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IMF Working Paper

Fintech in Latin America and the Caribbean: Stocktaking

by P. Berkmen, K. Beaton, D. Gershenson, J. Arze del Granado, K. Ishi,
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Prepared by S.P. Berkmen, K. Beaton, D. Gershenson, J. Arze del Granado, K. Ishi, M. Kim, E. Kopp, and M. Rousset, with contributions from H. Miao, Y. N. Mooi (all IMF), and E. Duch (World Bank) and research assistance by D. Pan (IMF), under the guidance of P. Alonso-Gamo (IMF), and led by S.P. Berkmen (IMF).[1]

Authorized for distribution by Patricia Alonso-Gamo

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Abstract

In Latin America and the Caribbean (LAC), financial technology has been growing rapidly and is on the agenda of many policy makers. Fintech provides opportunities to deepen financial development, competition, innovation, and inclusion in the region but also creates new and only partially understood risks to consumers and the financial system. This paper documents the evolution of fintech in LAC. In particular, the paper focuses on financial development, fintech landscape for domestic and cross border payments and alternative financing, cybersecurity, financial integrity and stability risks, regulatory responses, and considerations for central bank digital currencies.

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Keywords: Fintech, cross border payments, financial sector, financial regulation, financial stability and integrity, cyber risk, cyber regulation, monetary policy, central banks, digital currencies, competition.

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I. INTRODUCTION

Financial technology, or fintech, is growing rapidly in the region.[2] The importance of fintech varies widely across countries and regions, depending on the level of economic development and market structure. In Latin America and the Caribbean (LAC) fintech has seen rapid growth after a slow start and is on the agenda of many policy makers. Following the Bali Fintech Agenda (IMF and WB, 2018), which sets the key considerations for policy makers with respect to fintech, this paper takes stock of the state of play in LAC. While digitalization and advances in technology have broader macroeconomic implications, the paper focuses on the financial sector.

Advances in financial technology are offering wide-ranging opportunities for the region.

- **Fintech can reduce transaction and services costs and foster financial inclusion and development.** The new technologies offer lower costs for both providers and consumers and have the potential to increase the efficiency of the market for financial products. Despite significant progress, financial development in many countries in the region lags other emerging and advanced economies (e.g., Heng and others, 2016). Indeed, many governments and fintech companies in the region aim to use new technologies to improve financial development and inclusion. According to the IDB and Finnovista (2018) survey, 46 percent of fintech startups in the region seek to help underbanked consumers and/or small and medium enterprises (SMEs).[3] For example, technologies such as mobile money might help increase financial inclusion for people living scattered across islands or remote areas. Fintech can also help reduce the cost of remittances, an important source of income for many countries in Central America and the Caribbean—particularly given the loss of correspondent banking relationships (IMF, 2017a).

- **Fintech can enhance financial sector competition and improve intermediation.** Since the global financial crisis, many foreign banks have reduced their exposures to countries in LAC, and some left for good, while no new global banks have been entering the region since then (see Enoch and others, 2017). This has caused profound changes in market structures across the region. The withdrawal has motivated further consolidation among leading local and regional banks, in some cases with adverse consequences for competition (reflected in wide interest rate margins and high lending rates) and liquidity supply in local markets. Fintech activities have the potential to boost competition and put pressure on margins, thus alleviating the adverse consequences of highly concentrated banking systems. Fintech firms are typically narrow in their scope and target specific

[2] Different definitions of fintech have been used by international bodies and national authorities. This paper adopts the terminology used by the Bali Fintech Agenda: The advances in technology that have the potential to transform the provision of financial services spurring the development of new business models, applications, processes, and products.

[3] 271 startups have already been identified focusing on SMEs with poor or no access to financial services.

areas where they have a perceived edge over their competitors in the traditional banking system. This edge can arise from either better technology that fills existing gaps (including through a better design of financial services) and increases efficiency or loser regulation and supervision that allow non-banks to provide certain services that would not be profitable for highly regulated banks. The impact on financial sector competition will depend on how the fintech startups develop (e.g., new entrants versus funding by incumbent banks) and how the regulation respond to new technologies and players. Reinforcing competition and commitment to open, free, and contestable markets would ensure a level playing field and promote innovation, consumer choice, and access to high-quality financial services (Bali Fintech Agenda, 2018). In this context, addressing the risks of market concentration and fostering standardization, interoperability, and fair-and-transparent access to key infrastructures would contribute to the objectives of enhanced financial competition and intermediation.

- **Fintech can support growth and reduce poverty in the region by strengthening financial inclusion, development, and intermediation**. Further progress in financial development is expected to support growth and reduce growth volatility in the region (Heng and others 2016). Similarly, financial inclusion could help reduce poverty and inequality, particularly in rural and remote areas.

But a more technology-based financial system also creates new and only partially understood risks to consumers, providers, and policymakers.

- ***Financial stability:*** The effects of fintech on the structure of financial systems and how these new technologies impact financial stability is not well understood. Especially during the startup phase, fintech firms may not have in place the risk management systems and practices that incumbent financial firms have been developing for decades amid increased regulatory demands, particularly since the global financial crisis. While most fintech applications are narrow in scope, the trend points to a broadening of services, including through provisioning of traditional banking services.

- ***Financial integrity:*** Safeguarding the integrity of financial systems is key, particularly in countries where corruption and crime are a concern. While new technologies may help strengthen compliance with anti-money laundering and combating the financing of terrorism (AML/CFT) measures, some innovations can be used for criminal activities. A rapid expansion of fintech activities, with increasingly complex transaction models (which limits the ability of the authorities to identify the real beneficial owners of assets) and without sufficient resources to supervise and regulate these activities, could pose a potential threat to financial integrity.

- ***Cyber risk:*** Increased digitalization and connectivity exposes operators and consumers to cyber risk, and active risk management is required so that cybersecurity-related measures are commensurate with the underlying risk (see Kopp and others, 2017). LAC is viewed

as relatively less exposed to cyberthreats than some other regions, which may reflect the modest degree of digitalization and the limited spread of online banking. Relatedly, the commitment to increase cybersecurity lags some other EM regions. The deficiencies are broad-based, owing to a shortage of cybersecurity skills, a lack of innovative technologies, weak (and in some cases) inexistent cybercrime legislation, and incipient cybersecurity strategies. More recently, cyberattacks in more developed financial markets (such as Chile and Mexico) led to swift reaction from the authorities to strengthen cybersecurity. Given the rapid evolution of fintech, cyber risk is rightly considered a key risk to financial systems and has become a dominant topic among policy makers in the region.

- ***Consumer and data protection:*** Another challenge for consumer protection is the potential misuse of consumer data by fintech firms (see Pereira da Silva, 2018), as regulatory requirements for data privacy are less developed, or stringent, than those for the traditional banking system.

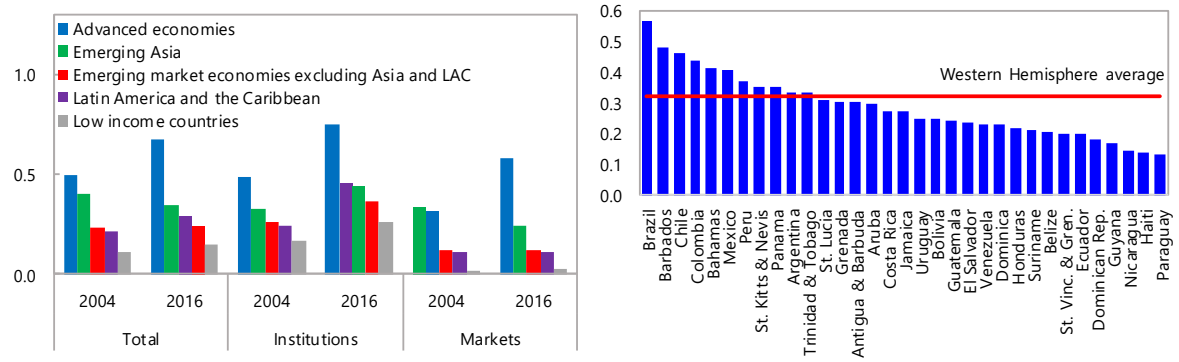
Consequently, the rise of fintech is a new challenge for policy makers. Fostering financial development and inclusion while maintaining these risks is a challenge, particularly given the rapid pace of technological change, and significant data and capacity gaps. On the one hand, fintech issues could be a part of national financial inclusion strategies to help overcome long-standing barriers to financial inclusion and develop financial markets across a broad range of financial services. On the other hand, regulatory framework and supervisory practices should be adapted for orderly development and stability of the financial system, to facilitate the safe entry of new products, activities, and intermediaries and to respond to and prevent stability and integrity risks. Similarly, central banks have the challenging task of evaluating the benefits and risks of adopting technological progress in payments systems and issuing their own digital currencies (IMF and WB, 2018; IMF, 2018b).

This paper lays out the fintech landscape in LAC. First, Section II presents the level of financial development and inclusion in LAC. Section III summarizes the evolution of fintech startups in the region, focusing on payment systems and fintech lending. Section IV discusses regulatory and supervisory developments and challenges, as well as financial stability implications of fintech, with country specific examples on Brazil, Colombia and Mexico. Section V delves into various macroeconomic aspects of fintech, focusing on central bank digital currencies, taxation issues, and cross-border payments (especially remittances). Section VI discusses security issues related to the digitalization of information amid increasing connectivity and suggests concrete measures that help increase cybersecurity in the region. Section VII presents the main conclusions and puts forward a set of issues that requires further analysis.

II. Financial Development and the Role of Fintech

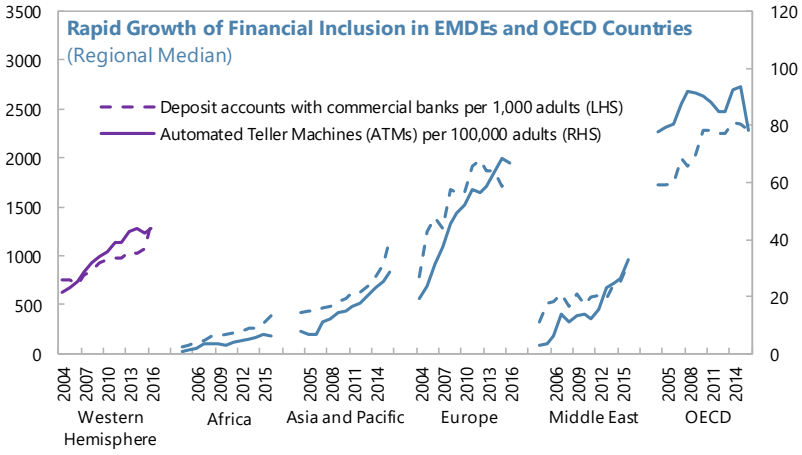
Despite recent improvements, there is further room to improve financial development in LAC. Financial development— measured by the *Financial Development Index*—along the dimensions of access, depth, and efficiency—in LAC lags Emerging Asia but is at par with other emerging markets. While the improvements are evident in financial market institutions (i.e. banks), LAC performs poorly in terms of financial market depth and efficiency (Heng and others, 2016).

Figure **1. Financial Development Index**



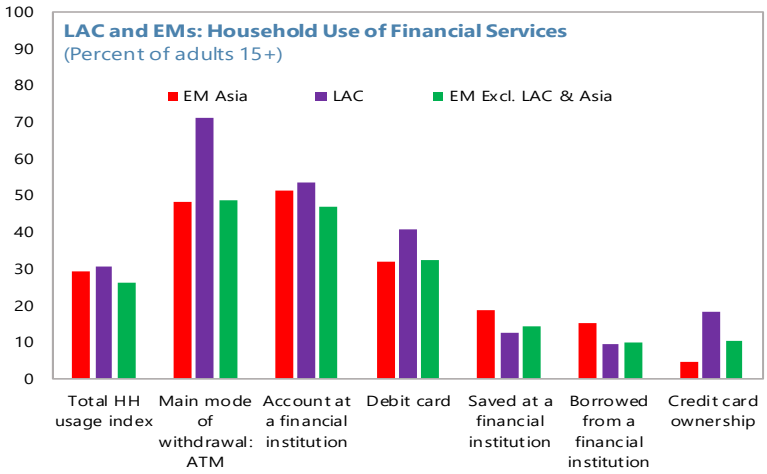
Sources: Svirydzenka (2016) and IMF staff calculations.
Note: The Financial Development Index is a summary index which covers depth, access, and efficiency of both financial institutions and markets. For detailed methodology on the index and country groupings, please see the referenced source. Country groupings conform to WEO definitions.

Cross-country variation in financial development is significant. Brazil, Barbados and Chile rank the highest in the region, closely followed by Colombia, Bahamas, Mexico, and Peru. Nicaragua, Haiti, and Paraguay rank poorly, with Haiti and Paraguay scoring worse than low-income country average. Significant progress was made in some countries, reflecting targeted reforms to deepen financial markets and inclusion, including through regulatory frameworks (Heng and others, 2016). *Financial institutions* appear to be particularly well developed in the Caribbean (notably the Bahamas, Barbados, St. Kitts and Nevis, and Antigua and Barbuda), which, along with Brazil, lead the financial institutions component of



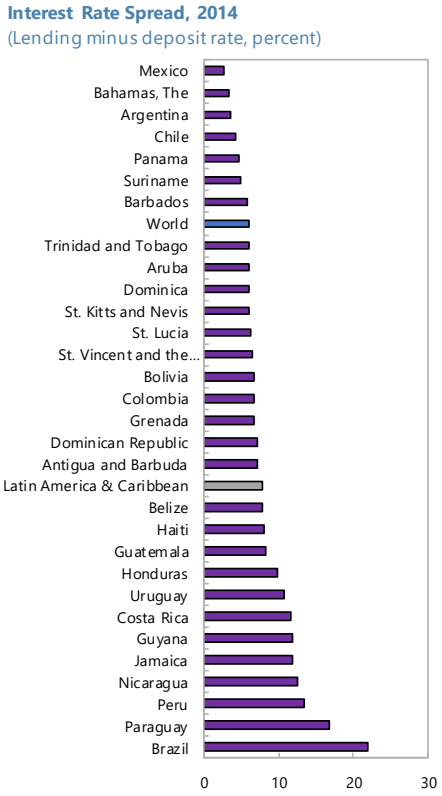
Source: IMF, Financial Access Survey.
Note: The observations available for Automated Teller Machines (ATMs) per 100,000 adults in 2016 for each region are: 29 for Africa, 22 for Asia and Pacific, 15 for Europe, 19 for Middle East, 28 for Western Hemisphere, and 27 for OECD countries. The observations available for Deposit accounts with commercial banks per 1,000 adults in 2016 for each region are: 22 for Africa, 20 for Asia and Pacific, 11 for Europe, 13 for Middle East, 18 for Western Hemisphere, and 20 for OECD countries.

the Financial Development Index in the region. *Financial markets* are well developed in Brazil, Mexico, and Chile, unlike the Caribbean, where many countries have no market access.



Note: Main mode of withdraw: ATM is reported in 2014 survey, while the rest of the series are reported in 2017 survey.
Source: World Bank, Findex Database; Staff's calculation, the index is calculated by taking the simple average of each components.

