% of respondents mentioned that financial services are too expensive, while 10% stressed their lack of confidence in financial institutions. Technology represents a great opportunity for innovation and financial inclusion as it provides access to financial services at a lower cost.

Lack of a digital identity is a major obstacle the unbanked face when they attempt to access financial services. That is why the first objective of a financial inclusion strategy must be to get every individual into a unique ID network. These systems have several advantages: for example, replacing multiple ID documents, improving government process efficiency, ensuring tax compliance and supporting policy development. Most important, these systems satisfy KYC requirements that facilitate opening financial accounts.[20] Some countries have made considerable progress in this area; for example, the Aadhaar system in India has enrolled 99% of the population. In Latin America, a success story is Argentina's digital DNI (Documento Nacional de Identidad) system. This digital ID system is linked to biometrics and allows individuals to store digital mobile ID, disability certificates, vaccination certificates and vehicle insurance documents. Argentina has now achieved a universal birth registration rate and more than 45 million residents (98% of the population) are registered (World Bank (2020)).

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[20]   See Citi (2020).

5.2. The highways

For digital financial services to prosper, the services offered have to be tightly tailored to local needs (Malady and Buckley (2014)). Although there are various limitations on the supply side, there are also restrictions on the demand side of formal financial services that go beyond low income levels or a lack of financial education. They are associated with the lack of products and services that provide value to users. That is, those who currently make cash transactions and use informal financial services will not migrate to the formal sector unless these products are easy to understand, use and access and contain a significant value proposition (De Olloqui et al (2015)). For example, the Aadhaar system by itself cannot fully explain the increase in financial inclusion in India. Aadhaar is one pillar of the India Stack, a set of technologies that create a flywheel for financial inclusion. In parallel to Aadhaar, the Indian government created low-cost P2P payments and interbank payment infrastructure. This system enabled interoperable, instant and inexpensive payments.[21]
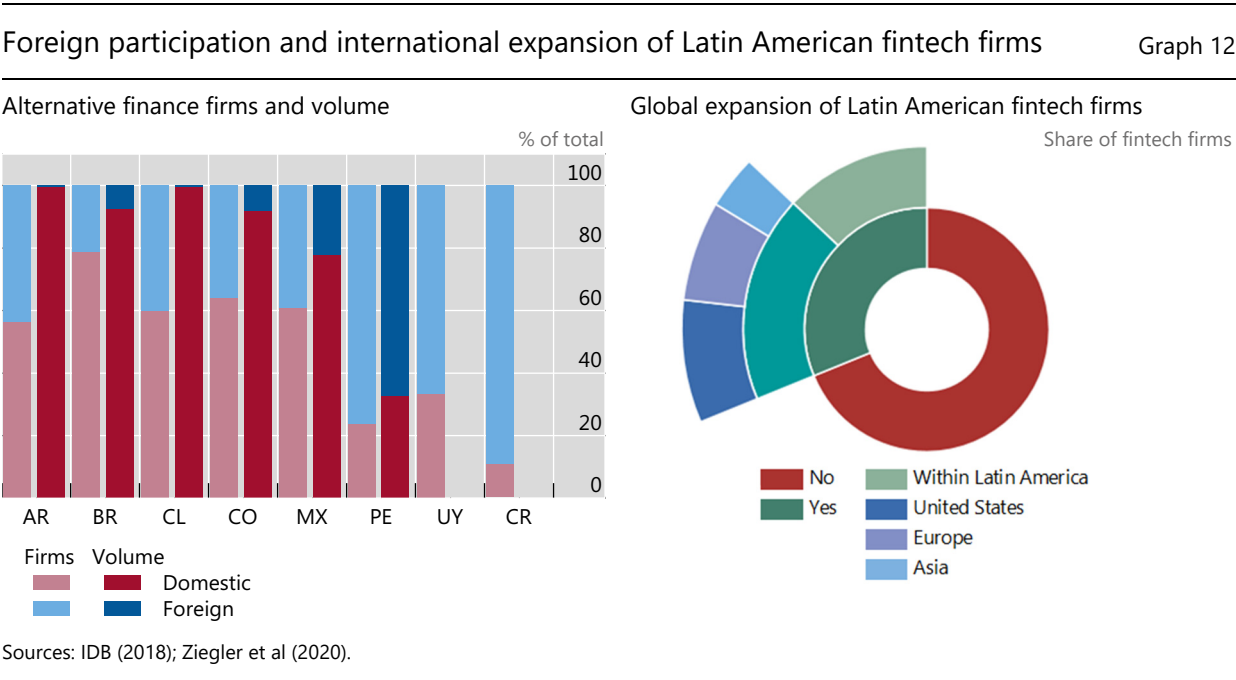
Building highways relates to the infrastructure that allows users of fintech services rapid access to the financial system. In Latin America, a strong national digital payment infrastructure could boost mobile payments, given the high penetration of mobile phones (Frost (2020)). Central banks in the region have started to lay the foundations for the digital payment systems revolution. In September 2019, the Bank of Mexico launched a new digital payment system (Cobro Digital, CoDi) that allows payments through QR codes. CoDi works through Bank of Mexico's electronic funds transfer system and allows real-time settlement of payments. After two months of its implementation, more than 1.2 million users were onboarded to the platform. A second example is the Brazilian Instant Payment Scheme (PIX), announced by the Central Bank of Brazil in February 2020. This system allows immediate transactions, such as money transfers and payments, and is mandatory for all financial and payment institutions licensed by the central bank.[22] Finally, Costa Rica has a robust and efficient public national payments system.

