Policy report on FinTech data gaps

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A B S T R A C T

This document aims to provide an overview of the main issues related to data gaps to facilitate monitoring of FinTech and overcome the significant challenges towards incorporating FinTech activities in regular statistics. Moreover, the document explains the implications of data gaps on some of the Central Banks' main areas, in particular, monetary policy, financial stability, payment systems, and economic activity. Additionally, other implications related to the activity of BigTech companies, the impact of COVID-19 and Cybersecurity issues are explained, which represent an important challenge for data gathering at Central Banks. Also, it describes the main findings of the Irving Fisher Committee (IFC) survey "Central Banks and FinTech data" based on the answers provided by Latin American and Caribbean (LAC) countries, which identify their different positions regarding this topic and the current initiatives that each one is launching. Finally, a number of next steps are proposed based on a policy discussion and how LAC countries could overcome data gaps and improve data collection based on their current experience.

1. Introduction

The global financial crisis (GFC) of 2007 revealed how important it is to be aware of global interconnections and to be up to date on the consequences of financial innovation. Since the crisis, the G20, through the Data Gaps Initiative (G20-DGI), has been studying information gaps in the financial system and identifying ways to close them.[1] Recent developments, such as the FinTech
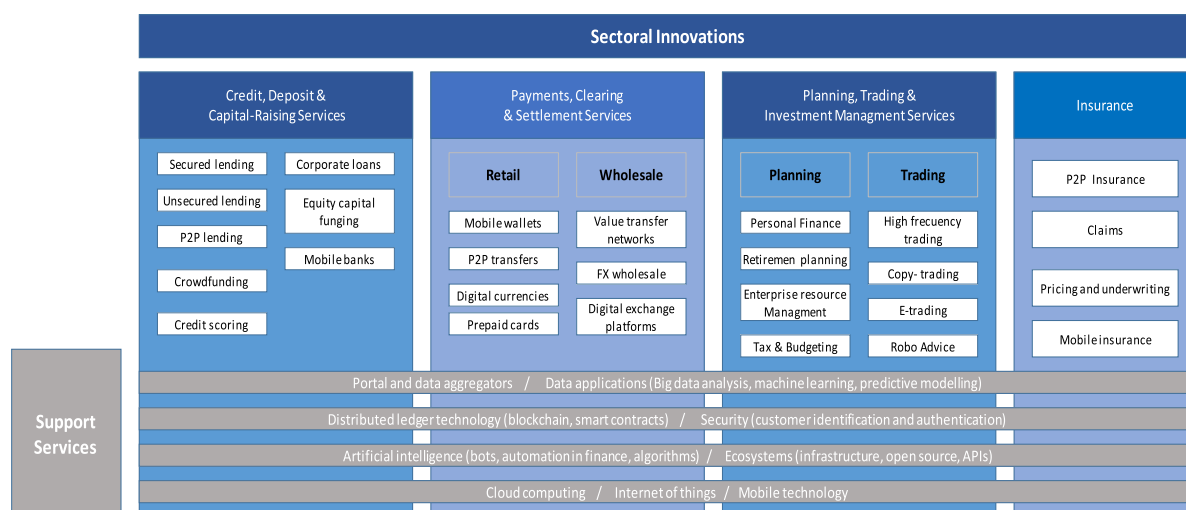

Fig. 1. FinTech activities.

Source: Own elaboration with information from Bank for International Settlements (BIS), International Association of Insurance Supervisors (IAIS) and International Organization of Securities Commissions (IOSCO).

activity,[2] should also be part of this analysis. For this reason, regulators and policy makers are working to determine the best ways to close data gaps resulting from the FinTech sector. In general, these gaps have been generated by activities performed by FinTech firms that lie outside the regulatory perimeter and are thus not obliged to provide information about their activities. In other cases, FinTech companies offer their services across borders, which means that they are not bound by the local reporting requirements of a single jurisdiction. Finally, in some cases, there are reporting procedures in place companies are subject to, but the scope of required information is narrow and does not produce enough data to allow monitoring or analysis of the effects of this industry on the financial system.

The variety and cross-sectional nature of FinTech activities (see Fig. 1) also leads to a problem of information classification, which may result in source of data gaps. FinTech companies might be either i) firms offering new or existing financial services or existing technology companies that have developed a financial service or provide back-end infrastructures or ii) traditional financial intermediaries offering a new set of technological products. Nevertheless, not all are registered as suppliers, so they are difficult to identify. Moreover, given the dynamism of the market, they may quickly change what services they provide or incorporate new ones.

All of the above makes the data gathering process difficult for central banks, which care about FinTech data gaps for two main reasons: first, FinTech activities could have important implications for the development and stability of the monetary and financial system and thus need to be properly identified, measured, and assessed. Second, as with many other economic activities, it is necessary to correctly monitor and classify this "new" type of economic activity in national accounts.

This document aims to provide an overview of the main issues related to data gaps to facilitate monitoring of FinTech and overcome the significant challenges of incorporating FinTech activities into regular statistics. Section 2 explains the impact of FinTech data gaps on some of the central banks' main areas, namely, monetary policy, financial stability, payment systems, and economic activity statistics. Other implications related to the activity of BigTech companies, the impact of COVID-19, and cybersecurity are also addressed. Section 3 presents the main results for the Latin American and Caribbean (LAC) countries from a survey conducted in close cooperation with the Irving Fisher Committee (IFC) on "*Central Banks and FinTech Data.*" Section 4 discusses how LAC countries could overcome data gaps and improve data collection. Finally, Section 5 presents conclusions.

2. Implication for Central Banks

This section discusses the possible implications, in terms of data gaps, that FinTech activities could have on monetary policy implementation and transmission, financial stability, regulation and oversight of financial markets infrastructures, and generation of economic and financial statistics.

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[2] Similar to other novel concepts, there are numerous definitions for FinTech. This document follows the FSB definition: "*Technologically enabled financial innovation that could result in new business models, applications, processes, or products with an associated material effect on financial markets and institutions and the provision of financial services.*"

2.1. Monetary policy and data gaps

Monetary policy consists of the decisions taken by the central bank in order to accomplish its main objectives: price stability and, in some cases, economic growth. Within this context, one of the pillars of modern monetary policy is the understanding of monetary transmission, i.e., the mechanism by which policy actions taken by the central bank are reflected in the economy's real sector, and therefore, guide the authorities towards their preferred direction (Gigineishvili, 2011).[3] Traditionally, this understanding has been obtained from the data gathered by central banks on the financial intermediation activity of commercial banks. Moreover, statistics on payment turnover have been a source of information regarding the levels of economic activity. However, by offering alternatives to traditional financial services, FinTech companies may hamper the ability of central banks to have a full picture of the above variables, impacting, as a result, the effectiveness of monetary policy.

On the one hand, thanks to technology and new business models, some FinTechs allow direct financing from savers to borrowers through peer-to-peer lending and crowdfunding activities. Even without FinTech companies, there is disintermediation that can affect the implementation of monetary policy. However, given the growth of the FinTech industry, this disintermediation phenomenon could become very important and could affect the transmission channels of monetary policy. These services may prevent, in a partial or complete manner, financial intermediation and may, thus, have an effect on the efficiency of the pass through between monetary policy decisions and other macroeconomic variables, which may influence the attainment of price stability.