LAC scores relatively well on access to financial institutions. The number of automated teller machines (ATMs) and bank branches per 100,000 adults has improved steadily and is now higher in Latin America than in many other regions, excluding Europe (also see Svirydzenka, 2016). Nevertheless, it remains well below the OECD average, and some countries (such as Haiti Nicaragua, and Paraguay) remain below the regional average.



Source: IMF, International Financial Statistics.

Bank intermediation is, however, low. Credit-to-GDP in LAC is low relative to other EMs, and credit is expensive (De Carvalho and others, 2012; Enoch and others, 2017). While households in LAC have access to financial accounts and debit/credit card use, they don't extensively use formal financial services for saving and borrowing. This may reflect (i) high reliance on nontraditional finance sources (such as borrowing from friends, family, and informal lenders, as well as banking correspondents - food stores, gas stations, pharmacies) (Dabla-Norris and others, 2015); (ii) high bank lending rates in the context of highly concentrated banking system; and (iii) and informational requirements given the widespread informality in some countries. Similarly, small and medium size enterprises are considered too risky to provide credit given lack of credit information.

Many countries have been adopting targeted policies to bolster financial inclusion. LAC performs well in regulation and supervision of bank branches and agents, prudential regulation, and market conduct rules (Dabla-Norris and others, 2015). However, there remains room for improvement: high service fees, are a considerable barrier to the availability and accessibility of financial services. In addition,

policy action is needed to improve credit reporting systems, regulation of electronic payments, and regulation and supervision of deposit-taking activities in general.

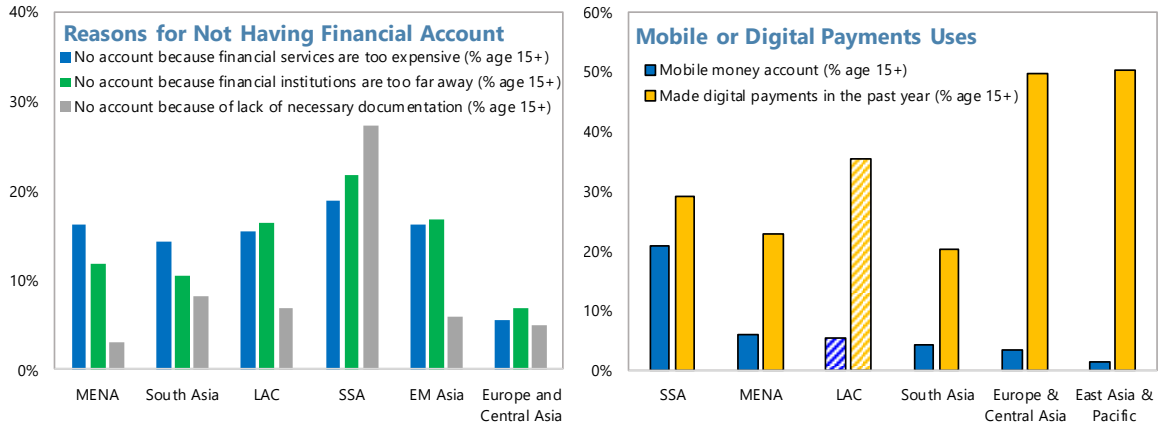
If managed well, fintech can improve financial inclusion and intermediation, lower costs, and diversify financial products. First, fintech allows for the entry of new players – non-banks and mobile network operators—which offer more tailored financial products for unbanked and underserved customers. Second, the use of artificial intelligence, machine learning, and big data makes risk evaluation of borrowers cheaper and quicker.[4] Digitally collected data, including e-commerce and mobile transaction data, could complement and/or substitute traditional methods of client identification and credit risk assessment. Lower borrowing costs would greatly benefit SMEs, which rely less on bank credit products than large firms, owing to high service fees and interest rates (Martinez Peria, 2014). Third, Fintech gives more flexibility through Application Programming Interface (APIs) and provide more efficient and user-friendly services and help develop business models to address underserved markets. For example, these innovations allow many low-income countries to deliver mobile banking services and digital payments at low costs (World Bank, 2018). Finally, even in countries where the availability of financial services is severely limited, fintech applications can help reduce poverty and lower inequality (Box I).

But the associated risks need to be managed well. Similar to other forms of credit, fintech credit needs be well supervised to avoid the boom-and-bust cycles—especially in the financial markets that are not yet mature—and other unforeseen consequences. For example, Fuster and others (2018) show that the use of machine learning in credit markets may inadvertently penalize the already-disadvantaged groups, leading to financial exclusion (because of, for example, artificial-intelligence-based ad-hoc computations of the credit score). In addition, data collection could raise cyber and other third-party related privacy risks.

Cross-country experience suggests that fintech has supported financial inclusion in other regions. According to the World Bank (WB), in emerging and developing economies 55 percent of the adult population is unbanked amid high financial costs, a lack of necessary documents, and long distances (Figure 2). Online lending platforms have supported increased SME lending (United Kingdom, United States and China), while several countries in Sub-Saharan Africa and South Asia have been successful in promoting mobile money savings and payments, which has significantly enhanced financial inclusion (Lukonga, 2018). Mobile money has profound implications in improving financial inclusion by permitting "unbanked" consumers to access financial services for the first time (He and others, 2017).

[4] For instance, Hau and others (2018) discuss how fintech can mitigate local credit supply frictions in China and Jagtiani and Lemieux (2018) demonstrate that fintech lending reduced the cost of credit for some borrowers.

Figure 2. High Financial Costs and Digital Payments



Sources: World Bank, *World Development Indicator* Database; The Global Findex Database, Fund Staff calculations

Box 1. Use of Distributed Ledger Technology in Haiti

A pilot project in Haiti, financed by the World Bank, is an example of how fintech can help increase competition and efficiency, facilitate cross-border trade payments, improve financial inclusion, and raise real incomes. In particular, this box highlights how blockchain technology combined with mobile payments can benefit even the least sophisticated and tech-savvy users in one of the least financially developed countries in the region.

Project description and purpose. A pilot project financed by the World Bank through an IDA loan, aimed at poverty reduction and financial inclusion, is under execution in Haiti. The project uses a third-party Cold Logistics Service provider to reduce spoilage and a broker, equipped with blockchain (distributed ledger) technology to connect Haitian mango and avocado farmers with consumers in the United States and Canada to obtain better sale prices. Wageningen University and Research supervised the technical dry run in May 2018, monitors the project, and provides recommendations tailored to the Haitian environment. The Haitian Ministry of Trade and Industry (MCI) supports the project by running the value chain analysis and identifying the mango and avocado smallholders for the pilot.

Preliminary results. The results of the pilot dry run were encouraging. First, spoilage rates were reduced dramatically, while shelf life and quality of produce improved due to better post-harvest handling and temperature control. Second, farmers' revenue increased eightfold, as the technology helped eliminate inefficient middlemen resellers and reduce markups. Third, smart contracts and cross-border mobile payments reduce transaction costs, and real-time data enable all parties (including the government) to track merchandise throughout the whole value chain. In addition, consumers were able to obtain granular information about the product by scanning a

QR code, such as who the farmer is, where the tree is located, the timeline from harvest to table, and the price structure.

Potential macroeconomic implications. If implemented on a larger scale in Haiti, such use of blockchain technology has the potential to:

- improve financial inclusion by giving rural smallholder farmers access to a financial service platform;
- contribute to poverty reduction among the rural poor, thus reducing income inequality between rural and urban zones (in the Haitian countryside, almost 70 percent of households are considered chronically poor, against a little over 20 percent in cities);
- increase fiscal transparency and tax compliance (tax revenue is easily tracked), potentially raising domestic revenue;
- generate some employment during the harvest season and improve the skills of produce growers.[1]

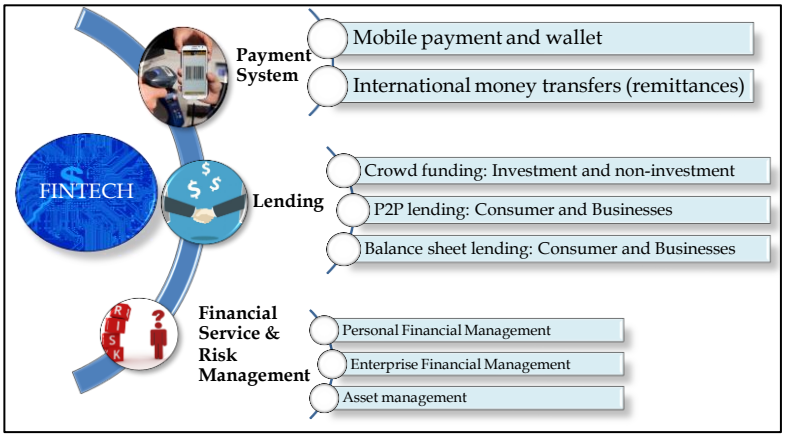
Possible issues. Going forward, a wider implementation of this program could involve various challenges that would need to be addressed. These include the logistical management of a larger scale program with domestic resources, having effective mechanisms in place to deal with system failure (for example, due to a hacking), determining a sound and secure governance of the blockchain nodes to ensure the integrity, scalability and relevance, preventing intervention by interest groups (who may, for example, block shipments or transit until a "fine" is paid), and addressing any potential environmental consequences (such as mono-cultivation if the program becomes too lucrative).

Prepared by M. Rousset (IMF) based on inputs from E. Duch (WB).
Sources: Oostewechel and others, 2018.

[1]Many of the mango trees, according to the pilot report, are very tall, making harvest difficult and risky. Given limited local marketability of mangoes and challenges associated with the harvesting process, some of the mangos from the treetops are not collected. If, however, a higher value was attached to these mangos, farmers would be encouraged to hire help (or exchange labor services) to collect these fruits. Growers' skills are improved through the continuous training on postharvest fruit handling provided by the Cold Logistics Service.

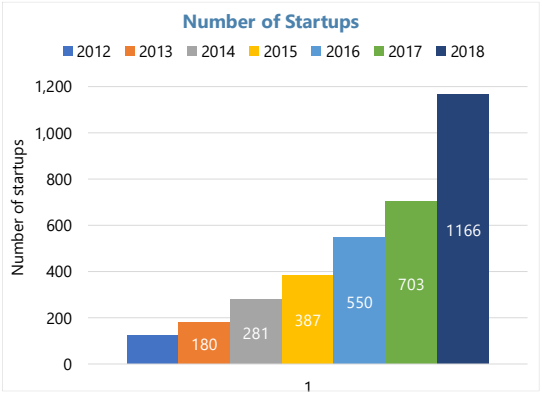
III. FINTECH STARTUP LANDSCAPE IN LATIN AMERICA[5]

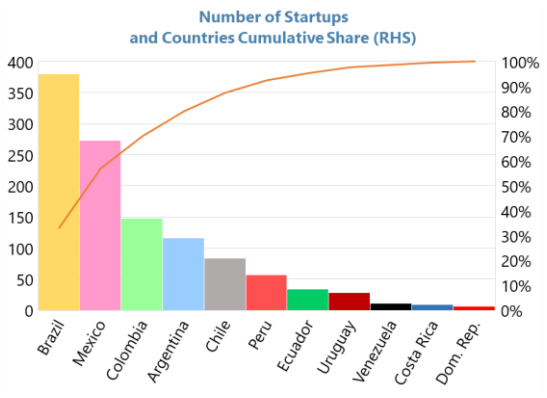
Rapid development of a broad range of technological innovations has affected all functions of finance. The financial sector covers five broad functions: (i) payments, including across borders; (ii) saving and investing; (iii) borrowing; (iv) managing risks to income, savings, and transactions; and (v) receiving financial advice (see He and others 2017 for a detailed discussion). Fintech platform-based business models utilize digital technologies and automated processes and affect all these functions. This section focuses on payment systems and lending functions and in doing so uses data from different sources with different coverage, reflecting significant measurement issues and data gaps.



In LAC, fintech startups are growing, albeit from a low base. According to an IDB and Finnovista survey (2018), 1,166 starts ups are operating in 18 countries in the region—with Brazil (33% of startups), Mexico (23%) and Colombia (13%) leading significantly other countries (Figure 3).

Figure 3. Total Number of Startups in LAC



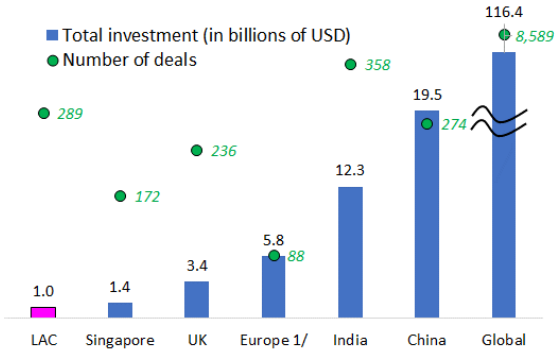


Source: IDB/ Finnovista 2018. Countries with less than 5 startups are not included in the right chart.

[5] Data used in this section draws on the reports prepared by the IDB and Finnovista (2018) and Cambridge Center for Alternative finance (2018b). We are grateful to Sylvia Gabriela Andrade and Diego Mauricio Herrera Falla for sharing data and their comments.

Nevertheless, investment levels are still muted. Despite rapid growth, the number and volume of investment deals remain lower than in other regions. According to CBInsights, investment into private technology companies in Latin America was US$ 1.4 billion in 2017.[6] According to Fintech Global, the value of fintech investment in LAC was about US$1billion between 2014–2017. These compare to gross fixed capital formation in LAC of about $987 billion and corporate bond issuance of about $71 billion in 2017.

Total Investment and Number of Deals (Cumulative, 2014–2017)



Source Fintech Global.
1/ Europe includes France Germany and Spain.

Fintech startups are attracting significant investments from different sources, including traditional banks, so-called *Finvestment* banks, investment management firms, syndicates of local investors and international venture capital firms.[7] The majority of startups (51 percent) received some form of third-party funding.[8,9] Some startups plan to become banks going forward. For example, *Nubank*, a Brazilian credit card operator—which in 2018 received regulatory approval to operate as a consumer finance company—offers a free-of-fees mobile credit card to 4 million users and reached 1.5 million digital savings accounts by June 2018. At the same time, other startups allow customers to open a savings account accessible through mobile phones and provide debit cards that can be used to make utility payments. Some debit cards are connected to global card systems granting users access to international

[6] CBInsights reports total investment of $1.4 bn. This includes all equity financing into fintech companies. Funding covered by this source must be put into venture capital-backed companies, which received funding from at any point from venture capital firms, corporate venture groups, or super angel investors. The total amount of investment deals was significantly higher in Brazil with a cumulative financing raised of $4.2 billion from 2012 until June 2018, followed by Argentina ($600 million) and Mexico ($570 million). Examples include Nubank in Brazil, a financial services startup that raised $605 million across ten rounds of funding (currently valued at more than $1 billion), and Decolar, startup that provides online travel agency services in Argentina, that raised $270 million of financing in 2015 (valued at 1.7 billion in 2017Q4). Source: "*Latin America Tech Booms as Brazil Dominates and Regional Investors Grow*. (Jul 18, 2018), CBInsights, https://www.cbinsights.com/research/latin-america-tech-funding/."