Cross-border payments are another area where fintech can help reduce costs and increase efficiency. Payments across borders are typically slow, opaque and costly. One clear example is lower-value payments such as remittances, which in 2018 accounted for 1.4% of GDP in Peru, 2% in Colombia and 3% in Mexico. Most cross-border transactions flow through a network of correspondent banks. Cash transfers through banks are the most expensive at 10% of value, reflecting handling costs and lack of competition. By contrast, transfers made through money transfer operators cost 25% less than those through banks (BIS (2020)). That said, technology is transforming cross-border payments. For example, in Colombia Daviplata allows users in foreign countries to pay in cash while the receiver gets the funds in a mobile wallet. Another option is the interlinking of two national payment systems. One example is Directo a Mexico, a system set up between the Bank of Mexico and the Federal Reserve which links their two automated clearing houses. The system lowered costs and offered higher speed, and by 2018 it had cleared 2% of total remittances. The limited market share may be due to limited participation by banks in the US and the requirement of a banked sender (Alfonso et al (2020)).

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[21]   For more information, see the India Stack website at www.indiastack.org/about/.

[22]   For more information, see www.bcb.gov.br/en/pressdetail/2313/nota.

A strong infrastructure of domestic and cross-border digital payment systems would serve as a catalyst for the internationalisation of Latin American fintech firms (CPMI (2020)). The alternative finance market is largely dominated by domestic firms (Graph 12, left-hand panel). In 2018, more than 60% of alternative finance fintech firms in the main fintech markets in Latin America were domestic and provided more than 80% of the alternative finance volume. In the same way, only 30% of fintech firms expanded internationally (right-hand panel). Of those that expanded globally, 40% had a presence in other Latin American countries, 30% in the US, 20% in Europe and 10% in Asia.

Foreign participation and international expansion of Latin American fintech firms   Graph 12

Alternative finance firms and volume

Global expansion of Latin American fintech firms

Sources: IDB (2018); Ziegler et al (2020).

One impediment for internationalisation is a lack of cross-border compatible regulation. It would be particularly beneficial for the region to share a set of basic principles that facilitate cross-border payments and that could be added to national payments regulation. Some initiatives have made progress in this area. For example, the Pacific Alliance countries (Chile, Colombia, Mexico and Peru) have agreed on a series of guiding principles for fintech regulation in the sub-region. The provisions included in the Trans-Pacific Partnership on the digital economy are another example (Chile, Mexico and Peru). These provisions remove barriers among members to the free flow of data that may represent an impediment for the development of cloud services and a free internet (Elms (2018)). By reducing regulatory uncertainty, this effort strengthens the possibility of regulatory convergence, enabling fintech firms to scale up in countries other than their country of origin.
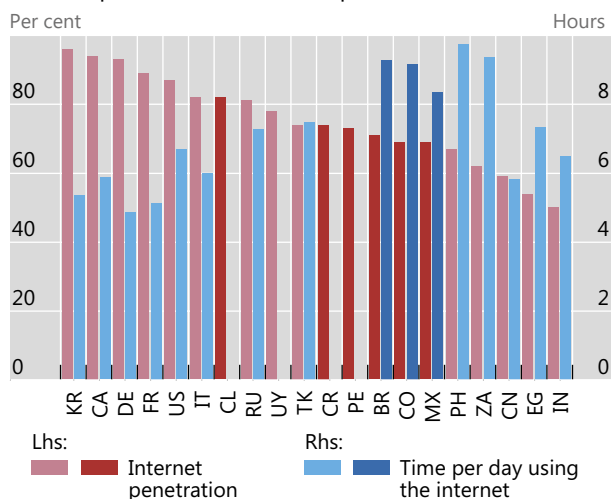
5.3.   The new oil