On the other hand, cryptocurrencies and stablecoins—which are conceived as a medium of exchange, are issued and put in circulation by private agents on a decentralized global platform, and have a specific unit of account (Alfaro and Muñoz, 2019)—offer an alternative payment channel to sovereign currencies that could disturb the transmission of monetary policy (European Central Bank 2012). So far, as mentioned by Dabrowski and Janikowski (2018), despite the technological advances and global reach of digital currencies, this scenario is far from materializing since the currencies (still) have no broad credibility or stability. However, in extreme cases (hyperinflation, political turmoil, etc.), they could indeed become a means of currency substitution.

As such, there is a need to close these data gaps to determine the impact that the FinTech industry may have on the transmission effectiveness of monetary policy. That is, new monetary policy design and follow up will necessarily require that central banks know, in a detailed manner, the operations and transactions of FinTech firms, particularly in regard to their lending activity and the use of crypto-assets for payment purposes (Balyuk and Davydenko, 2018).

2.2. Financial stability

Financial stability can be understood as a condition in which financial institutions, markets, and their infrastructures facilitate the exchange of funds among deficit and surplus agents, with adequate risk management, thus contributing to the proper functioning of the economy and the achievement of sustainable economic growth. Proper functioning of the financial system also contributes to price stability, since it promotes a more efficient operation of monetary policy's transmission channels.

In this context, central banks need to be aware of the risks that FinTech could pose to the stability of the financial system without ignoring that FinTech credit activity could have benefits for financial stability (CGFS and FSB 2017).[4] Some of the positive potential impacts of FinTech on financial stability are the access to alternative funding sources[5]; the creation of credit hubs that allow the direct interaction between borrowers and savers; and the potential opportunity to foster financial inclusion or generate incentives to incumbent banks to improve the efficiency of the financial services they offer (Demirgüc-Kunt, 2017). In this case, as FinTech companies have the ability to process information in a faster and cheaper way, they could face fewer information asymmetry in their credit origination processes, which is at the heart of credit constraints.

FinTech risks for financial stability may stem from a wide range of sources. The possibility for end users and FinTech companies to become direct lenders exposes them to risks similar to those faced by regulated financial institutions, but they do not have the same level of experience or risk management capabilities. Additionally, their heavy reliance on algorithms and extensive use of large volumes of data (big data), as result of the innovative nature of their business models, could pose a risk if models are flawed or ill-calibrated. This aspect is more relevant for FinTech, as its technological platforms allow faster completion of transactions. The maturity transformation derived from FinTech lending activity could also be a source of risk if there are mismatches between investments and loans or if the investors experience unexpected liquidity constraints. Therefore, if data on FinTech credit activity is

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[3] Broadly speaking, economic literature has explained monetary policy transmission through five main channels: credit (balance sheet and bank loans), interest rates, asset prices (wealth effect), inflation expectations, and exchange rate. Some of these do not act independently but simultaneously or as complementary processes. In general, theoretical models depart from a scenario where there is a complete transmission from changes in monetary policy interest rate towards interest rates of the financial system. But the empirical evidence has shown that this pass through is incomplete; it has a lagged effect because of the market's structural characteristics such as its industrial organization, entry barriers, sunk costs, or regulations. Also, the way in which financial institutions perceive the changes in monetary policy may have different effects; for example, if they consider that the change is transitory, their incentive to modify their own interest rates in the same direction will be low.

[4] For further discussion of FinTech benefits and risks for financial stability, see Financial Stability Implications from FinTech Supervisory and Regulatory Issues that Merit Authorities' Attention. FSB, June 2017.

[5] P2P lending represents an alternative funding source that could foster diversification of credit risk and offer an alternative to the intermediation functions provided by a banking system.

not reported or somehow collected,[6] central banks will not be able to create an accurate picture of total indebtedness in the economy or make accurate assessments of financial risks (i.e., liquidity and credit risks), which would jeopardize their capacity to ensure the stability of the financial system.

Moreover, the use of new FinTech to facilitate investment services, such as wealth management or investment in mutual funds, has created opportunities for customers to automatically move their resources between different savings accounts, mutual funds, and other investment options to obtain better returns. While changes across accounts facilitated by FinTech services could increase the efficiency of wealth management and improve investors' potential for better returns, it could also reduce customer loyalty to a specific financial intermediary, as changing service providers would be faster and cost less. This would increase volatility in deposits, leading to higher liquidity risks; therefore, central banks need to have information on these services in order to properly assess potential contributors to instability.

The use of crypto assets might also be subject to liquidity risk, as these assets could be affected by speculative price bubbles (generated by the relatively good performance registered since its inception due to the innovative concept, the feasibility of channels to trade with them, etc.). In this regard, it is worth mentioning that the scale of the impact on financial stability would depend on the extent of the crypto assets' use. The Financial Stability Board (FSB) concluded,[7] "crypto assets do not pose a material risk to global financial stability presently, but vigilant monitoring is needed in light of the speed of market developments." Implementing this monitoring requires, among other things, the collection of accurate data on the use of crypto-assets.

Non-financial risks (for example, operational or cyber risk) of the FinTech sector could also affect financial stability, and central banks need to stay informed about these vulnerabilities. These risks could be amplified due to broader reliance on technology or if different firms rely on the same technology provider. Additionally, given that the FinTech sector makes intensive use of non-traditional data including personal data, other non-financial risks need to be considered, because information security issues, the misuse of personal data, or undesirable competition effects could undermine confidence in the financial system (Huoben et al., 2004).[8]

One relevant factor in the analysis of financial stability is the degree of interconnectedness in the financial system, as shocks spread more easily as interconnectedness increases. In this sense, while interconnectedness is not bad by itself, it is an important factor to measure and analyze to understand potential risks and how they could be propagated or amplified across the system (Martinez-Jaramillo et al., 2019). Any new development, such as FinTech, could bring additional interconnections and pose new risks or increase existing ones. For instance, risks generated by FinTech could spread to the financial system if financial intermediaries have direct exposures to FinTech entities (i.e., in the form of credit exposures or as shareholders) or indirect exposures if they have clients in common. The expansion of FinTech activity could generate larger transmission channels whereby risks generated by the FinTech industry could be spread to the wider financial system.

Therefore, central banks need to be able to identify and measure i) how FinTech interplays with regulated financial entities; ii) which vulnerabilities FinTech could introduce (or exacerbate); and iii) how shocks could be amplified and propagated throughout the financial system and to the real economy. A lack of visibility around these interdependencies and the risks they generate would hamper the central bank's function to ensure financial stability.

In conclusion, information is required to have a thorough understanding of all these potential risks and to perform, among others, contagion studies, systemic risk analysis, and stress testing. In particular, the data (microdata or aggregated) required include the following:

i The scale of the different types of FinTech activity. Traditionally this information is reflected in financial statements. Financial statements from FinTech companies would allow central banks to have clear knowledge about the different FinTech activities and their sizes. This data could also be reported using innovative procedures and estimated using micro data from FinTech transactions.
ii The characteristics of the financial services provided by FinTech to other financial entities and to other economic sectors.
iii The degree of interrelationships with other financial entities (funding).
iv The scale of the main economic sectors' credit exposure to FinTech (by activity).
v Common users of FinTech and other financial entities. This information would allow the measurement of potential structural changes to the financial system.

In addition to the above, detailed information on the characteristics of FinTech's business models would help clarify their specific risks.

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[6] For instance, there have been some recent initiatives that make use of novel databases to show facts of credit granted by FinTech (Cornelli et al., 2020). The metrics reported in the paper are growth in global volumes, growth in volumes by geography and, for some countries, information on interest rates, defaults, and profit margins.