[7] For example: Goldman Sachs (together with Fortress Investment Group) invested $455 million in Nubank in August 2017, while US$ 180 million was invested in October 2018 by Tencent a Chinese multinational investment conglomerate. Scotiabank (Canada) and QED Investors (USA) undisclosed investment in Colombian online credit provider Zinobe.

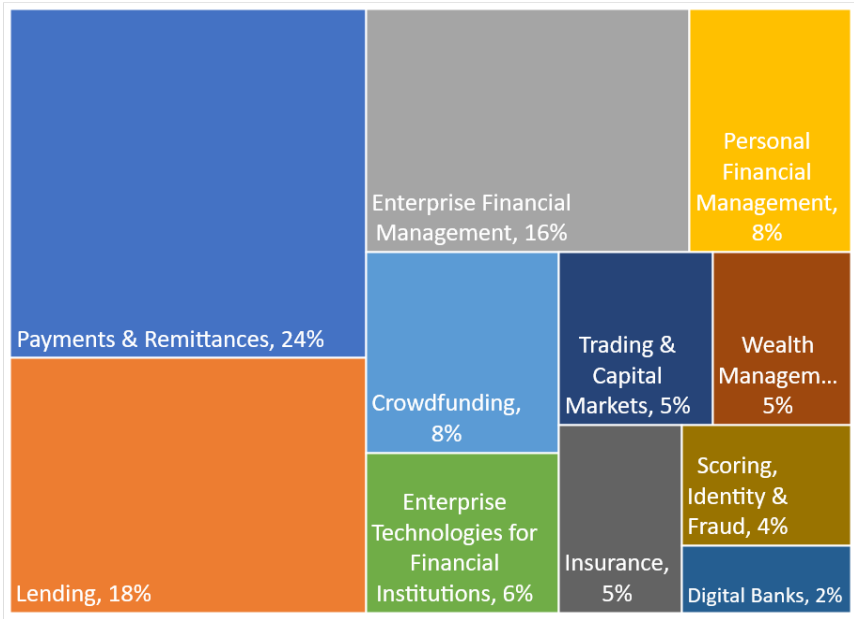
[8] Finnovista and IDB 2018.

[9] Around 21 percent of survey respondents received funds from parties other than friends or family, 9% from investment accelerators, while financial institutions played a minor role (5.3%). The share of firms with external funding also varies widely across countries, with 88 percent in Chile, 78 percent in Brazil, and ranging between 65 and 70 percent in Venezuela, Mexico, Argentina, Peru, Colombia, Uruguay, and Ecuador. Honduras, El Salvador, and Paraguay report not having had access to external financing.

markets. For example, debit cards provided by *Albo* in Mexico, and *Uala* in Argentina's are connected to global *Master Card*.[10]

Fintech startups in the region mainly focus on payments and alternative financing (lending and crowdfunding). Most startups in the region focus on digital payments and transfer services (24 percent), followed by alternative financing (lending) platforms (18 percent), and financial management to businesses (16 percent) and individuals (8 percent) (Figure 4).

Figure 4. Number of Fintech Startups by Segment of Service (2018)



Source: IDB/ Finnovista 2018.

In addition to fintech start-ups, many Caribbean countries are considering using distributed ledger technology (DLT) to foster financial inclusion.[11] In this respect, many governments are in the process of facilitating mobile money and DLT to improve payment systems for people living scattered across islands. In addition, lack of credit information and relatively small domestic market make business by SMEs in the islands risky to lend for standard banking institutions. Some countries are considering, in addition to alternative financing, using automated credit history recording (through DLT) to mitigate such risks and facilitate the matching between entrepreneurs and risk-taking investors.

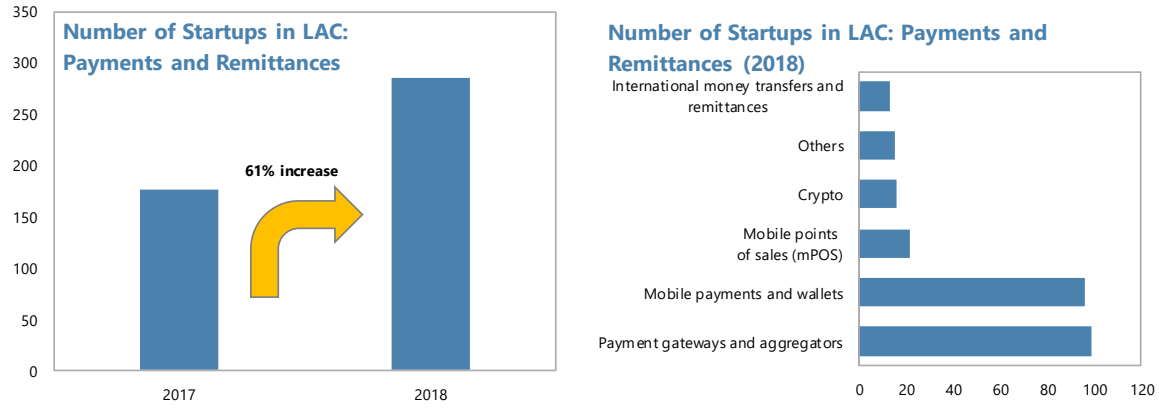
[10] See for an overview of neobanks in Latin America: https://www.bankingtech.com/2018/09/an-overview-of-neobanks-in-latin-america.

[11] See IMF (2016) for more detailed discussion on DLT and cryptocurrencies.

A. Payment Systems and Mobile Money Services

In line with global trends, payment systems are one of the fastest growing segment of fintech in the LAC. One in every four startups in LAC provides payment-related services, and although growth has been slower than in other regions, activities are catching up fast (IDB and Finnovista, 2018). Specific key drivers are payment gateways and mobile money services, while remittances so far have been less of a driver (Figure 5). Brazil and Mexico, for instance, have been the leading countries in the region: out of the 285 start ups in the payment ecosystem in 2018, Brazil had 94 (or 33 percent of total), Mexico 55 (20 percent of total), followed by Colombia (15 percent) and Argentina (9 percent).

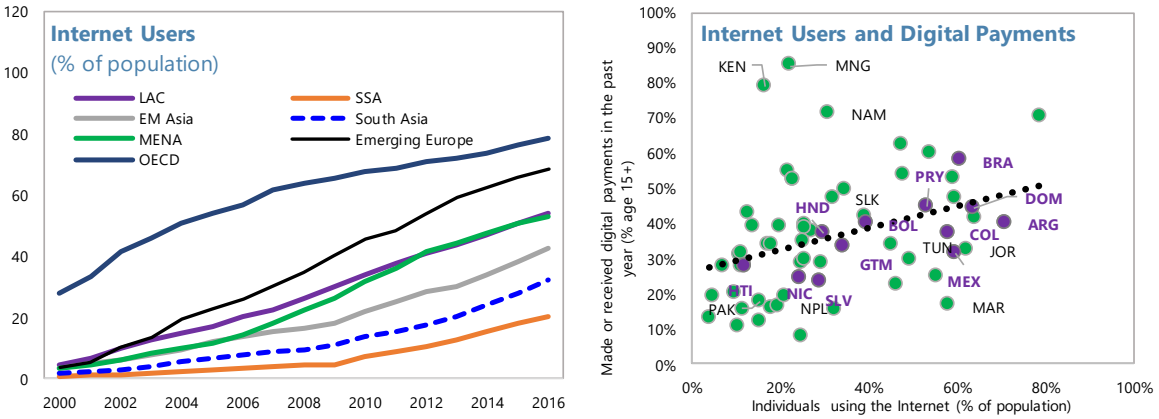
Figure 5. LAC Fintech Payment Startups Are Growing Fast



Sources: IDB and Finnovista, 2018; and Fund Staff calculations.

The increasing penetration of internet has enabled fintech expansion into the payment systems. Since 2000, internet usage across the world has increased substantially, including in LAC (Figure 6). Despite the progress in internet penetration, there is a wide variation across countries, and digital payments are somewhat lower than in some other regions.

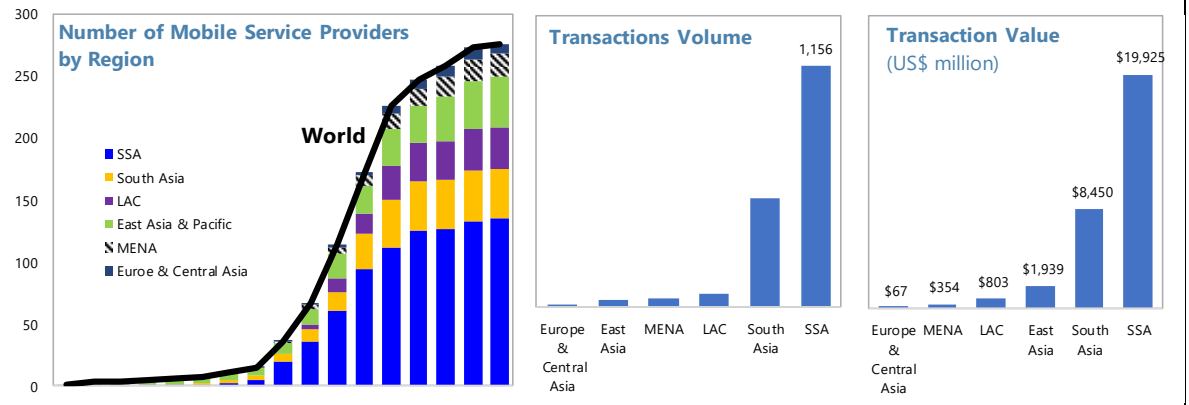
Figure 6. Internet Usage Has Helped the Expansion of Digital Payments



Sources: World Bank, World Development Indicator Database; The Global Findex Database, Fund Staff Calculations.

Mobile money services have grown significantly in recent years, but they remain low relative to other regions. Mobile money services process over a billion dollars a day, with 690 million of registered accounts worldwide (GSMA, 2017). In dollar terms, December 2017 alone saw mobile money transactions of US$31.5 billion, of which South-Saharan Africa (SSA) alone explained about two-thirds. The South Asia region has emerged as the fastest growing region, with transactions of 8.5 billion US$ per month. Adoption of mobile money services in LAC countries remained low, despite decent mobile and internet penetration rates in some countries. As of 2017, 276 mobile money service providers were available globally, with about half operating in the SSA region and only 34 operating in LAC (Figures 7 and 8). This could reflect either the availability of banking correspondents or agents in many countries, which could reduce the need for SMS/USSD-based mobile money services relative to regions where comparable infrastructure was non-existent, and/or the high degree of informality, which could reduce incentives to receive digital payments.

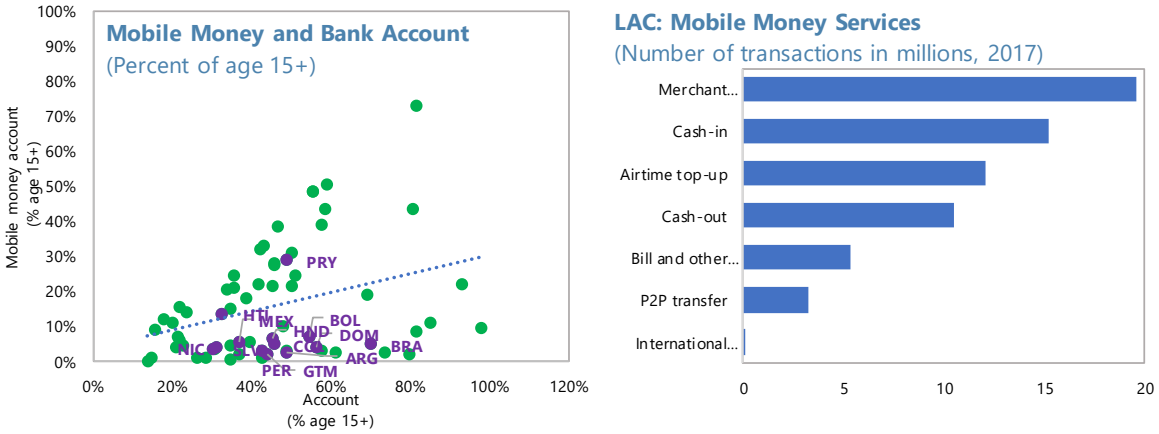
Figure 7. LAC Mobile Money Services Remain Low



Sources: IDB and Finnovista, 2017.

Mobile payment services are provided by both banks and non-banks. Mobile phone technology has allowed improved access to financial services for unbanked segments of the population in remote areas and does not require a dedicated physical infrastructure, such as ATM machines (Pereira da Silva, 2018). Although non-banks dominate mobile money services, banks have begun introducing mobile money features as part of banking services. Non-banks, mostly mobile communication companies, have also begun partnering with traditional banks to scale up their mobile money services. According to GSMA data (2017), out of 30 mobile money providers in Latin America, five have introduced mobile money features including peer-to peer (P2P) transfers, bill payments, and merchant payments (Figure 8).

Figure 8. LAC Mobile Money Services



Sources: World Bank, World Development Indicator Database; The Global Findex Database, Fund Staff calculations.

Box 2. Peru's Fintech Application to its Payment Systems, 2017

Compared to regional peers, the Peruvian fintech market is relatively small, representing about 5 percent of the Latin American market. There are 57 fintech firms in Peru, and activity is mainly in online lending, and payments and remittances. While financial inclusion in Peru has made substantial gains, remaining gaps afford an opportunity for fintech to provide fresh solutions. Increases in rural accounts have boosted account ownership from 29 percent of adults in 2014 to 43 percent in 2017. Nevertheless, some gaps remain: the gender disparity in account ownership has widened, and Peru lags regional and income peers in several financial inclusion indicators. Costs remain an obstacle, with non-account owners citing high costs as the main reason for not having an account. While fintech activity is currently limited in scale, it could provide innovative solutions to overcome barriers in demand and supply.

In the area of payments, the private sector launched a standardized, interoperable e-wallet (Billetera Móvil, or BiM) in 2016 with the aim of increasing financial inclusion. BiM allows users to conduct transactions through a simple interface on relatively low-tech mobile phones and was enabled by the passage of the 2013 law on mobile money and the central bank´s 2016 circular regulating electronic money payment agreements. Users can cash-in/out, transfer money to others, check account balances, and top-up mobile airtime.
BiM's uptake has fallen short of expectations due to implementation challenges. The lack of integration between the e-money platform and the core banking system generated a duplication of operating systems and the need for separate working capital at the agent level. Furthermore, BiM accounts lack interoperability with bank/deposit accounts, and the low coverage of agents particularly in remote areas limits BiM's reach. Users faced difficulties in cashing-in/out, hindering BiM's usefulness.

While design shortfalls are being remedied, the operating model could be redefined. Peruvian Digital Payments (PDP) has been working to expand both its footprint and value proposition to final users. An important step was state-owned Banco de la Nación's participation on the mobile money platform. Other efforts include piloting suppliers' payments, and two banks enabling cash-in through POS terminals. Issues being discussed include how to address the inability of non-shareholders to use the PDP platform, lack of interoperability between BiM and bank accounts, and the operation of BiM on an exclusive basis. The digitization of government payments could also boost usage and help build a critical mass of transactions.