In 2019, internet penetration reached 59% worldwide and users spent an average of six hours and 43 minutes on the internet every day. In Latin America, internet penetration reached 74%, while users spent at least eight hours on the internet every day (Graph 13, left-hand panel). From the total amount spent using the internet, access through mobile phones accounted for more than half the time. Latin America's mobile subscriber penetration was 67%, and smartphone adoption was 65%. These

percentages are expected to increase to 74% and 79%, respectively, by 2025 (Stryjak and Sivakumaran (2019)). At the dawn of 2020, the amount of data in the world was estimated to be 44 zettabytes (Desjardins (2019)). The International Data Corporation predicts that by 2025, the total amount of digital data created worldwide will rise to 163 zettabytes.[23] Given these numbers, it is not surprising that data are now considered the new oil.
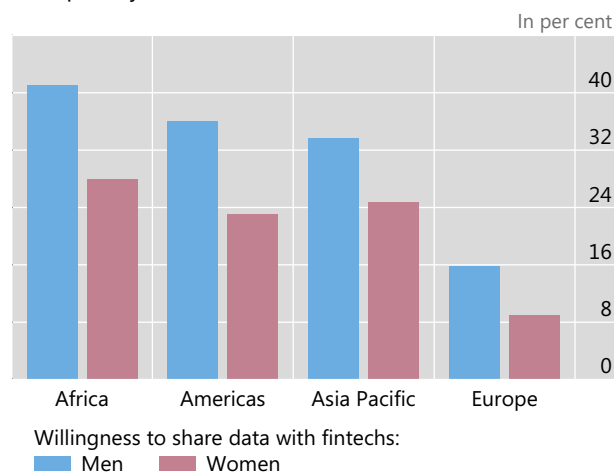

Data are the new oil   Graph 13

Internet penetration and time spent on the internet   Data privacy concerns

Sources: Chen et al (2020); Hootsuite & We Are Social (2019) using data from platforms' self-serve advertising tools, press releases and investor earnings announcements; EY (2019).

Our digital footprint, ie our transaction data, browsing history and geolocation, can all be highly valuable (Carstens (2019)). In particular, this information can improve assessment of credit quality, pricing insurance policies or marketing financial services. Even information as simple as whether a user has an Apple or Android device, or the time of day a purchase is made, can proxy for income, character and reputation and is highly valuable for default prediction (Berg et al (2019)). Models based on machine learning and non-traditional data used by fintech companies are better able to predict losses and defaults than traditional models (Gambacorta et al (2019)). But as data collection and use increases, so do issues regarding data privacy. Over 64% of world internet users are worried about how companies use their personal data. About 36% of men in the Americas are willing to share their data with fintech firms; this percentage is only about 23% for women (Graph 13, right-hand panel). During the Covid-19 crisis, privacy issues took the spotlight with the rise of contact tracing and location-tracking apps (Box D).

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[23]   To put things into perspective, a zettabyte is 1,000 bytes to the seventh power. In other words, one zettabyte has 21 zeroes.

# Technological antibodies: fintech's fight against Covid-19

New technologies, especially applied to finance, helped Latin America face the challenges of the Covid-19 pandemic. The virus hit the region hard. Lockdown measures decimated growth in the region. Weak health care systems compounded the number of deaths, and high levels of informality eroded the effectiveness of mobility restriction policies designed to control the spread of the virus. Central banks went into crisis management mode, and governments implemented social assistance programmes. For its part, technology helped mitigate the effects of the pandemic in several areas. First, the direct use of technology helped to monitor and trace how the pandemic spread and to increase access to remote health services. Second, it boosted access to financial services and contributed to the digital disbursement of government transfers. Finally, it helped channel funds to small and medium-sized enterprises (SMEs) in serious need of financial relief.

Four major types of technological applications were widely used for monitoring and control during the pandemic (Cantú et al (2020)). Telemedicine provided remote medical consultation for diagnosis, care or other non-emergency medical needs via mobile apps or websites. Flow modelling assessed the aggregate movement of people. Location tracking used geolocation to enforce quarantine rules. And contact tracing tracked interactions between people to alert them in case of possible contact with the virus. In most cases, governments launched these apps, which raised issues about data control and ownership (Graph D.1, left-hand panel).
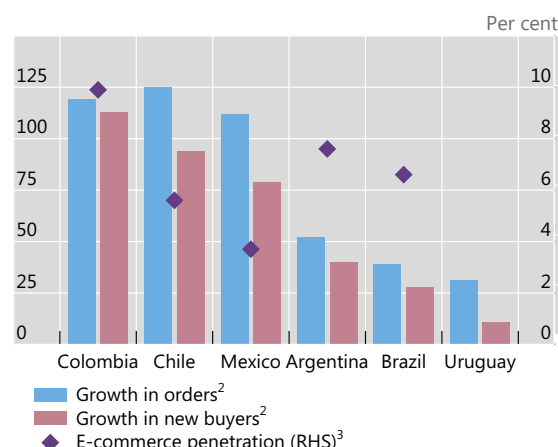
Technology was a powerful tool against Covid-19