[7] Financial Stability Board (2018), "Crypto-asset markets. Potential channels for future stability implications." Available at https://www.fsb.org/wp-content/uploads/P101018.pdf

[8] In a similar way to BigTech firms, the FinTech sector business model relies on the intensive use of personal data. See BIS (2019), "Big tech in finance: opportunities and risks," Annual Economic Report, Chapter III, for a deeper discussion on non-financial risks generated by the use of personal data.

Box 1

Wirecard: A recent case of FinTech data mismanagement.

Wirecard was founded in Munich in 1999 as a payment gateway for collecting card payments in online purchases. In 2006, it moved into banking as Wirecard Bank and began both issuing credit cards and handling money on behalf of merchants. This unusual hybrid of banking and non-banking (payment processing) operations made its accounts harder to compare with those of either banks or PSPs, exclusively.

After significant geographic expansion in Asia and major capitalization between 2011 and 2016, Wirecard was accused of market manipulation, and the German financial supervisory authority, BaFin, opened an investigation into the case. Notwithstanding the allegations, Wirecard announced its acquisition of the Citi prepaid payment card business to enter into the US payments market; the following year, it expanded the Citi card business to more than 10 countries in Asia. In parallel, Wirecard also developed new business lines based on contactless payment technology. By 2018, Wirecard was the first so-called FinTech to be listed on the DAX30, the stock index for the thirty largest companies of Germany.

Two years later, the Asia Wirecard legal group started an investigation of "round-tripping," a fraudulent scheme to divert money using third-parties. This set off two years of ups and downs in its market value and prompted continuous scrutiny from the press and financial regulatory authorities, resulting in audits to clarify whether financial information reported by the FinTech company had been manipulated. On June 19, 2020, Wirecard announced that nearly €2 billion were missing, confirming a multi-year accounting fraud by a growing and promising FinTech company.

Data mismanagement in this remarkable case occurred on two levels. First, on the regulatory level, notwithstanding the fact that Wirecard was subject to regulatory reporting requirements and public disclosures to investors, it was able to circumvent proper prudential oversight; data mismanagement practices stemmed from inappropriate accounting and reporting by the FinTech and related auditing firms, as the missing money was most likely associated with their inflated value and investor funding rather than with their core business lines. Financial authorities must always have a clear picture of exposures and the financial health of such large companies, and they must be able to monitor and enforce compliance among systemically important financial institutions on a verifiable basis. Second, on a payments level, Wirecard was able to divert money to third parties using unclear processing rules to mask intentionally fraudulent transfers; central banks and financial authorities must have oversight powers to closely monitor prominent domestic payment infrastructures, they must not focus solely on wholesale (large-value) payment and market infrastructures, and they must be able to address such practices to avoid spurring systemic consequences in the overall financial system.

Source: Financial Times.

2.3. Payment systems

Central banks are tasked with ensuring the safety and efficiency of the payment system (defined by the BIS as "*a set of instruments, procedures, and rules for the transfer of funds between or among participants*"). This function encompasses several tasks, from directly managing a payment system to monitoring the functioning of all relevant domestic payment systems, be they publicly offered or provided by the financial industry. To carry out this oversight function, central banks gather both qualitative and quantitative information from the companies managing the payment system or from the financial institutions themselves.

However, innovation has changed the current payments landscape internationally, and a complex ecosystem has resulted from the rise of new entrants, the unbundling of roles in the payments' value chain, and the emergence of innovative ways to make payments. When these new entrants and/or services do not fall under existing domestic regulation (e.g., many FinTech, BigTech, and crypto-asset providers), central banks cannot have a complete view of local payment activity, which impedes proper measurement of potential risks. Consequently, this scenario requires that authorities devote efforts to avoiding and minimizing data gaps, since information on the payments and market infrastructures is critical for central banks to carry out their oversight function.

Nevertheless, although closing data gaps is necessary to allow authorities to analyze risks to the payment system, this alone is not sufficient to preclude potential disruptions. Indeed, the analysis of data should be combined with thorough and frequent supervision of the sector. The Wirecard case is a remarkable recent example that demonstrates that closing data gaps is a necessary but not sufficient to avoid disruptions coming from the FinTech sector (see Box 1).

2.4. Economic and financial statistics

Due to typical institutional organization, in the production of the National Accounts Statistics report, central banks sometimes have to compile, in whole or in part, contributions to financial and non-financial accounts or disseminate information about the sectorization of units for the institutional sectors of the National Accounts. However, the emergence of both new technologies in the provision of services on the financial markets and alternative operators poses a significant challenge for the characterization and quantification of FinTech activityInternational Monetary Fund (IMF) 2009.[9]

The fact that there is no commonly accepted definition of the FinTech industry in the methodological manuals (National Accounts or Balance of Payments), is one reason that official statistics include so few data on FinTech. Some examples of potentially beneficial updates are modernization of the international classifications of economic activities and the establishment of a statistical solution for crypto-assets and their associated activities.

Furthermore, with a few exceptions, jurisdictions do not have official registers of FinTech firms since their activities do not require registration with a supervisory authority. Moreover, there are several factors that hamper the construction of exhaustive censuses of FinTech firms. In particular, FinTech firms have (i) a transversal nature with data from entities between financial and non-financial sectors, (ii) a high rate of births (new entities), (iii) a low survival rate in their first years of operation (at least in the case of small start-ups), and (iv) usual changes in the activities they carry out. Without a database of FinTech firms, central banks lack of an accurate view of the FinTech landscape and find it difficult to take it into account in the elaboration of economic and financial data.

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[9] An example is the difficulties computing FinTech activities in lending markets; in many cases, the financial brokerage business carried out by FinTech firms has no direct impact on their accounting statements.

Table 1

Relevant international and regional examples

Name	Core business	Principal financial services offered(deposits – D, payments – P, and lending – L)		Type of participation (stand-alone – S, joint-venture – J, and unknown – U)	Geographic working sphere
Mercado Libre	E-commerce	P	Mercado Pago	S	Argentina
		L	Mercado Crédito	S	Colombia
Amazon	E-commerce	P	Amazon Cash	S	**Mexico**
		L	Paga en 4	J	Spain
		L	Credit Line	J	Spain
		L	Amazon-Fintonic	J	Spain
Tigo / Movistar	Telecom	L	Movistar Money	J[30]	Spain
		P	Tigo Money	S	El Salvador
				S	Honduras
				S	Paraguay
Rappi	Delivery	P	RappiPay	J	Colombia
				U	Mexico
Google	Search engine	D	Cache	J	USA
MasMovil	Telecom	L	Xfera Consumer Finance	J[31]	Spain
Orange	Telecom	D	Orange Bank	S	France
					Belgium
					Spain
Vodafone	Telecom	D/P	M-pesa	S	7 countries in Africa[32]
Apple	Telecom	P	Apple Pay	S	Worldwide
Google	Search engine	P	Google Pay	S	Worldwide
Samsung	Telecom	P	Samsung Pay	S	Worldwide

[30] The product is known as Movistar Money and is offered through a financial institution that owned 50-50% by Movistar and Caixabank.

[31] Through a financial institution that is 49-51% owned by MasMovil and BNP Paribas.

[32] Kenya, Democratic Republic of Congo, Egypt, Ghana, Lesotho, Mozambique, and Tanzania

Accordingly, the statistical initiatives on FinTech sector would be enhanced significantly by (i) establishing an official register of FinTech firms at the national level and (ii) making the reporting obligations for these entities compatible with the information requests of traditional financial institutions.