Prepared by Y.N. Mooi (IMF).
Sources: IDB and Finnovista, 2018; Fintech Radar Peru 2017; 2017 Global Findex survey.

B. Alternative Financing (Fintech Credit)[12]

Lending through technology-enabled platforms in Latin America in 2017, at US$ 663 million, is 6 times higher than in 2015, and led by Brazil, Mexico and Chile (Figure 9). Fintech lending is often facilitated by automated credit processes (based on advanced data analytics) that match directly prospective borrowers with individual or institutional investors.[13] Borrowers share their financial information and characteristics of the project that is to be financed, which is then evaluated through automated credit scoring and risk pricing. When an investor is found, a contractual agreement is established, effectively shifting the risk from the fintech platform to the investor platform (Claessens, and others, 2018).[14]

Alternative financing in the region takes different forms and benefits both consumers and businesses.

- Alternative financing includes both lending activities by fintech companies and crowdfunding (Figure 10). Majority of alternative financing in LAC is done through lending. Crowdfunding represents only about 13 percent of overall alternative financing in the region (mostly in Mexico and Brazil) and is dominated by donations and revenue sharing.

- Focusing on lending activities, while most firms rely on peer-to-peer (P2P) or "market place" lending, 24 percent of fintech firms in LAC also mobilize their own-balance sheets. Across the region, while Chile and Colombia rely mostly on market place lending (including invoice trading), balance sheet lending is the dominant form in Mexico and Argentina.

- Across various financing options, both consumers and firms (including through invoice trading) have access to credit, each representing about half of total financing in the region. According to a deep-dive survey done in Chile and Mexico (Cambridge Center for Alternative Finance, 2018a) lending to businesses is dominated by lending to sole-proprietors and small and medium sized businesses.

- Overall, the modalities that represent the largest shares of alternative financing are market place lending to businesses (including invoice trading around 34 percent) and to consumers (around 27 percent), followed by balance sheet lending to consumers (about 19 percent) and to business (about 6 percent).

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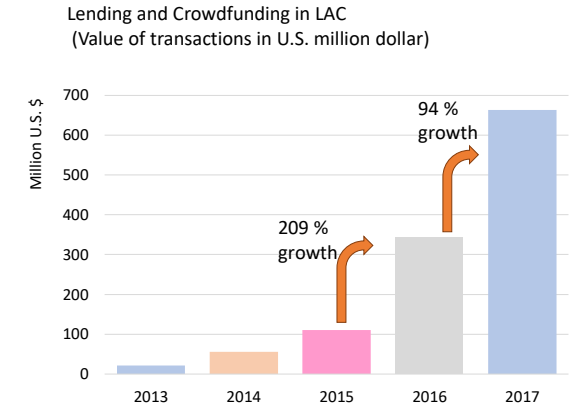
[12] Please see Cambridge Center for Alternative Finance, 2018b for a detailed discussion on alternative financing in Americas based on a comprehensive survey of the firms in Americas.

[13] Key innovations in processing power, and smart algorithms, Application Programming Interfaces (APIs) that allow different software components to interact, artificial intelligence, machine learning and availability and use of large data sets.

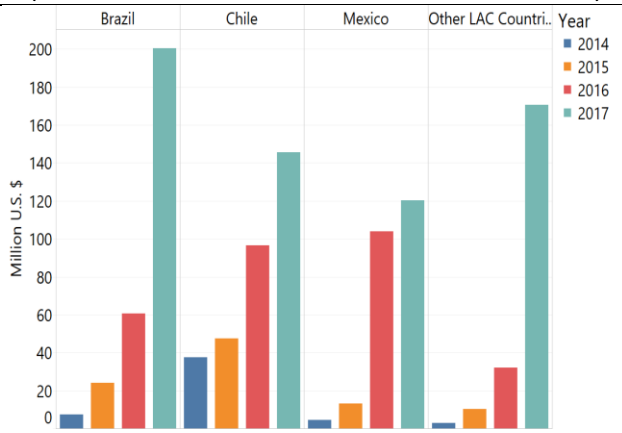
[14] Some fintech companies have access to nontraditional data from borrowers' digital footprint, including mobile payment history, internet browsing patterns, social media behavior, and government records (Costa and others (2016), Berg (2018)).

Figure 9. LAC Alternative Financing

Market value of Alternative Financing Segment

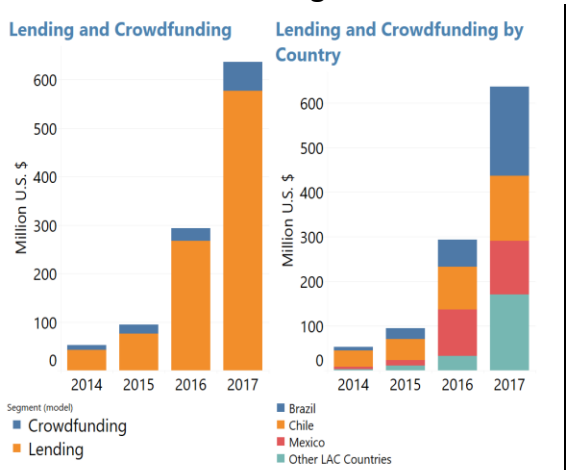


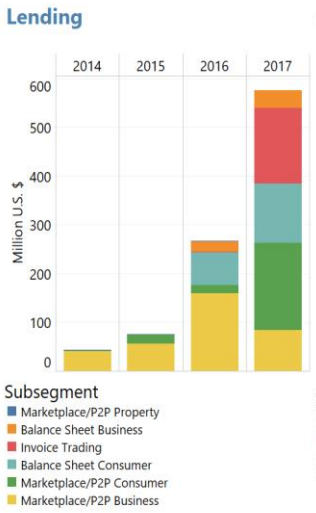
Market Volume per country, 2014-17
(Total loans or transactions value in million US$)

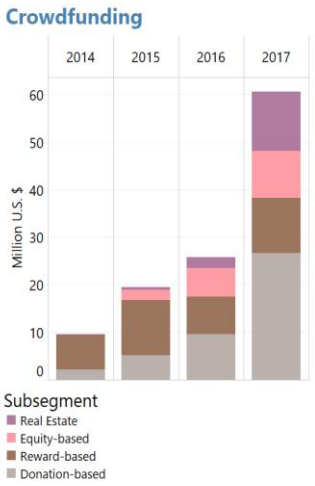


Source: Cambridge Center for Alternative Financing, 2018b.

Figure 10. LAC Alternative Financing Modalities







Source: Cambridge Center for Alternative Financing, 2018b.

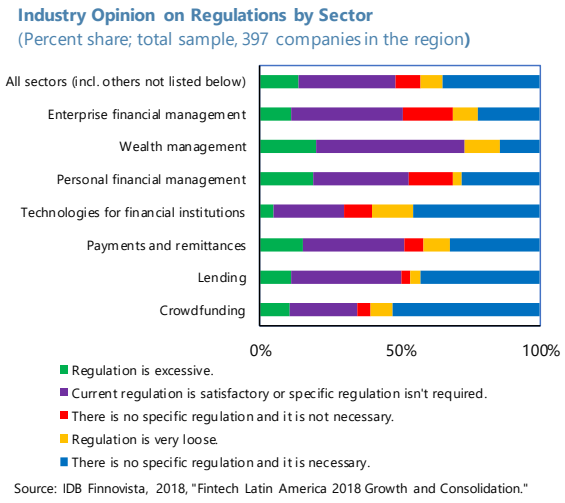
IV. Supervision, Regulation, and Financial Stability

A. Regulating Fintech in LAC

The rapid evolution of fintech has prompted authorities to respond. Fintech applications typically require new regulation or an adaptation of existing frameworks to encompass new financial services and products. LAC authorities have been increasingly concerned about potential risks that fintech could pose to the financial system. An FSB report (2017) argued that fintech is exposed to financial integrity risks and various operational risks pertaining to process control, cyber risk, third parties and, increasingly, to financial stability risk (Annex

I). The FSB also raised concerns about fintech firms' risk management frameworks and, thus, the potential for underestimating risk.

Fintech businesses have called for a regulatory review. An industry survey suggests that nearly 45 percent of the region's fintech entrepreneurs consider current regulation as either very loose or lacking even though it is necessary (IDB and Finnovista, 2018). Businesses engaged in lending, crowdfunding, and technologies for financial institutions are particularly concerned. Focusing on alternative financing, firms engaged in loan-based models are more concerned than those that are engaged in investment-based models (Cambridge Center for Alternative Financing, 2018b).



Source: IDB Finnovista, 2018, "Fintech Latin America 2018 Growth and Consolidation."

Many LAC authorities have already begun to review the regulatory framework for fintech. The speed of regulatory response varies widely across economies, depending on the size and structure of their respective financial and fintech markets as well as the flexibility of the existing regulatory and legal frameworks. Brazil and Mexico have been the most proactive in overhauling regulatory frameworks. While Mexico introduced new and comprehensive fintech-specific legislation, Brazil integrated fintech issues into the existing regulatory and legal framework. Uruguay passed a regulation in late 2018, focusing on P2P lending. Several other economies have also either passed or are considering regulatory changes, such as Argentina, Chile, Colombia, and Peru.[15]

In designing regulatory reforms, policymakers face multiple objectives. Basically, fintech regulation should be proportional and adaptive so as to balance innovation and risks. For example, in Mexico, the main objectives of the law include: (i) fostering financial inclusion, consistent with the *National Policy For Financial Inclusion* (National Council for Financial Inclusion, 2016) (ii) ensuring consumer protection (through transparency and propped disclosures, defense recourses, privacy and data protection); (iii) ensuring financial stability through macro prudential, micro prudential, market, operational risks, and cyber security measures; (iv) granting access to new companies and empowering authorities to intervene in case of abuse or breach of legal provisions, and (v) preventing money laundering activities and terrorism risk that can be caused by electronic payment means and digital assets transactions. In Brazil, the authorities hope the law encourages competition, increases

[15] The World Bank and the Inter-American Development Bank have been providing support for some of these regulatory initiatives.

lending, and lowers lending spreads, while not jeopardizing the stability of Brazil's financial system.

There is currently no common approach to AML/CFT crypto-asset regulation. Some jurisdictions have refrained from taking action while monitoring developments and potential ML/TF risks. Others have adapted their existing AML/CFT framework. Others still have banned all or part of specific activities deemed more at risk, such as "initial coin offerings." However, important progress is being made in the development of an international response to the financial integrity risks. The Financial Action Task Force (FATF) is playing a leading role in this context. It amended the AML/CFT standard in October 2018 to clarify that crypto-asset service providers (e.g., crypto exchanges) should be regulated and monitored for AML/CFT purposes. FATF and its members are now focusing on how to implement the new standard in an effective way. Further guidance in that respect is expected by June 2019.

LAC authorities have warned publicly about the potential risks from crypto-assets, like Bitcoin. Such warnings are largely aimed at educating the general public about the difference between legal tender (issued by the central bank or the state) and digital currencies issued by private sector firms; the high volatility associated with certain digital currencies; and the opportunities that cryptocurrencies create for illegal activities, such as money laundering and terrorism financing and transactions.[16]

While there is, to date, no legislation in LAC countries that specifically applies to digital currencies, some countries have taken concrete measures: Bolivia imposed direct restrictions on investments in cryptocurrencies, and Colombia bars financial institutions within their borders from facilitating transactions involving cryptocurrencies. In Mexico, the regulatory changes following the adoption of the new fintech law extend anti-money laundering laws to cryptocurrencies.

[16] For example, Aruba, Belize, Curacao and Sint Maarten, the ECCB, Jamaica, Peru, Trinidad and Tobago.

Table 1. Selected Latin America and Caribbean Economies: Fintech Regulations

	Key regulatory developments	Specific comprehensive law for Fintech	Private sector digital currencies	
			Allowed?	Any public warnings?
Latin America				
Argentina	In November 2016, Entrepreneurship Act was enacted to regulate equity crowdfunding and create legal faculties for the National Securities Commission to rule and provide oversight on activities.	No	Yes	Yes
Bolivia	In April 2017, the Central Bank of Bolivia issued a statement saying that the use of Bitcoin is prohibited.	No	No	Yes
Brazil	On April 26, 2018, the Central Bank of Brazil established a new regulatory framework that allows Fintech firms to provide direct credit services (e.g. P2P), without intermediary banks.	No	Yes	Yes
Chile	A review of the regulatory framework is under consideration. Reportedly, authorities are considering new specific regulations on cryptocurrency and crowdfunding platforms.	No	Yes	...
Colombia	A review of the regulatory framework is under consideration. The government enacted Decree 1357 to regulate crowdfunding platforms in July 2018.	No	Yes	Yes
El Salvador	The Financial Inclusion Las was enacted in September 2015. The law introduced the concept of an e-money provider, aimed at making financial services more accessible for lower income populations.	No	Yes	Yes
Honduras	The Central Bank of Honduras issued Acuerdo No.01/2016 in February 2016 to clarify existing regulations related to mobile money services.	No	Yes	Yes
Mexico	The Fintech Law (including a regulatory sandbox approach) was enacted on March 9, 2018.	Yes	Yes	Yes
Panama	The authorities are considering modifying the regulatory framework to support sustainable development of Fintech.	No	Yes	...
Paraguay	Regulations on electronic savings accounts were introduced in 2013, and on the operations of electronic payment services in 2014.	No	Yes	...
Peru	An e-money law was passed in 2013. The central issued a circular (0013-2016-BCRP) regulating electronic money payment agreements in 2016. The authorities are considering regulations on crowdfunding and the introduction of a regulatory sandbox	No	Yes	Yes
Uruguay	On November 23, 2018, the Central Bank of Uruguay approved Circular No. 2307 to regulate the activity of peer-to-peer platform companies.	No	Yes	...
Caribbean				
Aruba	A review of the regulatory framework is under consideration.	No	Yes	...
Bahamas	Reviewing legislative framework: considering the introduction of sandbox.	No	Yes	...
Trinidad & Tobago	A review of the regulatory framework is under consideration.	No	Yes	Yes
ECCU	A review of existing laws is underway to identify changes which may be required to ensure adequate regulatory cover for these initiatives thus supporting innovation, while ensuring consumer.	No	Yes	Yes

Sources: IMF Fintech Survey; authorities' websites; and think tank reports.

Like in other regions, some LAC jurisdictions have put in place various innovation facilitation mechanisms to ensure that the regulatory framework does not hold back innovation and market developments. Mexico's new fintech law introduces a regulatory sandbox approach, which allows fintech firms and authorized financial institutions to experiment with new business models under special authorization given by the Bank of Mexico, Banking and Securities Commission, and Insurance Commission.[17] Brazil's *Laboratory of Financial and Technological Innovations* (so called "innovation hubs") provides a virtual space for collaboration of academia, the market, technology companies and fintech firms.

[17] The special authorization may only be granted for a period of two years, and at the end of the second year, the fintech firm must obtain the applicable permit, authorization, registration or concession.