Graph D.1

Tech to combat the pandemic[1]
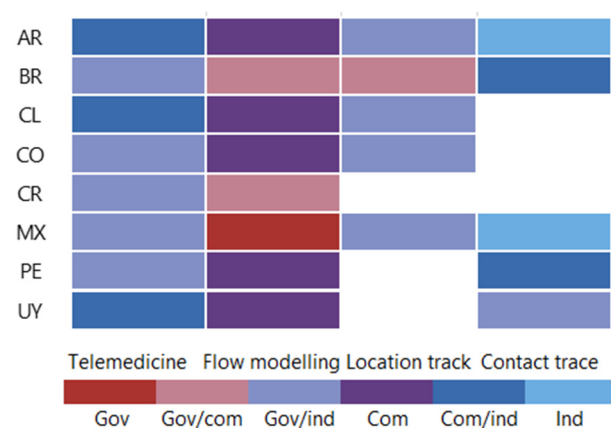
Rise in e-commerce

[1] Colours denote which entities have control over personal data. Gov= government, Com=company and Ind=individual.   [2] Change between 24 February and 3 May 2020 versus 2019.   [3] End of 2019.

Sources: Cantú et al (2020); Mercado Libre (2020).

Digital payments and e-commerce helped support economic activity as countries enforced strict quarantine measures to curb the spread of the virus. Online purchases skyrocketed during the pandemic. New orders on the platform Mercado Libre grew in some countries by more than 100% compared with the previous year (Graph D.1, right-hand panel). New buyers on the platform also increased substantially. Still, benefits from e-commerce were small as penetration in the region is less than 10%. By contrast, progress in digital financial services had a noteworthy effect during the pandemic by reducing the disparity in access to banking and helping governments distribute transfers. For example, in Brazil the federal government used the mobile app from a state-owned bank to enrol unbanked and underbanked recipients and disburse aid. Other examples are Cuenta DNI in Argentina and Peru. In Peru, BIM (Billetera Móvil) was also used to disburse Bono Perú Unido of the metropolitan Municipality of Lima.

Finally, fintech credit firms offered a lifeline to SMEs, helping them to raise capital. High uncertainty and risk aversion compounded the constraints SMEs faced to obtain bank loans. Novel credit rating algorithms based on big data allowed fintech firms to grant credit to SMEs at a lower cost than banks. One example is Konfio, a Mexican startup that granted loans with a value of $12,000 on average. Loans were approved in 24 hours without the need for collateral.

A major problem is the lack of a definition of the ownership of personal data. Some research suggests that giving data property rights to consumers can generate allocations that are close to optimal (Jones and Tonetti (2019)). This shift would drastically transform the relationship between finance and data, setting the stage for a financial system based on the monetisation of data. The European Union (EU) implemented regulatory changes in this direction. First, the EU General Data Protection Regulation (GDPR) gave individuals power and control over their individual personal data. It allows individuals to direct holders of their personal data to delete it permanently or transfer it to whomever they chose. Second, the EU Payment Services Directive 2 (PSD2) set new rules to allow open entry of a wide range of new entrants to the payments industry and created a series of requirements to allow third parties to access data. In Latin America, a similar regulatory change is open banking. This allows banks to share client data and transaction history with third parties, if instructed to by the user, and it represents an opportunity for fintech firms to compete more aggressively with traditional banks. In Mexico and Brazil, open banking regulations came into effect in 2020.

6.   Final considerations

In Latin America, fintech is off to a strong start, and is forecast to be an important catalyst for improving financial and social conditions in the region. In 2019, consumer fintech adoption in the largest economies was above the world average (Graph 14, left-hand panel) and some regional fintech firms are quickly capturing the world's attention. In Argentina, Mercado Pago, the financial side of the e-commerce behemoth Mercado Libre, is quickly expanding to the rest of Latin America. It started as a way to enable payment between users in the marketplace; however, it grew to offer a diverse portfolio of financial services such as online and offline payment, bill payment and, more recently, investment. Mercado Pago reported in 2019 that it processed around 400 million transactions.

In Brazil, Nubank was valued at $10 billion in 2019 and was among the 25 highest-valued privately held fintech unicorns globally.[24] Nubank reported that it was gaining up to 42,000 new users a day during the first months of 2020, reaching 25 million customers by end of May in Brazil and Mexico. In Colombia, the Colombian Stock Exchange announced the launch of an online crowdfunding platform for SMEs. This joint venture between the state and the private sector is the first of its kind in the region. In Mexico, Konfio is among the 50 fastest-growing companies in the Americas, according to a *Financial Times* ranking. It raised $100 million in the last quarter of 2019 and has helped finance SMEs that struggle to access government support and bank finance during the Covid-19 crisis. Finally, in January 2020 the Peruvian subsidiaries of BBVA, Scotiabank and Interbank (the second to fourth largest banks in Peru) launched PLIN, a real-time platform that enables consumers to send funds to any of those banks using their mobile wallets and mobile numbers; it is free of charge.[25]

As fintech firms become major players in the financial system, central banks and regulators in the region need to respond fast to ensure a level playing field with

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[24]   For further details, see CB Insights website at www.cbinsights.com/research-unicorn-companies.