2.5. Other implications

a) The role of BigTech

BigTechs[10] are positioning themselves as a particular type of FinTech entity by connecting their business model with features of financial services provision (initiation, authorization, notification, etc.). Broadly speaking, most BigTechs started with activities that support and provide payment-related services, either directly or in cooperation with traditional financial entities, then expanded into the provision of credit, savings, etc.[11] This expansion is explained given the comparative advantage in achieving economies of scale and scope in financial services provision afforded by their (commonly cross-border) platforms, messaging applications, and search engines as well as their expertise in analyzing information. A primary motivation for BigTechs to provide traditional financial services derives from the network effects that allow them to monetize the customer information they manage, which is collected through the different services they offer. This represents a new ecosystem in which financial services are not necessarily at the heart of the customer's experience (e.g., the payment services offered by Google, Amazon, Facebook, and Apple). In some cases, however, BigTechs have established dedicated intermediaries to focus on meeting financial customers' needs (Frost, 2019)—either with a holistic approach, such is the case of Tencent (WeBank) and Alibaba (MYbank) in Asia, or with a more focused aim, such as the payment and banking services provided in Africa by M-Pesa, owned by the UK telco Vodafone.

The presence of BigTechs in the financial industry is notably growing (Table 1 provides a list of several relevant international and regional examples). Thanks to their capacity to develop and implement proposals and their broad base of customers, they have the potential to change the financial landscape quickly and dramatically, possibly creating significant data gaps. The relevance of such gaps will depend on the business model BigTechs chose to follow:

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[10] In this report, we define BigTech as large existing companies whose primary activity is different than financial services but that have engaged in the provision of financial products, either directly or indirectly, as part of their core business lines, thanks to the intensive use of new technologies (Tanda and Schena, 2019).

[11] Tanda, Alessandra, Schena, Cristiana-Maria, "FinTech, BigTech and Banks. Digitalisation and Its Impact on Banking Business Models." Palgrave MacMillan Studies in Banking and Financial Institutions (2019).

- BigTech companies providing financial services in one-on-one relationships with customers. This is the scenario that could create the largest gaps if the financial or financial-like services offered by BigTechs fall outside the regulatory perimeter (e.g., credit granting in certain jurisdictions without being deposit takers) and neither the central bank nor other relevant authorities are able to monitor their activity and its potential implications for monetary and financial stability.[12]
- BigTech companies providing auxiliary services to traditional financial entities. This approach is becoming typical in most juris-dictions, as BigTech companies have comparative advantages that financial entities can exploit when the regulatory framework enables these third-party service providers to interact. The inclusion of BigTechs in the value chain of financial services could be a potential source of operational risk (e.g., if they mishandle customers' data), and relevant authorities usually have little or no information on how they operate. For instance, as a global platform, Google may support the integration of payment card infor-mation seamlessly into specific transactions. BigTechs do not yet handle an extensive amount of customers' data in this type of business model; however, authorities should continually monitor the development of such models in domestic markets, to detect and prevent data gaps and other unintended consequences for financial stability and consumer protection.
- BigTechs providing services in cooperative schemas with financial entities. This is a joint-venture business model in which a BigTech company and a traditional financial entity merge to produce a co-branded product. For this case, data gaps could be minimized if the financial authorities have set clear rules for the joint venture and the related auxiliary services connected to such co-branded products. This is an approach BigTechs have been exploring in and out of the LAC region. In a growing number of LAC jurisdictions, BigTechs are cooperating with incumbents to produce products ranging from delivery services to e-commerce, for which no additional data gaps have been perceived.

In light of the above scenarios, it is important for authorities to monitor the progress and functioning of BigTech companies, as their influence could be growing in an unsupervised fashion. As this raises several concerns for central banks and financial authorities, it is important that central banks be able to measure how systemic is the role of a BigTech. In other words, it would beneficial for authorities to have the capability to measure the influence of FinTech companies in the financial system. Such data would enable authorities to understand what new systemic interconnections and interdependencies may be created for each possible scenario.

b) **Cybersecurity**

Cybersecurity is a major responsibility for central banks, and it is a growing concern for the global financial system. In effect, the financial sector is at the forefront of cyber-attacks, as observed in international reports, which show 2 out of 10 cyber-attacks around the world occur in the financial industry, while in Asia this share rises to 4 out of 10. Furthermore, dwelling time has been reduced dramatically, to a point at which the absence of prevention and detection measures could cause major disruptions in wholesale payment systems' functioning and international financial systems. In view of this, central banks and other financial authorities are joining forces with the industry to build up cyber resilience frameworks for financial entities and market infrastructures (including third party service providers, when possible).[13] Special attention has been paid to promoting tasks that rely heavily on data gathering, such as incident detection and notification. But while these initiatives are useful to define a cyber strategy at the domestic level, significant data gaps around incidents, such as data needed to identify vulnerabilities, threats, and risks vectors, could impede the effective implementation of such a strategy or produce irrelevant results (Basel Committee on Banking Supervision, 2018)[14] (Aldasoro et al, 2021).

In this context, the international financial community acknowledges that cybersecurity is one of the most significant concerns around FinTech.[15] This is due to the fact that a growing number of financial systems' core and critical functions rely on technological aspects, which often require outsourcing to third-party service providers. Moreover, new market players are also entering the market through their key roles as final endpoints (e.g., becoming financial service providers). This is a direct source of vulnerability, as the transmission of sensitive data may be significantly compromised by attackers.

In addition, many of the activities held by such new entrants relate to software and support functions, in higher concentrations that could enlarge the cyber risks vector. In most cases, their relatively new and unknown place in the ecosystem may fall beyond current business rules and arrangements, and central banks may need to adjust to regulate such new service providers or related third

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[12] An interesting example relates to lending by a BigTech. Mercado Credito, for instance, may not fall under the regulatory perimeter, thus its intermediation activity is not reported, with potential consequences including immediate effect on credit statistics and credit risk, among others. Another case in point is a telco company providing financial services and operating completely out of the financial regulatory remit.

[1] Some initiatives are particularly noteworthy. The CPMI framework for cyber resilience in financial market infrastructures and the European Central Bank (ECB) Cyber Resilience Oversight Expectations (CROE) both comprise international guiding references. In March 2021, the Basel Committee on Banking Supervision (BCBS) published its Principles for Operational Resilience, which cover cyber incidents and other operational risk-related events.

[14] For instance, more information is needed on incident dynamics (i.e., evidence about how the incident happened, which vulnerabilities made it possible, how it was handled, etc.), testing, and penetration exercises carried out by financial institutions. BCBS and the FSB are laying the grounds for a coordinated framework for regulated entities to fulfill specific information requirements (e.g., incident response) that will support central banks in monitoring cyber risk. However, there is an evident need to keep reviewing whether the current regulatory requirements are sufficient and embrace the relevant stakeholders to maintain a broad and accurate picture of cyber threats, internationally and at the country level.

[15] References:CEMLA. "Key Aspects around Financial Technologies and Regulation Policy," report, June 2019. Available at: https://www.cemla.org/FinTech/docs/2019-06-KeyAspectsAroundFinancialTechandRegulation.pdfIIF-EY. "10th Annual IIF/EY Global Risk Management Survey", November 2019. Available at: https://www.iif.com/Publications/ID/3638/10th-Annual-IIFEY-Global-Risk-Management-SurveyFireEye. "M-Trends 2020". February 2020. Available at: https://content.fireeye.com/m-trends/rpt-m-trends-2020

parties. As a consequence, supervisors could lose sight of relevant information (e.g., incident reports, interconnectedness) to assess the adequacy of the existing controls for data (and money) management against cyber threats. Data on cyber-attacks are scarce. It is difficult to assess cyber losses[16] due to incomplete information in the datasets. To fill these data gaps, some private sector and international cooperation initiatives have been launched to foster the harmonization of data related to cyber-attacks (Bouveret, 2018).

c) COVID-19 and FinTech

As a final reflection, it should be acknowledged that the pandemic has had an impact on every aspect of the industry, and this translates into new opportunities and risks for FinTech organizations.