B. Recent Regulatory Developments in Brazil, Mexico, and Colombia

Brazil

Over the past several years, Brazil introduced several new rules to foster the innovation and encourage fintech industry to grow, particularly in the areas of payment, peer-to-peer lending, crowdfunding, and personal finance management. As mentioned above, in Brazil fintech is not regulated as an industry but within the existing regulatory framework.

In April 2018, the *National Monetary Council* issued a new resolution giving fintech firms the opportunity to enter the financial market. Brazil's banking sector has long been viewed as highly concentrated with unduly high market interest rates, and thus the new regulation is expected to enhance competition, reduce market interest rates, and increase access to capital markets for small firms and start-ups. Under the resolution, two types of fintech firms are allowed to operate banking services without arranging partnerships with a bank as an intermediary.[18]

- Direct Credit Companies (*Sociedades de Crédito Direto*, SCD), which are financial institutions that provide loans and financing and acquire collection rights, always with own capital.

- Peer to Peer Loan Companies (*Sociedades de Empréstimo entre Pessoas*, SEP), which are financial institutions that broker loans and financing between peers.

As in many economies in the region, crypto-assets like Bitcoin are not regulated in Brazil. Nonetheless, the central bank has warned the public about the risks posed by cryptocurrencies, mainly because cryptocurrency providers are not regulated, supervised, or licensed by the central bank. The *Securities and Exchange Commission*—Comissao de Valores Mobiliarios (CVM)—has also clarified that investment funds are not allowed to invest in cryptocurrencies, as cryptocurrencies are not classified as financial assets. The authorities are currently preparing a new bill to include digital currencies under the supervision of the central bank.

Mexico[19]

In 2018, the Mexican government enacted a specific *Fintech Law* along with regulations. Fintech firms in Mexico used to operate either under regulations designed for traditional financial services firms or without a clear legal foundation. Over the years, the authorities and the fintech industry recognized that a specific regulatory framework would be needed to

[18] Under the new legislation, these firms must act exclusively via electronic platforms, be incorporated as corporations, and have minimum paid-in capital and net worth of BRL 1 million. These firms may also provide other services, such as credit analysis, loan collection and electronic money issue.

[19] Prepared by Hui Miao (IMF).

provide more certainty to investors, users, and fintech firms. The legislation is the first in the region that attempts to cover all fintech sectors (including electronic money services, crowdfunding, and cryptocurrencies). The main objectives of the regulatory reform are to provide more legal certainty; establish risk mitigation standards, while maintaining a regulatory equivalence between new fintech businesses and traditional financial institutions; ensure a competitive environment; and enhance transparency. Selected provisions in the law include:

- *Electronic money services*. The electronic money service companies (i) are required to keep a level of liquidity at par with the electronic money issued to return customer funds at any time; (ii) are not allowed to pay interest on client balance or extend credit to its users; (iii) need to separate client funds from own investments.

- *Crowdfunding and peer-to-peer lenders*. These lending service providers are (i) obliged to inform investors of the selection of criteria and risks of the projects; (ii) prohibited to guarantee returns to investors; (iii) required to segregate funds from customers and those of their own; (iv) obliged to have operational risk controls, and cyber security and AML/CFT policies; and (v) required to link the level of fees with the overall performance of the project to better share project risks.

- *Cryptocurrencies*. Fintech firms and credit institutions can operate only those virtual assets authorized by the central bank and in the particular business model authorized, also considering the restrictions established by secondary regulation. They are also required to return these assets (or their equivalent amount in national currency) to customers and are not allowed to see or transact crypto-assets that are held on behalf of customers.

Mexico's new Fintech Law has also paved the way for "open" banking. This aims to let the banks share with third parties (including fintech firms) certain customer data through public *application programming interfaces* (APIs). With an open banking policy, small and medium-sized banks as well as fintech firms can use large banks' client information through APIs, and this information sharing can help improve transparency and financial inclusion. The fee to access the data will be regulated to cover the cost of providing the data over open data APIs.

Moreover, licensing requirements for fintech firms are published in the secondary legislations on e-payment, crowdfunding, and cryptocurrency on September 10, 2018. The updated fintech regulations provide detailed rules on license requirement, investor protection, data sharing and AML/CFT (Box 3). For example, capital requirement and loan size limits are established for P2P lenders. The individual loan limit is capped at US$15,000 and minimum capital requirement for P2P lender is set at US$250,000. Fintech firms can formally apply for the license to enter the new regulatory regime. More secondary regulations including the implementation of the "skin-in-the-game" for P2P lenders and IT security requirement are to be published soon.

Regulation needs to strike the right balance between promoting innovation and protecting investors and consumers. Mexican fintech regulation applies a temporary approval system for the testing of new financial services under limited and controlled conditions ("regulatory sandbox") for fintech firms and financial institutions—though key AML/CFT measures and fit-and-proper requirements are typically not waived. To mitigate the risks, sandboxes often include safeguards to contain restrictions on the scope of the experiment, such as the duration and number and type of customers. For example, e-payment firms with demonstrated benefit for its users can operate under a regulatory sandbox approach for up to one year, subject to regulatory discretion.[20]

Box 3. Provision on Anti-Money Laundering in the Fintech Law

The Mexican Fintech Law has AML provisions that fintech firms must comply with *Secretaría de Hacienda y Crédito Público* (SHCP)'s requirement to prevent and detect potential AML/CFT activities.

- The regulatory framework centers in prevention and detection of transactions, through i) client and user information storage, ii) detection of clients or transactions that could lead to felonies, iii) training to directors, executives, and employees that participate in such transactions, and iv) internal or independent evaluations on compliance with such provisions and presentation of periodic information to the *Comisión Nacional Bancaria y de Valores* (CNBV).

- E-money institutions shall request an authorization from the CNBV to receive and deliver cash in Mexican currency, specifying the mechanisms to be used for such purposes. Such authorization shall be subject to the following limits: (i) the reception and delivery of cash in Mexican currency up to an amount in Mexican Pesos equivalent to 10,000 UDIs per client, and (ii) the delivery of cash in Mexican currency up to an amount in Mexican Pesos equivalent to 1,500 UDIs per client on a daily basis.

- Crowdfunding institutions shall request an authorization from the CNBV to receive cash funds in Mexican currency from their clients—for them be able to pay their loans or credits in cash—by means of deposits in accounts opened in financial entities authorized for such purposes, on behalf of the relevant crowdfunding institution, up to a monthly amount equivalent in Mexican Pesos to 3,000 UDIs for low-risk clients, and up to a monthly amount of 10,000 UDIs for other clients.

Colombia

The Colombian authorities address regulatory needs through introducing new legislation as well as amendments to existing decrees. Colombian regulators introduced

[20] In addition, key AML/CFT measures and fit-and-proper requirements are typically not permitted.

new regulations for specific fintech activities and introduced a sandbox approach. These include the enactment of Law 1734, which allows the establishment of specialized electronic deposit and payment companies to promote a digital transaction environment; and amendments to the *Sole Decree on the Finance Sector* (Decree 2555), originally issued in 2010.

In 2018, Colombia issued regulatory rules for crowdfunding. Decree 3157 defines crowdfunding as an activity in which more than one contributor is in contact with recipients, raising funds in their own name. Colombian entities offering crowdfunding services must be incorporated as sole purpose stock corporations authorized by the *Superintendence of Finance* (*Superintendencia Financiera*), stock exchanges, or trading systems. Fund-raisers must act on their own behalf for their own benefit. Also, funds must be used for productive investment projects.

On crypto-assets, the government is still working on a new regulatory framework. Meanwhile, the central bank and supervisor have issued public warnings and instructions. The Colombian central bank repeatedly stressed that crypto-assets like Bitcoin are not recognized as a currency and are not supported by the central bank. The authorities also clarified that financial institutions subject to supervision are not authorized to hold, invest in, intermediate or operate with cryptocurrencies.

C. Challenges Ahead

Proper regulation is important to achieve policymakers' multiple objectives of financial inclusion, financial stability and integrity, and consumer protection. Adequate regulation should be in place to protect consumers and investors, ensure healthy competition, and guard against financial stability and integrity risks. Authorities need to monitor fintech markets, assess their vulnerabilities, and develop a financial stability assessment framework for fintech that takes into account an evolving market structure. However, calibrating regulation poses a challenge to policymakers, especially since fintech technologies and business models are evolving rapidly. Hence, the traditional (entity-based) regulatory framework is not necessarily a good fit for fintech business models. Clearly, regulators need to develop new skills to assess and analyze risks pertaining to fintech activities.

In a quickly changing environment, regulators need to increasingly make use of activity-based regulation. Fintech evolution has been driven not only by the traditional financial industry (e.g., banks) but also by new businesses, including mobile and web-based payments, crowdfunding, peer-to-peer lending, currency exchanged through cryptocurrencies, robo-advisors, and smart contracts. All these are dynamic fields subject to fast technological change. And having adaptive and flexible regulation in place reduces the likelihood that regulations have to be changed repeatedly to remain comprehensive and adequate. Some jurisdictions (e.g., Brazil, Mexico, and Colombia) already moved to address the fast evolution that fintech is associated with. Other countries will likely follow suit (IMF, 2017).

Capacity constraints in supervisory and regulatory bodies constitute an important challenge. Authorities will need to keep up with industry and technology developments and maintain adequate skills and tools to effectively supervise the fintech industry. However, this requires additional resources and expertise. Given the limited capacity of supervisors and regulators in smaller countries, including in the Caribbean, uncontrolled and rapid fintech adoption is a challenge to maintain financial stability and integrity.

Safeguarding the integrity of financial systems is key, particularly in countries where corruption and crime are a concern. While new technologies may help strengthen compliance with AML/CFT measures—for example, by developing "regtech" to automate regulatory reporting and compliance requirements as well as facilitate more cross-sectoral and cross-jurisdictional cooperation for improved compliance—, some innovations can be used for criminal activities. For example, in the case of crypto-assets, their decentralized nature and global reach, as well as the absence of a regulated intermediary in many transactions would raise difficult questions about whom to regulate. In addition, their varying degrees of anonymity or 'pseudo-anonymity" can significantly impede regulatory action. A central bank digital currency (see next section) is not exception, as it could also be used for criminal purposes, although such risks may vary depending on its specific design. Furthermore, a rapid expansion of fintech activities, with increased complexity transaction models— which limit the ability of the authorities to identify the real beneficial owners of assets—, without having sufficient resources to supervise and regulate these activities, could pose a potential threat to financial integrity.

V. Other Macroeconomic Policy Considerations

A. Central Bank Digital Currencies[21]

While public authorities around the world are stepping up their efforts to monitor fintech developments, a question that has arisen is whether central banks themselves should issue digital currencies as legal tender. The global and regional debate has been motivated by several factors, including: (i) desire to reduce the costs of maintaining, transporting, replacing notes and coins; (ii) needs to foster financial inclusion; (iii) interest in technological innovations; (iv) increased use of private digital currencies, including crypto assets (e.g., e-money, and bitcoins), which may erode the demand for central bank money and the transmission mechanism of monetary policy; and (v) reduced use of cash in some economies.[22] A survey conducted by BIS shows that many central banks are collaboratively looking at the implications of a central bank digital currency, but only few plan to issue a digital currency in the near future (Barontini and Holden, 2019).

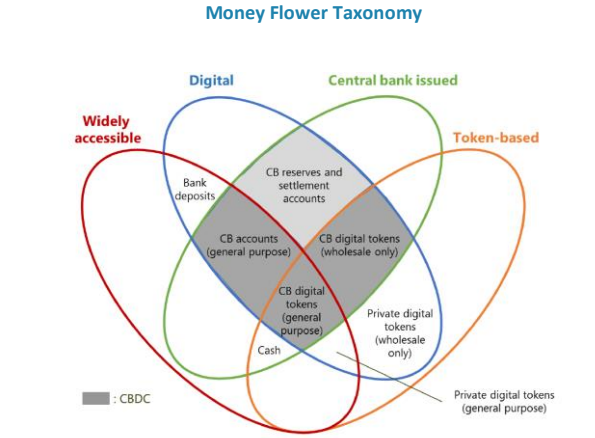
[21] A central bank digital currency can be defined as a digital form of central bank money that is different from balances in traditional reserve or settlement accounts (BIS, 2018).

[22] See Claessens and others (2018) and IMF (2017, 2018b) for a more specific discussion.

IMF (2018b) developed a conceptual framework to assess the case for CBDC adoption from the perspectives of users and central bankers. While, the impact of CBDC will hinge on its design and country-specific characteristics, critical features include anonymity (the traceability of transactions), security, transaction limits, and interest earned. The role of cash and commercial bank deposits in payments is also important. IMF (2018b) notes that CBDC could strengthen the benefits and reduce some of the costs and risks to the payment system and could help encourage financial inclusion. However, demand will not necessarily be very high and will depend on the attractiveness of alternative forms of money. In countries with limited banking sector penetration and inefficient settlement technology, demand for CBDC could be greater.

Several forms of CBDC can be considered depending on who has access to CBDC (general public or just banks) and in what form (token or account based); see BIS (2018) and IMF (2018b).

- Today's technology allows the general public (including non-financial sector businesses and households) access to central bank accounts. This model could materially affect the current relationship between central banks and commercial banks, as funds could move from commercial bank deposits to CBDC if CBDC effectively gives the general public full access to central bank accounts.



Notes: The Venn-diagram illustrates the four key properties of money: *issuer* (central bank or not); *form* (digital or physical); *accessibility* (widely or restricted) and *technology* (account-based or token-based). *CB* = central bank, *CBDC* = central bank digital currency (excluding digital central bank money already available to monetary counterparties and some non-monetary counterparties). *Private digital tokens (general purpose)* include crypto-assets and currencies, such as bitcoin and ethereum. *Bank deposits* are not widely accessible in all jurisdictions. For examples of how other forms of money may fit in the diagram, please refer to the source.

Source: BIS, 2018, "Central Bank Digital Currencies"

- CBDC can be account- or token-based, providing various degrees of anonymity and immediate settlement. Ultimately, design features would depend on financial integrity and stability considerations.

Central banks are considering what benefits central bank digital currency could bring to the payment system and monetary policy. The benefits of introduction of the central bank digital currency (CBDC) is very case specific, and the adoption of the CBDC will depend on attractiveness of alternatives (such as cash and CB reserves) from both the user and the central bank perspective (IMF, 2018b).

- *Payment system considerations.* Introducing the CBDC may allow the central bank to perform its role in insuring an effective payments infrastructure, including the issuance of currency. By replacing a part of notes and coins with CBDC, the costs of maintaining, transporting, replacing notes and coins would be reduced. A CBDC could also help improve financial inclusion, especially those individuals and small enterprises that have little or costly access to banking services.

- *Monetary policy considerations.* Depending on how wide access to CBDC is allowed and whether it is remunerated, some view that CBDC could strengthen the pass-through of the monetary policy rate to market rates, thus enhancing the effectiveness of monetary policy. In addition, CBDC may provide more timely information regarding money demand, which could be important for monetary targeting regimes. Some central banks are also concerned that the introduction and potential proliferation of private virtual currencies might erode the demand for central bank money and the transmission mechanism of monetary policy in the future. For some countries, additional considerations include potential implications of high dollarization and informality.