[25]   BanBif later joined this initiative. Banco de Crédito (the largest bank) offers a similar solution (Yape) along with several financial institutions.

traditional financial institutions and to prevent the sudden build-up of financial risks. Indeed, from the point of view of alternative finance fintech firms, change in regulation was perceived as the greatest risk in 2019 (Graph 14, right-hand panel). That said, the Covid-19 crisis has changed the landscape and the set of major challenges for central banks and fintech firms in the region. Default and cyber security breaches, which were considered as high or very high risks for only 25% of the alternative finance fintech companies, will definitely become more of a concern in 2020. There needs to be a push for regulation aimed at protecting consumers and their data as well as imposing minimum standards for cyber security.

Fintech adoption in Latin America and risks

Graph 14

Consumer fintech adoption[1]

Fintech risks
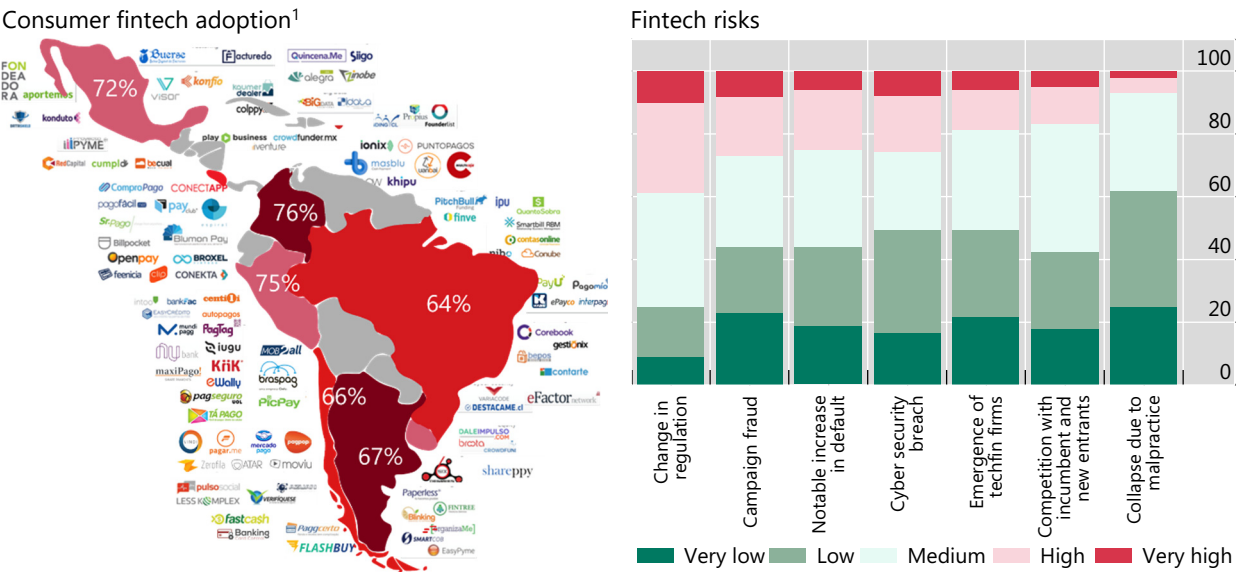
[1] Consumer fintech adoption as a percentage of the active digital population in each country. World average is 64%.

Sources: EY (2019); Ziegler et al (2020).

Continued developments in processing speed, apps, big data and the use of AI to better understand and predict what users want, how they want it, and when they want it will continue to change the way we do things, mostly for the better. The region is at a crossroads for how fintech can transform financial services. First, Latin American countries need a strong regulatory framework and institutional capacity-building before they can fully capitalise on new fintech technologies. Second, more investment in technology is needed to beef up defences against cyber attacks and protect data privacy. Third, connectivity and hardware infrastructure in rural areas must be improved to prevent them from being further marginalised. Finally, financial education is the only road that can lead consumers to understand the benefits of fintech and truly be incorporated into the financial system. By overcoming these challenges, fintech can create a deeper, more liquid and more connected regional financial market.