As regards opportunities, social distancing and confinement have encouraged increases in the consumption of digital services and e-commerce, the work field of FinTechs and most of BigTechs. This tendency will accelerate as society becomes more digitally literate in a post-COVID world, so FinTechs are well positioned to take advantage of the next wave of digitization. Since they are adept at quickly changing their business and operational models, they may be more prepared to cope with the pandemic consequences than are traditional financial institutions, which must deal with legacy technologies and models. In the particular case of BigTechs, these companies will likely emerge stronger after COVID-19, as society is reframed around digital services.

However, market conditions created by the pandemic have limited the flow of capital and investment to the FinTech sector. Now, FinTechs have to compete for capital not just against each other but also against a whole host of other businesses, which could prove a challenge that will probably lead to some degree of cooperation and market consolidation. This crisis will not affect all FinTechs equally, those who provide services around international money transfers depend on the global flow of capitals, whereas those around lending and funding individuals and businesses would depend on the extent that borrowers keep their ability to repay their loans and on credit demand channeled to the sector as economic activity recovers. BigTechs, on the other hand, were not as affected as smaller FinTech companies, so their role as potential transactional financial services providers could be intensified, with important regulatory implications.

In conclusion, the pandemic will probably result in greater opportunities for FinTech that could translate into more space for these companies and, consequently, result in an exacerbation of the data gaps identified above. Moreover, this crisis highlighted the importance of digital financial services' ability to respond to a changing environment, like the one presented by the pandemic, and FinTechs could be particularly welcome in the development of tools to distribute public measures to support more vulnerable households or to better identify small firms with viable business models that require funding. Moreover, they could develop different initiatives to improve digital identity, since this is an essential element of providing remote financial services.

3. Current situation

Using the survey on central banks and FinTech data conducted by the IFC on Central Bank Statistics, this section collects and summarizes information from 16 LAC countries and analyses several FinTech data issues (IFC 2019). Countries that participated in the survey include Argentina, Bolivia, Brazil, Belize, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Honduras, Jamaica, Mexico, Peru, Suriname, Trinidad & Tobago, and Uruguay.

3.1. Overview of common reporting practices from FinTech activities

The FinTech scene in Latin America is booming. For the past several years, FinTech start-ups have pushed development in the financial services sector, posing a challenge to incumbent institutions and their regulators.

For central banks, one of the challenges is statistical in nature. In the future, when these new forms of businesses become more prominent, the lack of information about them could become problematic. A majority of central banks stated that FinTech is already creating gaps in their statistics. These gaps are mainly created due to FinTechs' diversity and market size. According to the survey, in most countries, FinTech firms are emerging outside the regulatory perimeter, making it harder for regulators to access their information (Graph 1, see Appendix 3). This point might be of particular interest in the LAC region, as people outside the traditional financial system might use FinTech services, bringing the underserved population closer to the financial markets.

Regarding coordination within institutions, around 47% of central banks reported engaging in regular cooperation with other authorities on FinTech (Graph 2, see Appendix 3). For instance, the Central Bank of Chile reported communication regarding FinTech issues with the Financial Market Commission (CMF); the Ministry of Finance; the Ministry of Economy, Development, and Tourism; and the Financial Stability Council. The Central Bank of Mexico reported its cooperation with the National Banking and Securities Commission (CNBV) and the Ministry of Finance. Colombia reported collaborating with the Financial Supervisor and FinTech associations.

At the same time, Honduras coordinated with the Financial Innovation Bureau, which allowed the Central Bank of Honduras and the National Bank and Insurance Commission to identify new players and digital transformation challenges. Trinidad & Tobago reported coordination with the Financial Intelligence Unit and the Securities and Exchange Commission, and Jamaica reported coordination with the Financial Services Commission.

The abovementioned gaps affect different areas of central banks' statistics, but payment systems concentrate the most significant need for information. According to the survey, all central banks were interested in FinTech data regarding payment systems and

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[16] Direct losses: information security, confidentiality, integrity, and availability. Indirect losses such as reputation, business recovery and remediation, etc.

remittances (Graph 3, see Appendix 3). The above might be related to the rapid growth of alternative payment systems in the region, driven by mobile devices' massive penetration. The areas of monetary policy and banking supervision seem to have less need for FinTech data; this may be because FinTech services that could impact monetary policy transmission, such as crypto or digital currencies, are not yet developed to a large extent across the region (He et al., 2016).

3.2. Challenges and current initiatives to improve FinTech reporting

To address these gaps and needs, several central banks in the region have already begun monitoring FinTech firms. Graph 4 (see Appendix 3) shows the main initiatives currently being undertaken by central banks. Most countries have started to include FinTech in their legislation, analyze the sector through traditional sources of information like financial statements, and adjust reporting requirements. These measures constitute a good starting point for data collections. Another relevant source of information is FinTech associations; cooperation between regulators and associations could assist in the initial registration of these companies. In addition, some central banks reported using other information sources, such as internet data, through web-scraping techniques and application programming interfaces (APIs). These methodologies have the advantage of being less expensive and faster than traditional sources of information, which could be convenient for the first approach to this data (Graph 5, see Appendix 3).

Once central banks begin collecting FinTech-related data, the statistics divisions will face the challenge of including them in their classification systems and regular statistics. In order to do so correctly and comparably, international cooperation is crucial. Most central banks declared the importance of international initiatives such as clarifying statistical definitions and adjusting guidance on its compilation (Graph 6, see Appendix 3). In this regard, international organizations' opinions are key to clarify the treatment and classification of these new firms within the current statistical framework.

4. Policy discussion

This section points out the main policy implications in terms of data gaps and the related initiatives to close them. The main potential issues were identified to be further discussed and developed in LAC countries that consider them as policy recommendations. The issues identified can be grouped in four broad aspects: relying on alternative sources of information, broadening the regulatory perimeter, leveraging cooperation with other authorities, and making efficient information requirements.

4.1. Relying on alternative sources of information

The relative recent emergence of FinTech companies, their potential increasing participation in the financial system, and their innovative business models represent challenges to central banks, which must compile data on these financial participants without inhibiting innovation (Restoy, 2019). In this context, initiatives in some jurisdictions facilitate getting access to FinTech sector data without imposing a burden on these companies. For example, public (such as mercantile registers) and private sources (industry associations, private consultancy firms, and commercial data providers) could be used to compile information in certain jurisdictions. This approach was taken by Banco de España to build a database on FinTech firms for the production of statistics for the National Account.

New technologies could also be useful to close data gaps, and the use of innovative procedures and methods to compile information should be considered. For instance, web-scraping techniques could be used to obtain information directly from firms' websites or other internet pages that gather data on FinTech activities, allowing the construction of useful databases (e.g., there have been some recent initiatives (Cornelli et al., 2020))[17] that make use of novel databases to show the activity of FinTech companies in fields such as credit provision.

Furthermore, regulatory sandboxes[18] represent good sources of information about the general state of the market (i.e. new companies, services, technologies, business models, etc.) and to better understand the risks associated with these new developments and how to manage them (IMF, World Bank 2018).[19] These sandbox initiatives are emerging in many countries around the globe and, in the LAC region, in Bermuda, Brazil, Mexico, and Colombia. The Spanish sandbox was also recently launched, and although it is early to draw any conclusions, it can be expected to constitute a valuable source of information given the large number and the heterogeneity of the projects submitted in the first cohort (Cornelli et al., 2020).[20]

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[17] The metrics reported in the paper are growth in global volumes, growth in volumes by geography, and, for some countries, information on interest rates, defaults, and profit margins.