Many economies in the region expect that CBDC could strengthen the implementation of AML/CFT policy. Risks will vary greatly depending on the design features of CBDC. Given that the CBDC can allow for digital records and traces, and be designed to provide different degrees of anonymity, it could improve the application of rules aimed at AML/CFT and help reduce informal economic activities. However, such benefits may be small because illicit transactions and informal economic activities will not use a traceable and transparent CBDC. In addition, if CBDC were to be entirely anonymous or pseudonymous, it would provide no or little improvement over physical cash and could prove more vulnerable than current non-cash funds transfer systems. Central banks may also take the responsibility of the "know your customer," particularly in case of account-based digital currencies available to general public, so as not to risk reputation. In this context, the understanding and implementation of the revised FATF recommendations will be important (October 2018). Strong AML/CFT could include for instance effective identification of the user and beneficial owner, and monitoring and reporting of suspicious transactions. The users' legitimate rights to privacy can still be respected (e.g., by ensuring that user identity is not available to unauthorized third parties) as long as they do not impede effective AML/CFT action. Importantly, many questions remain unanswered at this stage, such as who should implement the AML/CFT measures in the context of a CBDC.

In addition to financial integrity risks, CBDC could involve other types of risks, such as operational risks arising from disruptions, cyberattacks, and potential disintermediation. Substitutability between CBDC and bank deposits could be viewed as much larger than that between CBDC and physical cash because CBDC can offer cheaper transaction costs. As a result, to attract deposits, banks may need to pay higher interest rates, which could squeeze their profits, especially if they face tougher competition with alternative lenders. Bank deposits may become more volatile, especially in the system without deposit insurance scheme. Or banks may need to rely more on wholesale funding. In either way, banks may become more susceptible to liquidity shocks, raising financial stability risk. While IMF 2018b provides initial insights, further work is needed, particularly in the context of regional financial landscape—involving high concentration, operational costs, and lending margins.

Overall, it is too early to draw firm conclusions on the net benefits of CBDC. Further analysis—focusing on technological feasibility, operational costs, payment systems, and the impact on monetary policy transmission, particularly in the presence of informality and dollarization—is needed.

Country Examples in the Region

As in other regions, several central banks in LAC are exploring the possibility of issuing CBDC. Motivations range from supporting economic development through increased financial inclusion, reducing the costs associated with physical cash, and limiting ML/FT activity.

Uruguay—E-Peso pilot program

The Central Bank of Uruguay implemented a successful retail CBDC pilot program. The legal tender digital currency issued by the central bank is called the E-Peso—which does not use distributed ledger technology. The pilot program was used to test the technical aspects and ran for six months (November 2017–April 2018), with limited digital note issuance ($20 million for 10,000 mobile users) and size per person ($30,000 per wallet and $200,000 for registered businesses). E-peso was mainly used for payment transactions in registered stores and businesses, and peer-to-peer transfers. The settlement was instantaneous, and it ran on mobile phones (no internet connection was needed). E-peso was anonymous but traceable by the central bank, with unique digital notes preventing double spending and manipulation.

Jurisdictions Where the Introduction of CBDC is Actively Considered 1/

North and Latin America and Caribbean	Asia and Pacific	Middle East and Africa	European
• Canada (R&W)	• Australia (R&W)	• Bahrain (R)	• Denmark (R)
• Ecuador (R)	• New Zealand (R)	• Iran	• Israel (R)
• Uruguay (R)	• Cambodia (W)	• Senegal (R)	• Netherlands (W)
• Venezuela	• China (R&W)	• Tunisia (R)	• Norway (R)
• Bahamas	• Hong Kong (R)	• South Africa (W)	• Russia (R)
• ECCU	• India (R)		• Sweden (R&W)
	• Indonesia (R)		• Switzerland (R)
	• Korea (R)		• U.K. (R)
	• Singapore (W)		
	• Thailand (W)		
	• Marshall Islands		

1/ Note: (R) indicates retail CBDC; and (W) indicates wholesale CBDC.

The central bank of Uruguay is one of the pioneers in the world in taking a proactive approach in evaluating the case for CBDC (IMF, 2018b). The central bank aims to reduce the transaction costs of cash (estimated at 0.6 percent of GDP), improve financial innovation by creating a supportive regulatory environment and infrastructure, and foster financial inclusion by reaching out to un-banked segments of the society through mobile networks. Before a wider implementation, the central bank will undertake additional work on the payment systems in Uruguay and the impact of CBDC on traditional banking system. More broadly, further analysis is needed to understand better (i) given Uruguay's monetary targeting framework, whether the E-peso has the potential to enhance the transmission mechanism as it provides more systematic and transparent information on money demand in real time; (ii) whether the use of E-Peso encourages innovation and competition in the financial sector, resulting in narrower lending spreads, and higher financial intermediation and inclusion, and avoiding disintermediation risks; (iii) the impact on dollarization and

exchange rate channels, given the demand for domestic and foreign assets is likely dominated by domestic and external fundamentals and shocks.

Eastern Caribbean Central Bank (ECCB)—Fintech Pilot Program in Collaboration with a Fintech Company

The ECCB is actively seeking the possibility of leveraging fintech to enhance economic growth. Specifically, the authorities expect gains from the introduction of CBDC, as printing and distributing physical cash across the monetary union is costly. Furthermore, the region continues to face challenges in strengthening the effectiveness of AML/CFT measures.

Against this backdrop, the ECCB is planning a pilot program. On February 21, 2019, the ECCB signed a contract with the Barbados-based fintech Bitt Inc. to conduct a CBDC pilot project (based on the blockchain technology) in the Eastern Caribbean Currency Union. The digital EC dollar will be distributed to financial institutions and used for financial transactions between customers and merchants, including peer-to-peer transactions, and across the ECCU economies. The pilot program is part of the ECCB's strategic plan, aimed at reducing physical cash by 50 percent, promoting greater financial sector stability, and expediting the growth and development of ECCU member economies.

Ecuador—The Case of a Dollarized Economy

Ecuador launched a retail CBDC project in 2014, but three years later, terminated the project. The government barred private companies (including mobile payment and fintech firms) to issue or deal with digital currencies and passed a law to introduce the central bank electronic money system in mid-2014. The law allowed the public to open accounts at the Ecuadorian Central Bank and use these accounts for payments using their mobile phone applications. Actual services started in February 2015. The government's stated intention was to reduce currency in circulation—as wear and tear of the bills implied a replacement cost for the BCE of about US$3 million per year—, foster financial inclusion, and help the poor, as dollar cash was relatively scarce and holding dollar cash had been expensive due to supply limitations.

Three years later, the government decided to terminate the project. People were reluctant to accept CBDC, and users did not grow much (White, 2018). By weighing the benefits and risks stemming from digital currencies, in December 2017, Ecuador's National Assembly passed legislation to abolish the central bank electronic money system and instead, allow the private sector to operate electronic mobile payment platforms.

Ecuador's experience could provide lessons, especially in the context of a dollarized economy. In particular, the form of money may not necessarily alter the underlying demand for domestic currency. Following crisis in the late 1990s—resulting in very high inflation (over 100 percent)—, the government officially dollarized the economy in January 2000. The introduction of CBDC could have been perceived by the public as a first step to restore

monetary autonomy. The government repeatedly reaffirmed its commitment to maintaining the dollarized monetary system and stressed that use of CBDC would be voluntary and that even public employees and state contractors would not be obliged to accept it in payments from the state. Despite the efforts to convince the public on the merit of CBDC, the demand for the CBDC did not materialize as expected.

Venezuela—Petro

Venezuela announced its plan to introduce "Petro". In February 2018, President Nicolas Maduro announced the launch of the oil-backed "Petro" digital currency, with ICO of about 100 million petro tokens (equivalent to US$6 billion). However, thus far, reportedly, ICO has not taken place.

B. Taxation

Fintech requires tax authorities to review their existing tax policy and legal frameworks and make changes accordingly. This can be done either through administering legal changes to existing tax laws, or by elaborating new interpretations of existing rules as they apply to fintech activities. The latter can take the form of statements (or position papers) such as a notice or a ruling issued by tax authorities, specifying the application of existing laws to fintech activities.

Most jurisdictions in Latin America and the Caribbean do not have public positions on taxation of fintech-related activities, and the few that do, rely primarily on existing legal frameworks. Today, there is no comprehensive source for taxation-related information specific to the region. While a detailed tabulation of fiscal positions by jurisdiction is not available, Box III presents general rules for tax treatment of fintech-related activities also applicable to the region.

Tax treatment of cryptocurrency trading/exchange depends on how cryptocurrencies are classified from a legal standpoint. In many cases, in the absence of specific statements by country authorities, explicit classification is unavailable. Select examples of cryptocurrency treatment by nations in the region are listed in the table below.

Examples of cryptocurrency treatment

Asset	Medium of exchange	Legal tender	Banned [1]
Brazil	Argentina	N/A	Bolivia
Chile	Bermuda		Ecuador
Mexico			
USA			
Colombia			

[1] In many jurisdictions, the illegality of a transaction does not negate the taxability of the gains derived from them, and therefore even in countries where cryptocurrencies are banned from the regulatory perspective, rules may need to be devised or the existing frameworks may need to be interpreted on how a crypto transaction ought to be taxed.

Box 4. Taxation Issues

If the supply of a cryptocurrency is treated as a supply of goods or services in countries with VAT/GST[1], cryptocurrency transactions are generally subject to VAT/GST (e.g. Singapore). Gains derived from trading in cryptocurrencies are generally taxable in accordance with first principles (i.e. capital gains tax if held as investment, income tax if held as part of trade or business).

If viewed as a transaction, where cryptocurrencies are interpreted as *legal tender/money/currency*, in countries with VAT/GST, such supplies are out-of-scope and not subject to VAT/GST. For example, in the European Union, certain transactions where certain type of cryptocurrencies were subjectively used as a means of payment are exempt from VAT. Gains derived from trading in cryptocurrencies are generally taxable in accordance with first principles (i.e. rules on gains or losses from foreign currency exchange apply).

As pertains to **cryptocurrency mining,** income tax treatment of block rewards from mining varies: Some jurisdictions fully tax block rewards received from mining as income (e.g. US, Israel), others only tax block rewards if mining activities amount to a trade or business or goes beyond mere speculation (e.g. Singapore, Australia, South Africa, Netherlands). Supply of mining "services" generally considered to be out-of-scope (i.e. not taxable) for VAT/GST purposes (e.g. United Kingdom and Germany).

Remuneration in cryptocurrency, airdrops to wallets, and initial coin offerings (ICOs): Remuneration paid in cryptocurrency generally subject to tax in the year of receipt and subject to pay-as-you-earn withholding where applicable (e.g. US, Australia, Netherlands, South Africa); no specific tax treatment for coins received during airdrops; no specific tax treatment on amounts raised during ICOs – likely to depend on the nature of tokens issued.

Taxation of person-to-person (P2P) activities is generally straightforward, although cross-country specificities exist. For example, under Brazilian regulation, P2P loan companies must act exclusively via electronic platforms, be incorporated as corporations, and have minimum paid-in capital and net worth of BRL 1 million at all times. They may also provide other services, such as credit analysis, loan collection and electronic money issue (Carrigues Digital).

More broadly, tax treatment of P2P activities is discussed below, by tax type:

Direct taxes

P2P sellers typically register as self-employed businesses and are responsible for self-reporting their income and tax liability to the tax authorities, with all deductions applicable to the self-employed. Typically, exemptions apply:

- Due to irregularity of engagement and small scale of many P2P sellers
- On some rental income (typically, if it is below a certain threshold)

Indirect taxes

In countries with VAT/GST, these will apply to the provision of goods and services in the P2P economy. Generally, the P2P platform is liable to discharge the tax on services provided by the sellers, although the question of who is liable is disputed by some authorities. Typically, exemptions apply:

- For businesses operating below a certain threshold of gross income
- On long-term residential rental income

Sources: Prepared by M. Rousset based on Carrigues Digital (2018) and Gupta and others (2017).
[1] In Latin America and the Caribbean, all countries have de facto VAT regimes except Brazil, Haiti and Suriname (according to a FAD database).

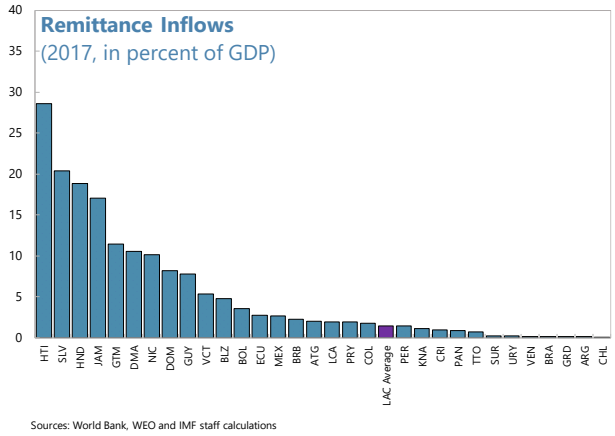
Box 4. Taxation Issues (concluded)

Other taxes

Some countries apply sector-specific taxes that would extend to P2P business operating in the sector. For example,

- Taxes applicable to hotel guests now extend to users in the P2P accommodation-rental sector
- Taxes targeted at the ridesharing sector, especially in the presence of license fees applicable to traditional taxi drivers

C. Cross-Border Payments

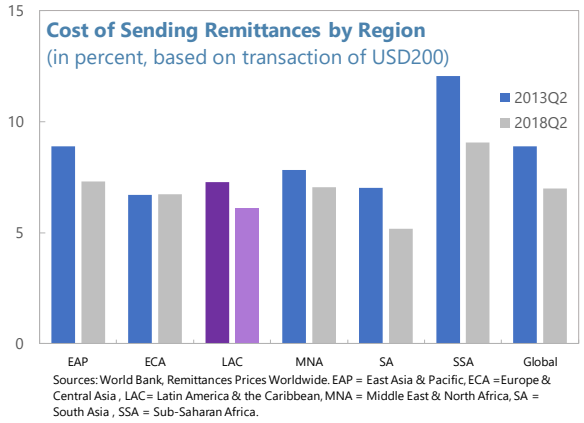


Sources: World Bank, WEO and IMF staff calculations

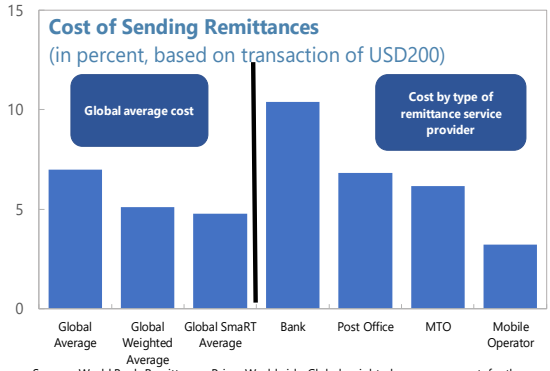
Fintech has the potential to improve efficiency and reduce the cost of cross-border transfers, an important source of income for many LAC countries. With LAC's large migrant population abroad sending home sizeable remittances (1.5 percent of regional output in 2017), the potential transformative impact of fintech on remittances may be particularly significant.[23] And the gains may accrue primarily to the region's relatively less developed economies in the Caribbean and Central America, whose remittance inflows dwarf those received by their South American neighbors. In four countries—El Salvador, Haiti, Honduras, and Jamaica—remittances received exceed 15 percent of GDP.