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8. Annex

8.1. Glossary

The terms below are not formal definitions. They are provided solely as a guide for this paper.

alternative finance	Financial channels and instruments that have emerged outside of the traditional finance system such as regulated banks and capital markets.
application programming interface (API)	A set of rules and specifications followed by software programs to communicate with each other, and an interface between different software programs that facilitates their interaction.
artificial intelligence (AI)	The theory and development of computer systems able to perform tasks that traditionally have required human intelligence.
big data	A generic term that designates the massive volume of data that is generated by the increasing use of digital tools and information systems.
central bank digital currency (CBDC)	A new form of digital central bank money, ie a central bank liability, denominated in an existing unit of account, which serves both as a medium of exchange and a store of value. CBDC can be distinguished from reserves or settlement balances held by commercial banks at central banks.
crowdfunding	The practice of raising funds, equity or donations from a large number of people via an internet-based platform.
cryptoasset	A type of private digital asset that depends primarily on cryptography and distributed ledger or similar technology as part of its perceived or inherent value. All cryptoassets utilise various forms of DLT.
distributed ledger technology (DLT)	A means of recording information through a distributed ledger. These technologies enable nodes in a network to propose, validate and record state changes (or updates) consistently across the network's nodes – with no need to rely on a central trusted party to obtain reliable data. DLT in its blockchain form was first used in Bitcoin to facilitate peer-to-peer payments without a central third party.
electronic money (e-money)	Value stored electronically in a device such as a chip card or a hard drive in a personal computer.
e-trading	A broad category of financial market trading methods on electronic trading platforms and virtual marketplaces. This can include algorithmic or high-frequency trading among professional investors, and online investment, "social trading" or "copy trading" among retail investors.

fintech	Technologically enabled financial innovation that could result in new business models, applications, processes or products with an associated material effect on financial markets, financial institutions and provision of financial services.
fintech credit	Credit activity facilitated by electronic platforms whereby borrowers are matched directly with lenders.
innovation hubs	An iInnovation facilitator set up by supervisory agencies that provide support, advice or guidance to regulated or unregulated firms in navigating the regulatory framework or identifying supervisory, policy or legal issues and concerns.
loan-based crowdfunder	A Ttype of fintech credit platform. Borrowers are usually matched directly with investors.
machine learning (ML)	A method of designing a sequence of actions to solve a problem that optimise automatically through experience and with limited or no human intervention.
mobile and web-based payments	Applications that allow consumers to conduct transactions through their mobile phone or tablets, improving efficiency and the customer experience.
mobile wallets	A digital interface on a mobile phone which Rreplicates a physical wallet in a digital interface on a mobile phone. Customers can add store and carry credit, and debit cards, as well as prepaid cards, gift cards and rewards cards to be stored and carried. This use case not only replaces physical plastic cards, but also allows those cards to be enhanced by with additional services.
peer-to-peer (P2P) insurance	A risk- sharing network in which a group of individuals pool their premiums together to insure against a risk.
peer-to-peer (P2P) lending	A type of fintech credit platform, where individuals or businesses are usually matched directly for lending purposes.
regtech	Any range of applications of FfinTtech for regulatory and compliance requirements and reporting by regulated financial institutions. This can also refer to firms that offer such applications, and in some cases can encompass SupTtech (see below).
robo-advice	The provision of financial advice by automated, money management providers, thereby disintermediating human financial adviseors and reducing costs.
smart contracts	Computer protocols that can execute, verify or, constrain the performance of a contract.
usage- based insurance	A business model that aligns premium rates with policyholder behaviour.

8.2. BIS questionnaire: fintech landscape in Latin America

To answer this questionnaire, please use the following definitions:

Fintech *is a technologically enabled financial innovation that could result in new business models, applications, processes or products with an associated material effect on financial markets, financial institutions and provision of financial services. — Financial Stability Board (FSB)*

Fintech firms *are non-deposit taking firms who provide fintech services.*

Part I: Fintech landscape

1. Has the central bank or the supervisory agency of your jurisdiction developed or use a formal definition for fintech, different from the one stated above?

    ☐Yes   ☐No

    If **Yes**, please define and explain the purposes for which the definition is applied.

2. Which technologies applied to financial services have shown the greatest development in your jurisdiction in recent years? *Please rank all options that are applicable to your jurisdiction, starting from 1, where 1 is the technology that showed the greatest development.*

    ☐ Mobile and internet

    ☐ Application programing interface

    ☐ Artificial intelligence, machine learning and big data

    ☐ Distributed ledger technologies (DLT)

    ☐ Biometric technology

    ☐ Other (please specify)

3. Does your central bank have a formal methodology or process to monitor and measure the growth of fintech activities and firms within your jurisdiction?

    ☐Yes   ☐No

    If **Yes**, please explain how is it done. If **No**, indicate how your central bank is planning to tackle this issue in the future.