[18] A regulatory sandbox in the FinTech context refers to the framework in which financial innovators can operate in a live environment under the scrutiny of a regulator for a limited amount of time. First, it allows experiments to take place even where it is not possible at the outset to anticipate every risk or meet every regulatory requirement. Second, it provides an environment where if an experiment fails, it fails safely and cheaply within controlled boundaries, without widespread adverse consequences for the financial system. In these schemes, the applicant and the financial authorities jointly define the boundaries within which the experiment will take place, and then authorities determine the specific legal and regulatory requirements it is prepared to relax for the duration of the experiment within these boundaries.

[19] IMF/WB Bali FinTech Agenda, October 2018.

[20] See Cornelli et al (2020) to review the experience of sandboxes in other jurisdictions. The authors found an increase in capital over the next two years from entry into the sandbox. These results could be explained by a decrease in information asymmetries and regulatory costs. Thus, sandboxes are an effective instrument to be considered by policy makers to enhance innovation in the financial sector.

These alternative sources of data may prove particularly helpful in jurisdictions where the sector is small and does not represent a threat to the financial system. However, there is no guarantee that this is going to be the case in the medium term, and, in fact, the current growing trend points in a different direction. Therefore, there may be a need to also consider the development of more formal data gathering procedures.

The risks to financial stability may be dependent on the extent of interconnectedness of intermediaries within the financial system. Having access to FinTech data to identify potential impacts on financial stability could determine possible vulnerabilities and new vulnerabilities and contribute to the understanding of how potential shocks within the FinTech industry could impact the financial system.

4.2. Broadening the financial regulatory perimeter, when applicable, to include FinTech activity

Even though in some jurisdictions the sector is currently small and, at the moment, does not represent a threat to the financial system, the trend exhibited in recent years points towards an increased relevance in the medium term. In these cases, broadening the financial regulatory perimeter to include FinTech activity could be the first recommendation. Recognizing FinTech activities in national legislation would allow financial authorities to set data requirements for supervisory and financial stability purposes. This may mean including FinTech activities in existing regulation (i.e., make statistics and regulations activity-based). For instance, in some Latin American and Caribbean jurisdictions (e.g., Colombia, Paraguay, and Uruguay), e-money regulations have helped incorporate such business models by forcing telcos to set up non-bank financial institutions, in effect becoming e-money service providers.

In other cases, however, the activity FinTechs perform is completely new and not covered by any existing regulation, so regulatory agencies need to develop their own data reporting frameworks. In this sense, it will be also of significant importance to determine how flexible the requirements must be to accommodate this continuously changing landscape. National legislation should be focused on credit, deposits, and payments services, as well as on allowing other innovative models and disruptive technologies.

Implementing effective monetary policy requires a greater understanding of the transmission mechanisms and of where potential policy lags may exist. This assumes a context where banks and FinTech companies are utilizing more technology on different platforms. Capturing aggregate data alone may help policy makers not only focus on policy lags but also on what defines the aggregate data, as data gaps could skew the effects of certain policy tools and recommendations. Therefore, greater interest in FinTech data must be encouraged to determine the possible impact on the effectiveness of the transmission mechanisms.

Finally, FinTech should also be borne in mind when developing new regulation. For example, recently, the central banks of Aruba and Dominican Republic enacted regulation aimed at promoting more rigorous controls, policies, and measures of cyber risk management for domestic financial system participants, and this regulation invites the fostering of institutional culture and risk management with related third parties, which, in many cases, could be FinTech companies.

4.3. Leveraging cooperation between authorities and jurisdictions

The need for international cooperation to address new developments in the financial sector is a natural consequence of the cross-border nature of FinTech activity, and this is particularly true in the case of BigTechs. This has been highlighted, for instance, by the IMF (IMF 2017) and the World Bank.[21] Horizontal initiatives, like the Legal Entity Identifier, which aims to increase transparency in the markets by univocally identifying legal entities, could help close data gaps in the FinTech area.

Nevertheless, additional efforts specifically focused on this field (e.g., establishing an international register of FinTech firms), are needed as well. In this sense, current international cooperation and coordination arrangements among jurisdictions should be modified to address FinTech activity and, in particular, how to close FinTech data gaps by defining data management practices and standards for FinTech, which could include the following:

- Collaboration between various standard setting bodies to review and modify existing data collection standards.
- The use of tools such as FinTech sandboxes, which would not only aid central banks' understanding of the regulatory requirements of new technologies but to also provide a deeper understanding of the data gaps.
- The creation of a forum, at the local or regional level, that allows FinTech firms and central banks to share common reporting practices from FinTech activities. The objective would be to define various FinTech activities and data types.

The efforts of the Committee on Payments and Market Infrastructures (CPMI) to update its payment statistical reporting framework (Red Book Statistics) to reflect the substantial changes related to FinTech developments that have arisen over the past decade (e.g., role of non-banks, contactless payments, fast payments) serve as a perfect example in this regard, since Red Book is used as a reference by many jurisdictions. In particular, in 2001, CEMLA established a regional payment statistics framework using a similar methodological approach for Latin American and Caribbean central banks (the Yellow Book).[22] Although each LAC central bank has its own reporting

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[21] IMF/WB Bali FinTech Agenda, October 2018.

[22] Yellow Book Statistics is an annual publication about payments and financial market infrastructures in Latin American and Caribbean Countries. The Yellow Book provides detailed tables for each individual country as well as various comparative tables. For more information, see https://www.cemla.org/forodepagos/statistics.html. Queries related to Yellow Book Statistics can be directed to the WHF Secretariat: mmorales@cemla.org. This statistical framework is periodically used by CEMLA to assist national central banks in developing oversight and data reporting frameworks.

framework according to its domestic regulation and oversight duties, the Red Book and the Yellow Book provide meaningful guidance for national authorities to identify data needs relative to payments and market infrastructures businesses.

Beyond international cooperation, promoting inter-institutional coordination with other industries and relevant national authorities could also help in closing data gaps. While there are diverse national initiatives in this regard, the cybersecurity strategy of Mexico implemented in 2020 is an example of inter-institutional coordination.[23]

This data sharing among authorities, be it at national or at international level, is also essential in improving the efficiency of statistical initiatives while minimizing the reporting burden for the entities[24] (see Appendix 2). For instance, developing networks to share intelligence, such as the global Incident Response Team (CSIRT) that the FSB is currently working on, could help to fill data gaps on cyber events.

4.4. Designing efficient information requirements

When designing their reporting frameworks, central banks need to be mindful of the fact that reporting overload and unduly regulatory costs could inhibit innovation, so the right balance needs to be found. In this regard, there are several measures that central banks could consider, beyond setting up cooperation and data sharing arrangements as stated above. First and foremost, information requirements should be proportional to the size and relevance of the firm. Moreover, priorities should be established when addressing the closure of data gaps through the identification and monitoring of potential risks to FinTech that could impact financial stability or the operation of the payments system and those on which better knowledge of them could improve the understanding of monetary policy transmission channels.

Furthermore, in order to design an appropriate reporting framework, the implementation of observatories, FinTech hubs, laboratories or forums for cooperation, as well as the promotion of private-public dialogue could prove useful in allowing financial authorities to acquire knowledge of new business models. The use of sandboxes could also help authorities to define efficient data requirements.