[23] See Beaton and others (2017) for an overview of historical emigration from the region and remittances received by LAC. Despite the importance of intraregional migration, LAC countries are not large senders of remittances, particularly when compared to the remittances they receive.

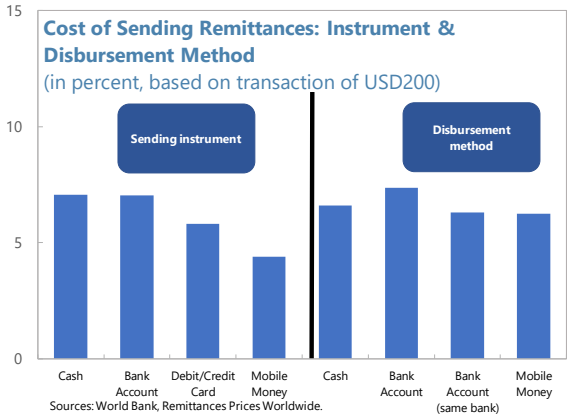
Sending remittances is still costly. Remittances remain costly to send as globally emigrants have continued to rely primarily on banks and money transfer operators (MTOs) to send remittances, funding transactions primarily with cash or their bank accounts.[24] The global average cost of sending US$200 in remittances was 6.99 percent as of 2018Q2.[25,26] The cost of sending remittances to LAC is lower than to other regions, except for South Asia, but, at 6.1 percent, remains substantial. Banks are the most expensive channel for migrants to send remittances, at 10.4 percent, while the costs of sending remittances through MTOs reached 6.2 percent. These costs are mirrored when comparing the cost of remittances by sending instrument and disbursement method (i.e. cash, bank account, mobile money etc.). By contrast, mobile operators and mobile money, a relatively new category of remittance service providers made possible by developments in fintech, transmit remittances at a relatively low-cost compared to other remittance service providers of 3.2 percent.



Sources: World Bank, Remittances Prices Worldwide. EAP = East Asia & Pacific, ECA =Europe & Central Asia , LAC= Latin America & the Caribbean, MNA = Middle East & North Africa, SA = South Asia , SSA = Sub-Saharan Africa.



Sources: World Bank, Remittances Prices Worldwide. Global weighted average accounts for the relative size of remittances sent between countries. Global SmaRT average is calculated with the three most cost effective services in each corridor.MTO = Money transfer operator. MTOs include both traditional service providers and innovative/fintech players.



Sources: World Bank, Remittances Prices Worldwide.

The high transaction costs of remittances reduce the money received by migrants' families in LAC. Based on the US$80.5 billion in officially recorded remittances to LAC in 2017, lowering the cost of remittances could significantly increase the funds received by

[24] While the market for MTOs includes many smaller operators, Western Union and MoneyGram are by far the largest players, operating in 99 and 92 percent of country corridors included in the World Bank's Remittance Prices Worldwide (RPW) database.

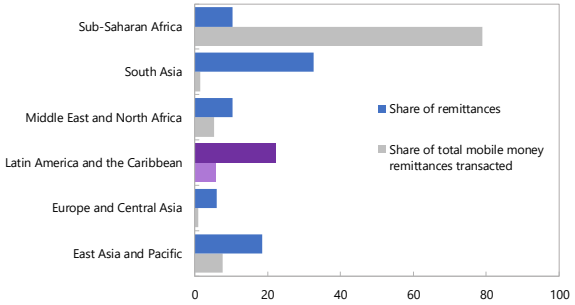
[25] The cost of sending remittances includes a transaction fee and a currency conversion fee, both typically paid by the sender, although some remittances-service providers may also require the recipient to pay a fee.

[26] Remittance corridors with larger remittances benefit from lower costs: the weighted average total cost, which accounts for the relative size of remittances sent between countries, is lower than the global average at 5.1 percent.

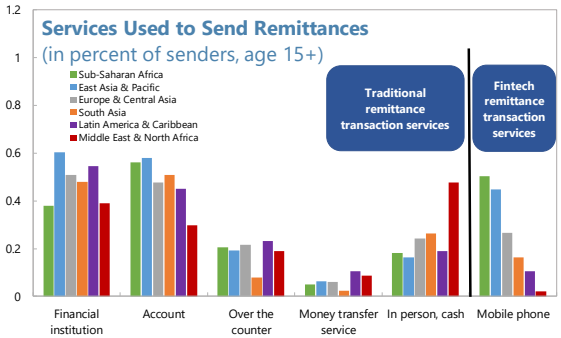
migrants' families back home. The United Nations has made lowering these transaction costs a priority; reducing them to less than 3 percent and eliminating remittance corridors with transaction costs higher than 5 percent by 2030 is a UN Sustainable Development goal. Existing efforts to lower remittances transaction costs have focused on enhancing competition in the market for remittances-service providers, which continues to be dominated by MTOs, and promoting the use of new payment technologies for sending remittances.

There is substantial scope to increase the share of remittances transferred to LAC with innovative technologies. An enhanced role for online and mobile payments in remittances may hold particular promise for reducing the cost of remittances to LAC. Despite the availability of existing technologies, mobile money is underutilized in LAC compared to other regions, both in terms of the services used to send and receive remittances.[27] As a result, LAC accounts for a much smaller share of world remittances transacted with mobile money than its share in total world remittances. This stands in stark contrast to SSA, the most advanced region in terms of the development of mobile money for remittances, accounts for the bulk of global mobile money remittance transactions and a much smaller share of world remittances.

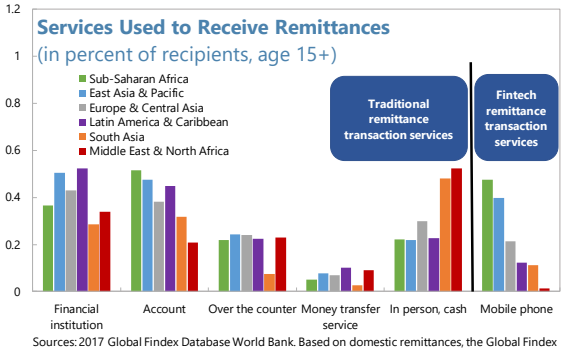
International Remittances Transmitted with Mobile Money
(in percent of total, 2017)



Sources: GSMA, World Bank and IMF staff calculations. Each region's share of remittances is calculated based on the World Bank remittances data using the same country coverage as in the GSMA data on the value of remittances transacted through mobile money.



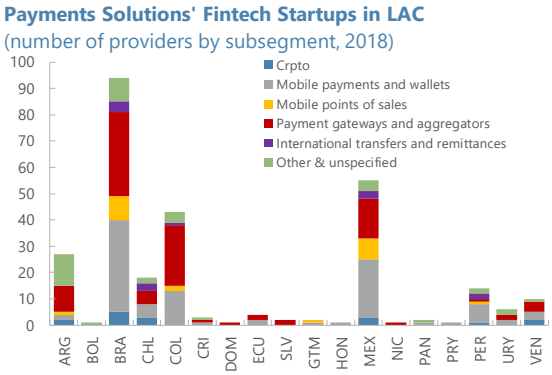
Sources: 2017 Global Findex Database World Bank. Based on domestic remittances, the Global Findex survey does not specifically cover international remittances. Over the counter transactions include all transactions conducted at any financial service provider in cash. Account transactions include both those conducted at a financial institution and those through mobile money when mobile money accounts are available.



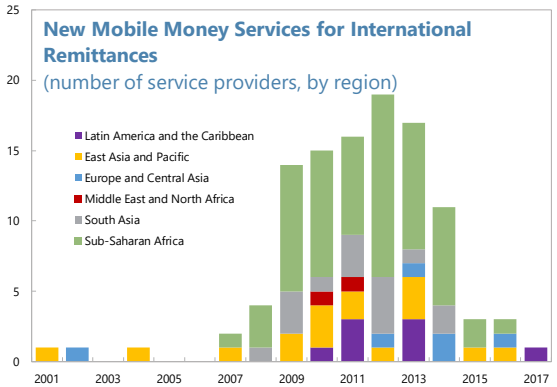
Sources: 2017 Global Findex Database World Bank. Based on domestic remittances, the Global Findex survey does not specifically cover international remittances. Over the counter transactions include all transactions conducted at any financial service provider in cash. Account transactions may include both those conducted at a financial institution and those through mobile money when mobile money accounts are available.

[27] According to the World Bank's Global Findex Database, the percent of both senders and receivers of remittances that use mobile money for remittance transactions is low compared to most other regions. While the Global Findex Database focuses on domestic remittances (rather than cross-border), the low take-up of mobile money services for domestic P2P transfers, which tends to develop before cross-border transactions, is an indication that such services are also underutilized for cross-border transactions.

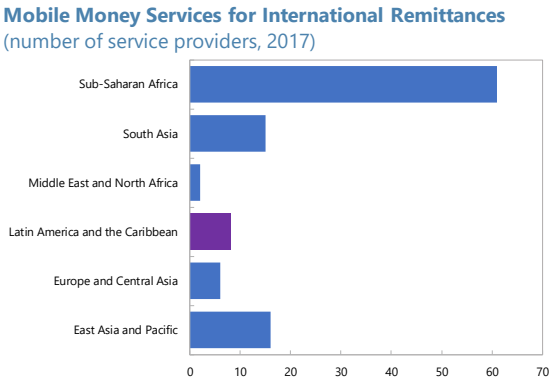
Despite the size of remittances received by the region, fintech activity in cross-border payment technologies within LAC remains limited. While payments solutions are one of the most important fintech segments in LAC, very few payments' startups are focused on international transfers and remittances. Of the 285 startups identified by IDB/Finnovista (2018) focused on the development of payment solutions in LAC, only 13 are focused on international transfers and remittances. With little fintech startup activity focused on cross-border payments, mobile money services for international remittances—the cheapest way to remit – are not widely available in LAC. New services have started to come on board in the last few years, but the number of mobile money remittance service providers remains limited, particularly compared to other regions. Such services are also active in only a select few LAC countries according to the mobile money deployment tracker of the GSMA (Table 2), with the available services having developed mainly in partnership with existing remittances service providers (both banks and MTOs). Promisingly, global fintech companies focused on money transfer services – mainly remittances – have also begun to serve LAC. For example, *World Remit*, an online financial institution regulated by the UK's FCA that partners with MNOs, MTOs and banks, is available in most LAC countries and *TransferWise*, a P2P transactions company is available in select countries in the region (e.g. Brazil, Chile, Mexico).



Sources: IDB/Finnovista 2018. Based on a sample of firms surveyed by Finnovista. Does not capture all Fintech startups in LAC, for which complete data is unavailable.



Sources: GSMA Mobile Money Deployment Tracker and IMF staff calculations.



Sources: GSMA Mobile Money Deployment Tracker and IMF staff calculations.

Table 2. Mobile Money Services for Cross-Border Remittances in LAC

Mobile Money Service	Partner	Country	Send Remittances	Receive Remittances
Ahorro a la Mano (BanColombia)	SogeBank	Haiti	x	x
DaviPlata	Davivienda	Colombia	x	x
GK mPay (GraceKennedy Money Services)	Dolex, Intermex, Ria, Transfast, Uniteller, Viamericas, Smallworld, Monty Global Payments	Colombia	x	x
Lajancash (Haitipay)	Banque Nationale de Credit	Haiti	x	x
Mon Cash (Digicel)		Jamaica		x
Tigo Money (Tigo Millicom)	Western Union, MoneyGram	El Salvador		x
Tigo Money (Tigo Millicom)	Western Union	Guatemala		x
Tigo Money (Tigo Millicom)	E FECTIVO ESPM SA	Bolivia		x

Source: GSMA Mobile Money Deployment Tracker. Based on information from the membership of the GSMA, which represents over 750 mobile operators worldwide.

The further development of innovative technologies like mobile money for cross-border transactions in LAC could occur through several alternative channels.[28] First, existing mobile network operators (MNOs) with international networks could leverage their services in different countries by acting as end-to-end payment service providers. Second, multiple MNOs across jurisdictions could enter into agreements with payment service providers or with traditional MTOs or banks – as has already started to occur in LAC. Third, MNOs from different jurisdictions could agree to exchange payment or partner with traditional or online mobile payments operators or global remittance hubs.[29] In practice, in LAC, as well as globally, development is likely to simultaneously occur along these three avenues and will depend on the progress with the widespread diffusion of mobile phones and transaction accounts in the region. A key advantage for LAC, but one that may also present its own financial stability challenges, is that the increased role of mobile service providers along these lines would circumvent the traditional role of correspondent banks in the clearing and settlement of transactions through banks and MTOs.[30] This may be particularly important for LAC as the withdrawal of global banks from correspondent banking has curtailed some MTOs ability to maintain their correspondent banking relationships, with some evidence that remittances to LAC have been negatively affected.[31]

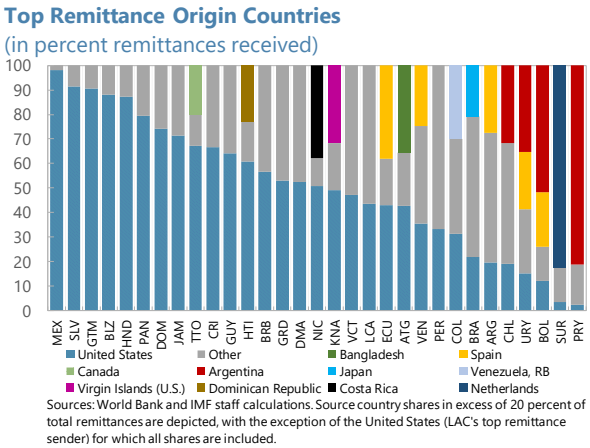
[28] See BIS (2018) and IMF (2017b) for a more complete discussion of these channels.

[29] Global remittance hubs connect remittance service providers to facilitate transfers. Existing hubs include HomeSend, MFS Africa, TerraPay and TransferTo.

[30] DLT-based systems for cross-border remittance transfers may also have the same benefit if banks are able to bypass correspondent banks and transact directly.

[31] 60 percent of the Asociación de Supervisores Bancarios de las Américas reported that remittances to LAC have been affected by the withdrawal of global banks from correspondent banking.

A supportive regulatory environment will also be important to help spur the development of fintech solutions for remittances transfer in LAC. With remittances to LAC overwhelmingly originating from the United States, supportive regulation from both the United States and the region's recipient countries is important. From the perspective of the United States, regulation over money transmitters, which includes traditional MTOs as well as firms involved in innovative, technology-based money transmissions, is at the state level. Such lack of regulatory harmonization can be costly for firms and may hinder development of fintech solutions for cross-border transfers like remittances.[32] From the recipient country perspective, it will also be important to remove regulatory burdens that may hinder development. Unifying licenses for mobile money and international remittances and licensing remittance service providers to both send and received cross-border payments are potential options in countries where existing legislation requires separate licenses.[33] Similarly, countries can support partnerships between traditional MTOs with established networks and mobile money providers (e.g. *Western Union* partnerships with *Tigo* money in LAC) or with global remittance hubs to connect with other remittance service providers and help to lower costs.