4. What are the requirements for the fintech firms to operate in your jurisdiction?

    ☐None ☐Licensing   ☐Registering   ☐Other

    Please provide further details if your answer is other than **None**:

5. How has the number of fintech firms, their share of the total financial system, and the total investment to fintech firms in your jurisdiction evolved in recent years? *Please provide the corresponding data whenever it is available. If not available, leave blank.*

Year	2013	2014	2015	2016	2017	2018
Number of fintech firms						
Share of total assets of the financial system						
Total investment in fintech firms						

6. Which services do fintech firms in your jurisdiction offer in the following financial areas? *Please select **Yes** if there is at least one fintech firm in your jurisdiction that offers a service in that financial area. Then, please provide the services or applications that fintech firms offer in that financial area. If available, please provide the number of fintech firms that offer services in that financial area.*

Financial areas	Service provided by fintech firm(s)	Services or applications[1]	Number of fintech firms
Lending	☐ Yes ☐ No		
Capital raising, alternative sources of funding	☐ Yes ☐ No		
Asset management, trading and related services	☐ Yes ☐ No		
Payments, clearing and settlement services	☐ Yes ☐ No		
Financial services related to crypto-assets	☐ Yes ☐ No		
Insurance	☐ Yes ☐ No		
Other financial area (*please specify*):	☐ Yes ☐ No		

[1] Examples of fintech services or applications within each financial area are: Lending (e.g. fintech credit, loan-based crowdfunding, peer-to-peer lending); Capital raising, alternative sources of funding (e.g. equity crowdfunding); Asset management, trading and related services (e.g. robo-advisors, e-trading); Payments, clearing and settlement services (e.g. mobile and web-based payments, mobile wallets, e-money); Financial services related to crypto-assets (e.g. issuing, marketing, trading, holding, storing, exchanging, advising on crypto-assets and initial coin offerings); Insurance (e.g. peer-to-peer insurance, usage-based insurance).

7. What risks and benefits do the provision of services by fintech firms pose for financial stability in each of the financial areas in your jurisdiction? *Please refer to the table above for examples of services and applications.*

Financial areas	Risks	Benefits
Lending		
Capital raising, alternative sources of funding		
Asset management, trading and related services		
Payments, clearing and settlement services		
Financial services related to crypto-assets		
Insurance		
Other financial area (*please specify*):		

8. What are the challenges to the future development of fintech services and firms in your jurisdiction (e.g. late adoption of technology, lack of investment, regulatory framework, low demand for service, entry costs).

Part II: Data gathering

9. Is there publicly available information regarding fintech activities in your jurisdiction?.

☐Yes   ☐No

If **Yes**, please provide details (e.g. surveys carried out by your central bank or other institution or from the private sector), and when available, the weblink to the data source.

10. Are fintech firms currently providing any information about their activities or balance sheets to your central bank or other institutions (e.g. the ministry of finance, the supervisory agency, etc.)?

☐Yes, to the central bank

☐Yes, to other institutions *(please specify)*:

☐No

If **Yes**, please answer questions 11–16. If **No**, skip to question **Error! Reference source not found.**.

11. Is the provision of information by fintech firms to the central bank or other institutions required by law?

☐Yes   ☐No

If **Yes**, please provide details on the regulation.

12. What kind of information are fintech firms providing to the central bank or other institution?

Data Type	Recipient agency / institution	Is the data public?	Does the central bank plan to start collecting this data in the following months/year?
☐ Sources of funding		☐ Yes ☐ No	☐ Yes ☐ No
☐ Amount of funding		☐ Yes ☐ No	☐ Yes ☐ No
☐ Total financial costs		☐ Yes ☐ No	☐ Yes ☐ No
☐ Employees		☐ Yes ☐ No	☐ Yes ☐ No
☐ Profits		☐ Yes ☐ No	☐ Yes ☐ No
Other (*please specify*):		☐ Yes ☐ No	☐ Yes ☐ No

13. What kind of information are fintech firms **that specialise in lending** specifically providing?

Data Type	Recipient agency/institution	Is the data public?	Does the central bank plan to start collecting this data in the following months/year?
☐ Type of loans		☐ Yes ☐ No	☐ Yes ☐ No
☐ Loans granted		☐ Yes ☐ No	☐ Yes ☐ No
☐ Amount of credit		☐ Yes ☐ No	☐ Yes ☐ No
☐ Delinquency rate		☐ Yes ☐ No	☐ Yes ☐ No
☐ Default rate		☐ Yes ☐ No	☐ Yes ☐ No
☐ Loan rate		☐ Yes ☐ No	☐ Yes ☐ No
Other (*please specify*):		☐ Yes ☐ No	☐ Yes ☐ No

14. If the supervisory agency is other than the central bank, is the information shared among institutions?

    ☐Yes   ☐No

    If **Yes,** please elaborate on the coordination among institutions for information sharing (e.g. frequency with which fintech firms provide information, variables reported, level of disaggregation, etc.).