Finally, new technologies could also raise the opportunity to implement new schemes to gather information (SupTech and RegTech)[5] that could improve the efficiency of the data collection process. For instance, new models to collect information, such as data hubs or the use of distributed ledger technology (DLT) may allow authorities to directly obtain granular data on FinTech activity. Modern techniques for data analytics, such as artificial intelligence algorithms, may also be leveraged, not only to analyze the compiled information, but also to close data gaps. Cagala (2017) evaluated the use and potential of machine learning not only to improve data quality management but to close data gaps by filling in missing values. The authors showed that a random forest algorithm performed better than predictions with Logit models. This finding brought new alternatives for central banks to established imputation methods. Finally, the adoption of homogenous interchange data standards would allow the collection of information through the use of new developments, such as APIs.

5. Conclusions and recommendations

As an emerging and sometimes disruptive industry, the FinTech sector creates data gaps which impact several of the main tasks performed at central banks, including monetary policy, financial stability, payment systems and economic and financial statistics, among others. According to the IFC survey sent to CEMLA members, Latin American and Caribbean central banks have reported that FinTech activities are creating gaps in their statistics because, notwithstanding that these firms are generally still too small, their diversity and the lack of regular information makes it difficult and challenging to include them within the classification system in central bank statistics. Additionally, most LAC countries highlighted that another cause for data gaps is that traditional financial intermediaries also provide FinTech services.

In the case of monetary policy, central banks must have a profound knowledge of how, and for how long, transmission mechanisms impact the economy. For this purpose, an accurate picture of the FinTech industry is crucial. The FinTech industry has implications on monetary policy because of its credit disintermediation role, additional to the new payment service innovations provided by these new players.

On the financial stability side, one of the relevant factors is the degree of interconnectedness in the financial system, as shocks could spread more easily as interconnectedness increases. While interconnectedness is not bad by itself, it is important to measure and analyze it in order to understand potential risks and be aware of how they could be propagated or amplified across the financial system. Also, given the nature of such participants, there is a need to build a detailed map of technological dependencies that can be used to study possible system-wide operational disruptions.

Regarding payment systems, innovations on payment services have dramatically changed the landscape at the national, regional, and international level and, in certain cases, central banks do not have a complete view local payment activity. This scenario requires, consequently, that authorities devote effort to avoiding or minimizing data gaps.

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[23] The Mexican Central Bank established a strategy, which is permanently coordinated with the National Council for Financial Stability and the Ministry of Finance. The strategy pays greater attention to overseeing channels and providers of data transmission as well as to fostering cyber intelligence sharing among the market infrastructures, financial entities, and third-party service providers, aiming at better coordination for incident response and prevention practices.

[24] IFC (2020).

[25] SupTech is the application of new technologies to help authorities improve their supervisory capabilities. RegTech is the application of new technologies by institutions to meet their regulatory requirements. (FSB, 2020).

Regarding the compilation of economic and financial statistics like the National Accounts or the Balance of Payments, the adequate registration of FinTech related activities poses a formidable challenge to central banks and statistical agencies. In this sense, the IFC recommendation to revise the International Standard Classification of All Economic Activities (ISIC) at the United Nations level with regard to section K ("Financial and insurance activities"), as formally submitted to the United Nations Statistical Division (UNSD) in 2019,[26] should be supported by central banks to achieve the ultimate goal of allowing that section K contain all activities with regard to the full value chain of financial intermediation, and provide all the relevant categories for integrating FinTech segments.

Cybersecurity as a growing concern for the global financial system, is an issue with which central banks are not necessarily tasked. However, the financial sector is at the forefront of cyber-attacks. The international financial community acknowledges that cybersecurity is one of the most significant concerns around FinTech. This can be explained by the risks related to FinTech due to the infrastructure that FinTech services provide to other financial entities, the clients, and links among them. In this context, cybersecurity risks could potentiate and spread to all the entities involved. For this reason, it is important to close the data gaps, so we can know the complete picture of FinTech services and their reach.

Another implication is the challenge that BigTechs represent for duties of the central banks and the data gaps which emerge in relation to their activities. BigTech companies are positioning themselves as a significant type of FinTech entity. These companies have not only important advantages like economies of scale and the cross-border nature of their platforms; the data they gather also arises from their users and the sophisticated data analytics they have developed.

Finally, all of these potential data gaps arising from increased FinTech activity in the financial system represent a challenge for financial authorities in the region. We would like to stress the importance of closing data gaps as necessary but not a sufficient condition to avoid disruptions related to the FinTech sector. International cooperation and the sharing of experiences between central banks can be valuable in defining useful information requirements, as well as in the design and implementation of efficient and consistent data management practices, in a way that supports innovation in the financial system.

Acknowledgements

Appendix 1. National experiences and initiatives on payment systems to close FinTech data gaps

Brazil

The Brazilian FinTech regulation framework focuses mainly on (i) payment services and (ii) the credit market. Regarding payment services, in the first decade of the 21st century, the Central Bank of Brazil (BCB) noticed the growing participation of non-financial institutions in the provision of payment services, especially through payment cards (both debit and credit), electronic money, and digital payments such as the those involving e-commerce or mobile devices.

Law 12,865 was published in October 2013. It defines relevant concepts to the Brazilian retail payment system, casting the bases for regulating payment schemes and establishing the principles and objectives regarding both payment institutions and schemes.

The BCB adopted a FinTech regulation that is proportional and does not refer to payment schemes below a specific threshold, to which the regulation could be too burdensome, inhibiting innovation.

After the aforementioned Law and regulation were enacted, the payment sector grew substantially. Since then, the merchant discount rate (MDR) has fallen, new payment products have been developed and the number of businesses (including street vendors) accepting payments via debit and credit card has increased significantly.

Given this scenario, it is safe to say that the BCB does not see a data gap concerning the payment system, considering that the payment institutions, even the ones below the said threshold, are required to send information regularly to the BCB. It should be mentioned that the BCB has set up an Information Governance process which, as stated in the Supervision Manual of the BCB,[27] is carried out according to the Central Bank of Brazil's Information Governance Policy, regulated by the Information Governance Committee (CGI). The purpose of Information Governance is to ensure enhanced efficiency in data management and to minimize operational risks, making use of best practices and overseeing

  i the existence, consistency, integrity, precision and relevance of information;
 ii the rationalization of the processes for data collection and information use.

Last, BCB has also published a draft on the Regulatory Sandbox for public consultation. Following the steps of the most advanced countries in terms of financial regulation, BCB expects this new approach to provide additional information on new developments and, in particular, foster innovative business models, which may help us tackle some of the issues we are facing at the moment in the promotion of an innovative and competitive environment.

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[26] IFC Report, Towards monitoring financial innovation in central bank statistics. Annex 4: IFC letter to the UNSD regarding ISIC Rev 4 issues. July 2020.

[27] See https://www3.bcb.gov.br/gmn/visualizacao/listarDocumentosManualPublico.do?method=listarDocumentosManualPublico&idManual=1.