VI. Security Issues and Cyber Risk

LAC is, on average, less exposed to cyberthreats than some other regions. Reasons for this include modest internet penetration in many countries (only about half of the population has access to and uses the internet);[34] the degree of digitalization (especially in government), is considerably below the global average; and mobile banking is less popular than in many other countries. Nevertheless, recently a series of important cyberattacks affected the more developed financial systems in the region (such as Chile and Mexico). While these incidents

[32] See US Department of the Treasury "A Financial System That Creates Economic Opportunities: Nonbank Financials, Fintech and Innovation".

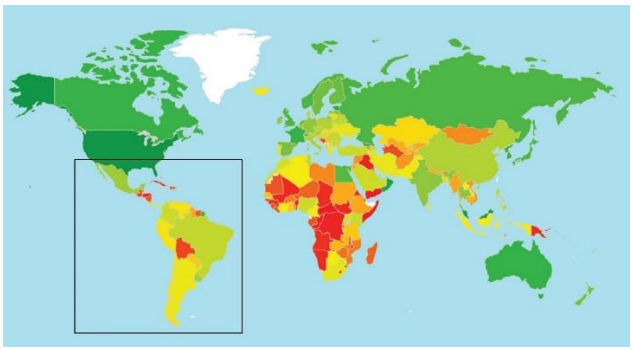
[33] See GSMA "Licensing mobile money remittances providers: Early lessons" (https://www.gsma.com/mobilefordevelopment/programme/mobile-money/licensing-mobile-money-remittance-providers-early-lessons-2/) for more detailed discussion of potential barriers to development from licensing requirements.

[34] According to the World Economic Forum's *Global Information Technology Report 2015*, "most countries in the region fall within the bottom half of percentage of citizens who are Internet users." Even the large economies only fall in the middle of the pack with only 45% of Mexicans being internet users and only one in three households having internet access. Much of Central America fairs even more poorly on Internet usage and access rates.

did not become large enough to induce financial stability issues, the events underline the importance of strengthening cybersecurity frameworks in the region.

Important steps have been taken by a handful of countries, but the region needs to increase its commitments to improve cybersecurity. According to IDB and Finnovista (2018), 80 percent of Fintech companies in Latin America see cybersecurity as a threat. About half of the region's fintech startups already have in place contingency plans for cyber events. In contrast to the U.S., cyber insurance plays only a minor role in the market. Figure 11 illustrates the extent to which countries have committed to increase cybersecurity. The measure used here is the *Global Cybersecurity Index*[35] (GCI)—a survey performed by the International Telecommunication Union (ITU), the United Nations agency for information and communication technologies. The index measures the commitment of countries to strengthen cybersecurity, quantified as a mix of quantitative and qualitative data. The GCI comprises five pillars (legal, technical, organizational, capacity building and cooperation) and, for each of these pillars index values computed. (see ITU, 2017, p.9-11).

Figure 11: Global Cybersecurity Index (2016 Data)



Source: ITU (2017).

The deficiencies in LAC are broad-based. Especially with respect to capacity building, there is a long way to go. Table 3 shows for different regions of the world the GCI disaggregated into sub-indices (legal, technical, organizational, capacity building, and cooperation). High numbers (green color code) signal strong commitment to increase cybersecurity, low values (red, orange colors) mean weak and very weak commitment.[36]

[35] The GCI is published by the International Telecommunication Union (ITU), the United Nation's agency for information and communication technologies. In the survey, 134 countries responded to the questionnaire. A group of experts then weighted the questions and constructed the index. Countries that did not respond to the survey were given the opportunity to validate the ITU's own estimates of the countries' commitment to increase cybersecurity.

[36] The table gives z-scores [0;1] for each sub-index of the GCI, averaged over all countries in a region.

However, the dispersion across LAC is particularly wide. According to ITU (2017), Mexico and Uruguay have the strongest commitment to increase cybersecurity, ranking just behind Canada and the United States. Mexico could still improve cooperation and organizational measures; and Uruguay could strengthen and improve organizational and legal measures (Figure 12). However, the GCI index may not reflect all measures taken by countries since 2017. For instance, Trinidad and Tobago passed cybercrime legislation, which is not included in the 2017 GCI scores. Similarly, Brazil also passed data protection and cybersecurity legislation and regulation.[37] Chile is in the process of preparing new cybersecurity legislation aimed at enhancing information sharing, detection, and response.[38]

Table 3. Commitment to Increase Cybersecurity, by Region (2015)

ITU Global Cybersecurity Sub-Indices (Average)

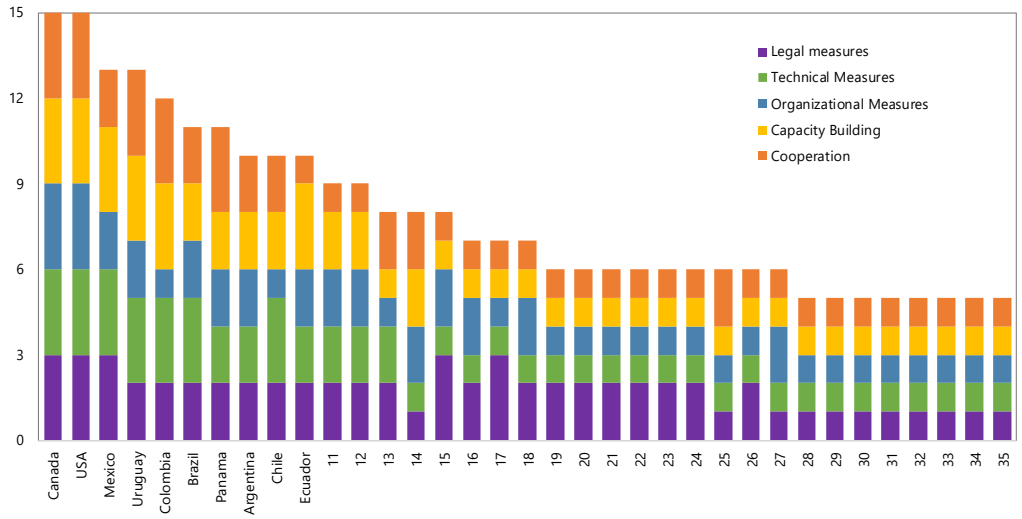
Region	Legal	Technical	Organizational	Capacity Building	Cooperation
Africa	0.29	0.18	0.16	0.17	0.25
Americas	0.40	0.30	0.24	0.28	0.26
Arabia	0.44	0.33	0.27	0.34	0.29
Asia Pacific	0.43	0.38	0.31	0.34	0.39
CIS /1	0.58	0.42	0.37	0.38	0.40
Europe	0.62	0.61	0.45	0.50	0.47

Source: ITU (2015).
Notes: The table gives z-scores [0;1] for each sub-index of the GCI, averaged over all countries in a region. Low numbers signal weaknesses, high number strengths. /1 Commonwealth of Independent States.

[37] For cybersecurity please see the Central Bank of Resolution 4.658/2018. On data protection, a draft law was approved in Parliament last year ("Projeto de Lei 13.709", see http://www.planalto.gov.br/ccivil_03/_Ato2015-2018/2018/Lei/L13709.htm) to strengthen data protection. The law will enter into force in 2020.

[38] There may be further measures that have been taken by countries but are not reflected yet in the GCI.

Figure 12. Cybersecurity across Selected Countries (2016 Data)



Source: ITU (2017).

Notes: The table shows for each country the sub-indices of the GCI. The larger a bar, the higher the sub-index value. The traffic light system used in ITU (2017) is translated into the numbers 1, 2, 3, with 3 indicating the strongest commitment to increase cybersecurity. The sub-indices' values are then aggregated, with the top score being 15 (3x5). The top-ranking 12 countries are identified by name, while the others are anonymized.

Specific weaknesses in LAC include:[39]

- *Legislation and regulation*: In many LAC countries, national cybercrime legislation is either weak or still inexistent.

- *Capacity and standards*: Skill levels with respect to cybersecurity are below average and cyber literacy is also relatively low. Separately, the availability of innovative technologies also lags many peer countries.

- *Strategy and institutional setup*: Most countries in the region established or are in the process of formulating a cybersecurity strategy. Cyberspace needs to be organized institutionally, with agencies performing regular audits of networks and systems.

Which policy measures should authorities in countries with deficits take to address these weaknesses? First, comprehensive *legislation* needs to be passed, covering both substantive law and procedural law. Legislation needs to be formulated in a technology-neutral way, so that the rules are relatively immune to inevitable changes in technology (i.e., laws should not be designed in a way that they only apply to specific technologies). Furthermore, national legislation needs to be compatible and, to the extent possible, harmonized with international law as a basis for cross-border cooperation. The *Budapest*

[39] IADB (2016), ITU (2015, 2017), Kopp and others (2017).

Convention on Cybercrime[40] has become the starting point for many countries' legal framework for cybersecurity.

Second, *organizational and institutional setups* need to be strengthened. Today, most countries already have or are in the process of formulating a cybersecurity strategy. This often includes the national security dimension of cyber risk. However, several Latin American countries have not yet started this process. Separately, the institutional approach has crystallized as an effective measure to coordinate and implement cybersecurity strategies: One or more dedicated agencies approve plans, programs, reports, procedures, principles and standards. The agencies then ensure proper application and implementation, while fostering coordination.

Third, *capacity building* will be key to improving cyber resilience. This is an area where Latin American countries score especially poorly compared to other regions. Capacity building includes staff training, capacity transfer, and cooperation with other, ideally more advanced countries. The United States, for instance, has in the past provided technical assistance to countries in the region.

Fourth, developing and achieving international *minimum standards* can send a very positive signal, especially to other countries. Certification can be a useful tool to prove that certain standards have been achieved.[41]

And fifth, the region needs to step up its *investments in technology* as, otherwise, LAC countries will fall behind even further.

VII. CONCLUSIONS AND FUTURE RESEARCH

This paper presented the fintech landscape in LAC. Fintech activity is characterized by considerable variation across the globe, and LAC is no exception. While developed countries with mature financial sectors tend to be at the forefront of innovation (Claessens and others, 2018), it is low income and emerging market economies who can benefit disproportionally from fintech innovations. Fintech investment in the region has seen impressive increase, but it still lags the boom seen in some emerging markets in Asia and Eastern Europe. Fintech provides opportunities for many, including for the least financially developed countries, since

[40] As of August 30, 2018, the following LAC countries ratified the Budapest Convention: Argentina, Chile, Costa Rica, Dominican Republic, Panama, Paraguay. In North America, only Mexico has not ratified the Convention.

[41] See Council of Europe (2004). Brazil, for instance, uses three different *Computer Emergency Response Teams* (CERT): the national CERT, a government CSIRT and a sector specific SCIRT (see ITU, 2017). The Brazil Federal Police participates in the I-24/7 global police communications system developed by Interpol to connect law enforcement officers, including cybercrimes.

it allows technological leapfrogging, as exemplified by the rapid development of mobile payment systems in Africa and Pacific Islands (IMF 2018a).[42]

Fintech has the potential to improve payment systems and intermediation in the region. Payment systems and alternative financing are evolving rapidly and among the largest and fastest-growing fintech areas in LAC. However, the adoption of mobile money services, cross border transfers, and fintech credit remain limited, suggesting that there is still considerable room for boosting financial inclusion and development through the adoption of new technologies.

The rise of fintech poses challenges for policy makers in the region. This reflects new and not-well-understood business models, lack of data and sufficient resources. Nevertheless, many regulators in the region have already taken steps to contain risks to the financial system and consumers, while encouraging innovation. Similarly, many central banks are evaluating benefits and risks of central bank digital currencies.

As financial technologies develop at an accelerating pace in the region, little is known about how new technologies will affect financial market structure and how the policies should respond. It is yet to be seen what impact fintech might have on the structure of LAC financial systems and how the adoption of new technologies will take place. In this context, there are many open questions, including the following:

- Will fintech foster competition and improve intermediation in banking systems in the region that are characterized by high concentration and low competition, and as a result, reduce borrowing costs and improve intermediation?

- How best to reshape regulation and supervision to encourage competition and innovation while containing risks and ensuring a level playing field?

- How can LAC leverage fintech further to facilitate cross border remittances transfers, particularly in the wake of declining correspondent banking relationships while ensuring financial integrity?

- Do central bank digital currencies constitute good alternatives for LAC to replace physical cash when it comes to improving financial inclusion, particularly in the presence of informality and dollarization?

- What are the risks stemming from increased crypto-asset presence? How can small countries, with limited human capital and technical resources reap the benefits while limiting risks?

[42] Leapfrogging refers to the adoption of the latest form of a technology while bypassing one or more of its antecedents.

- Can better data and new technologies (such as on SME's financial situation) be leveraged to reduce informality?

This paper is a first step towards understanding the key issues related to the rapid evolution of fintech in the region. The paper provides a comprehensive overview of the fintech landscape in the region and lays out new opportunities and key challenges introduced by new and rapidly evolving financial technologies. This sets the ground for further analysis on the remaining open questions, as listed above, which will be the subject of forthcoming research.

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Annex I. Fintech: Potential Financial and Operation Risks

	Possible Channels
Financial risk	
Maturity mismatch	Maturity mismatches could arise through securitization or if lending platforms were to start using their own balance sheet to intermediate funds.
Leverage	Not typically associated with fintech activities in their current form, but there are some cases where it could arise temporarily. For example, in some cases, fintech business and consumer lending or equity crowdfunding platforms may borrow funds in order to finance temporary holdings (or "warehousing") of bond or equity issuance.
Operational risk	
Governance and process control	Fintech companies that fall outside the regulatory perimeter or are subject to lower regulatory or supervisory standards, such as some third parties offering services to regulated financial institutions, may not be subject to the same level of oversight or scrutiny of their governance and business processes to which regulated financial institutions are subject.
Cyber risks	The susceptibility of financial activity to cyber-attacks is likely to be higher the more the systems of different institutions are connected, amongst which there is a weak link. In general, greater use of technology and digital solutions expand the range and number of entry points cyber hackers might target.
Third-part reliance	Some fintech activities could increase third-party reliance within the financial system—for example, cloud computing services could be provided by a limited number of parties, which could have significant implications for a range of cloud-based financial services in the event of operational issues. Disruptions to these types of third-party services— perhaps due to operational difficulties—are more likely to pose systemic risks the more central these third parties are in linking together multiple systemically important institutions or markets.

Legal and regulatory risk	To the extent that fintech activities are innovative and are not covered by existing legislation, legal and regulatory frameworks may need to adapt. For instance, there are issues of legal uncertainty related to fintech innovations such as smart contracts or robo-advisors. Blockchain has also raised questions, such as data privacy concerns across jurisdictions, and identifying the location of an asset when no one bank or entity is the custodian of the record.

Source*:* FSB, 2017, "Financial Stability Implications from Fintech."