15. Have your central bank developed a strategy to improve data gathering of fintech firms' activities and their balance sheets in your jurisdiction? *Please provide details:*

16. Please provide details on any future challenges for the data gathering of fintech firms' activities and balance sheets in your jurisdiction (e.g. lack of regulation, coordination problems, resistance from fintech firms to share information, reporting requirements, etc.).

Part III: Central bank analysis and research

17. Is your central bank currently conducting analysis on fintech related issues?

    ☐ Yes   ☐ No

    Please provide details (e.g. frequency, data, delivery format, uses):

18. Has your central bank included fintech related issues in its research agenda for this year or the following year?

    ☐ Yes   ☐ No

    If **Yes**, please skip to the next question. If **No,** please explain why, then skip to question 21.

19. What is the level of priority that fintech related issues have on the research agenda of your central bank for this and the next years, compared to other priority research topics? Please elaborate.

20. What are the factors that motivated your central bank to pursue a research agenda on fintech related issues?

21. Which fintech related issues is your central bank considering to research this year or the following year? *Please rank all the relevant fields starting from 1, where 1 is the most important issue in the central bank´s research agenda.*

☐ Technology-driven financial services innovations

☐ Fintech sector development

☐ Implications for bank supervisors and regulatory framework

☐ Implications for financial stability

☐ Implications for financial inclusion and credit availability

☐ Implications for banks and banking systems and financial services

☐ Implications for central banking

☐ Implications for monetary policy

☐ Other, please specify.

22. What are the main topics[2] on fintech related issues that your central bank is currently covering, or is planning to cover, with your research agenda? *Please rank all the relevant fields covered by your central bank´s research agenda, starting from 1 where 1 is the most important issue.*

[2] Examples of broad areas of research: new technologies being used in financial activities; global/regional trends of fintech industry; implication of recent/prospect developments in the local/international fintech industry for aspects in your jurisdiction, such as: changes in business models of financial entities, the role of the authorities; financial inclusion; financial stability; supervisory/regulatory frameworks; etc.

23. What are the key research papers/articles/chapters/boxes that have been produced at your central bank related to fintech or similar topics?

Research broad category	Title	Authors	Is it publicly available? (YES, NO)
Description, analysis, examination of current technologies being used in financial services (technical description of the fintech incipient market in your jurisdiction)			☐ Yes ☐ No
Theoretical or empirical models describing the new fintech sector and its interrelation with other sectors of the financial system			☐ Yes ☐ No
The role of authorities in the new fintech sector (e.g. central bank's involvement in digital currency/assets market development; supervisory or regulatory entities responses to new risks)			☐ Yes ☐ No

24. Which databases have been used or are being used to produce these studies?

Database(s) name(s) and source(s)	How is the data obtained? *(e.g. survey, interviews, reports, etc)*	Is the data available?
		☐ To the public ☐ To external sources for research purposes ☐ Not available If available, please, provide de weblink where data can be found:
		☐ To the public ☐ To external sources for research purposes ☐ Not available If available, please, provide de weblink where data can be found:
		☐ To the public ☐ To external sources for research purposes ☐ Not available If available, please, provide de weblink where data can be found:
		☐ To the public ☐ To external sources for research purposes ☐ Not available If available, please, provide de weblink where data can be found:

25. What are the difficulties that your central bank has faced in conducting research on fintech related topics? *Please tick the relevant fields.*

☐ It is not a priority topic in the research agenda

☐ Data availability

☐ Time, budgetary or human resources availability

☐ Difficulty on bringing together multidisciplinary themes

☐ Lack of collaborative initiatives that facilitate learning through the exchange of knowledge, data, research results, etc.

☐ Other

If **Other**, please specify:

26. Has the central bank established or does it plan to establish in the next years changes in the organization aiming to focus more on fintech research and analysis?

☐ A new unit/department

☐ An interdepartmental working group

☐ Other

Please provide further details on the the specific objectives, working plan and strategy supporting these changes:

27. Has your central bank developed or collaborated with other central banks, international organizations, think tanks, research centers, regulatory/supervisory entities, fintech companies or other stakeholders to develop initiatives that promote knowledge sharing, outreach, debate, technological innovation, financial education or further research on Fintech related issues (e.g. conferences, workshops, taskforce, contests, Finlabs, Tech hubs, regular meetings, etc.)?

☐Yes   ☐No

If **Yes**, please provide further details on the different initiatives:

If **No**, does your central bank plan to develop or join any similar initiative in the next year or two years?

☐Yes   ☐No

If **Yes**, please provide further details:

28. What do you foresee as being the biggest challenges in the future for the central bank to further expand research on fintech related issues (e.g. data availability, not a priority in the research agenda, lack of time, budgetary or human resources, etc.)?

29. What strategy does your central bank could follow to overcome these challenges? Pease elaborate on the strategy and if it applies, on the progress that has been made so far:

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