Costa Rica

Though there are some similarities within Latin America, the evolution of FinTech start-ups in Costa Rica is somewhat unique, mainly because of the central bank´s efforts towards the development of the payments system and its active role in financial inclusion. Two decades ago, the Banco Central de Costa Rica (BCCR) started to offer to the public the *National Payments System* (SINPE), which is an electronic platform that provides instant payments facilities 24/7. Also, since 2015, the Bank has provided agents with a digital payment platform called *Sinpe Móvil*, which allows people to make money transfers within regulated financial institutions in real time, at no cost, with only a text message. With them, the bank has developed a strong and secure network that has the trust of all participants, institutions, and agents, who maintain low cash levels in response. As a result, FinTech in Costa Rica has not developed mostly around payments systems. According to a report by the Inter-American Development Bank (IADB) and Finnovista (2019), there are 25 start-ups related to FinTech activities in the country, and the industry is evolving every day. As of today, FinTech firms do not have specific requirements or regulations in Costa Rica. However, if they offer services that are regulated, they are expected to comply with the corresponding legal framework. That said, the central bank has conducted a one-time non-official survey to identify and characterize the business models these companies are implementing (or trying to implement) in the country. The data were gathered from a questionnaire distributed among self-named FinTech firms that had requested access to the electronic platform of SINPE.[28] This survey, therefore, had no formal method of identifying the firms; it was self-selection. Hence, the results do not consider the whole sample of FinTech firms in Costa Rica. With that, in June 2019, the BCCR identified 25 firms that responded to the survey.

This strategy has opened a door for communication with these entities, and the central bank and superintendencies are currently studying the FinTech market reality in order to state a formal plan, according to the best practices of the Bali FinTech Agenda (IMF, World Bank 2018) and the actions suggested by the OECD. Below are the main data issues that have been identified:

- *Lack of a FinTech definition and selection criteria:* As mentioned, until now, there have been two references of the FinTech environment in Costa Rica, but even though both identified 25 firms, they were not the same firms. The study from the IADB and Finnovista considers only those that are 100% Costa Rican, and the BCCR's survey only studied those interested in having connections to SINPE. The definition of FinTech within the industry needs to be clarified for firms to be correctly identified.
- *Lack of a classification system:* The two mentioned references, have different contexts, methodologies, and classification categories. Therefore, it is necessary to have a uniformed classification system in which these firms can be categorized in accordance with their business models. The classification should be flexible and open to the inclusion of new categories on an ongoing basis.
- *Lack of available data and a process to regularly track the industry:* The lack of available data is related to the fact that some businesses are in very early stages or die very quickly, so there is no record of the activity. However, it is also related to the fact that there is no place for start-up firms to present the idea, information about the business model, or the transactions. The strategy of opening the door to the SINPE can help with that, but it is not sufficient because there will be business models that will not fit. It would be desirable to have a standardized process to obtain data and statistics in a regular manner about FinTech companies and their activities.
- *Lack of use of new instruments and tools:* In addition to the use of traditional ways to gather information (such as surveys), new instruments and tools could be explored to obtain data. The following table shows some examples:

Instrument or tool	Description
Web-scraping and data analytics techniques	Extracts from internet sites such as *Google Trends* and the web page of the firm, and analytics from social networks such as a) *LinkedIn* to find the number of employees, followers, and year of foundation of a firm and b) *Facebook* and *Instagram* to have a sense of the followers and consumer characteristics of a firm.
Business model catalog and network interconnection	Using, for example, a *business model canvas template* in order to describe the firm´s business models that can act as a catalog, identifying the clients, partners, value preposition, cost structure, revenue streams, channels, etc., and using the information to track the interconnections or links with known financial or business data from other participants in the financial system.
Partnership, collaboration and communication with the industry	Partnering with the FinTech Association and other organizations in order to develop a database, using their affiliates and some of the described tools. Also creating new mechanisms to open communication with the firms, such as an innovation hub.

Finally, minimizing gaps in the data from FinTech activities in the country can help central banks monitor the opportunities and challenges that this type of business can introduce into the financial system and their implications on monetary policy and financial stability.

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[28] The central bank updated its "Regulations for the Payments System" in September 2018, so that FinTech companies can register to use the SINPE platform. This authorization provides firms with the collection of payment services offered by the bank that cover corporate and individual clients. With this strategy, the central bank has experimented with a new flow of requests from new companies that are currently being analyzed.

Honduras

The Central Bank of Honduras (CBH), together with the National Bank and Insurance Commission (NBIC) and the support of the Inter-American Development Bank (IDB), has formed the Financial Innovation Bureau (FIB) with the purpose of creating an environment of public-private collaboration that favors innovation and healthy competition in the provision of financial products and services through the use of technology and digitalization, with the aim of contributing to financial inclusion through the adoption and use of financial technology. It also promotes the development of FinTech in the country and creates public policies that allow innovation to offer a better quality of life to consumers.

Additionally, the board of directors of the CBH has approved the creation of the Technical Committee for Innovation and Financial Technology (TC-IFT) and its internal regulations, whose purpose is, within the competence of the CBH, to advise, support, and make recommendations to its board of directors in regulatory matters and oversight of payment systems and financial stability, for the development of innovation in financial technologies. It also follows up on compliance with the resolutions and agreements issued by the Board of Directors in the aforementioned matter.

The FIB was launched on October 23, 2019, and according to the needs that members of the bureau have detected, two working groups have been formed:

1 Payments and Transfers
2 Transversal Technologies

These working groups will be responsible for submitting to the FIB proposals to strengthen and improve the country's FinTech ecosystem.

This strategy has allowed the CBH to identify, among other things, new players in the Honduran financial ecosystem. The FinTech ecosystem in Honduras is at an early stage but with high development potential. As of October 2019, 23 FinTech initiatives had been identified, of which 21 are entrepreneurial and two correspond to corporate FinTech. These initiatives are distributed in seven business segments, the most representative being payments and transfers, with 43% of the initiatives, followed by initiatives related to blockchain and crypto-asset technology (17%), business finance management and alternative financing (13%), and finally, personal finance management, scoring, and InsurTech (4.3%).

Regarding the status of the formalization of business activity, 61% already operate in the national market, 17% are legally constituted in the process of starting operations, and 22% are in the early stage of conceptualization, development and validation of their business models.

The corporate FinTech companies provide monthly reports with statistical information on the amount and the quantity of operations carried out.

With the base established within the FIB, more FinTech initiatives continue to be identified, some of which are in the process of adherence to this forum for cooperation and private-public dialogue.

Trinidad and Tobago

Over the last few years, the Central Bank of Trinidad and Tobago (central Bank/Bank) has received expressions of interest from entities wishing to develop FinTech products and services to facilitate payments, remittances, and international trade in the domestic payments space. Some of these expressions of interest included initiatives for establishing cryptocurrency exchanges or platforms, digital wallets, bitcoin ATMs, ICOs, CBDC, and the use of blockchain or DLT to facilitate KYC. However, more recently, most of the expressions of interest have concerned e-money.

In light of these ongoing international and domestic developments as well as the Bank's recognition of the possibilities that FinTech promises for enhancing efficiency and financial inclusion, the Bank published its public policy statement on Financial Technology and Virtual Currencies in November 2018. It also developed a FinTech policy with the objective of "promoting and enabling an environment to accommodate ongoing financial innovation while mitigating risks."

The Bank has also developed an e-money policy to widen the categories of persons who can engage in e-money activities beyond the financial institutions licensed under the Financial Institutions Act.

Furthermore, the Bank is contemplating the development of a Payments System Act that will comprehensively address all payment activities including issuance of payment instruments, clearing and settlement, payment system operators, and payment service providers including those providing e-money services and virtual asset services.

Plans for closing FinTech data gaps are in the early stages. However, reporting templates have been developed for some FinTech firms that are required to submit information to the Central Bank.

Appendix 2. Specific initiatives that LAC countries and Spain are launching in order to close FinTech data gaps

Central Bank of Chile

The FinTech issue is of special interest to the Central Bank of Chile (CBC, Bank). It has become an important topic for development as one of the new technologies defined in its 2018–2022 Strategic Plan.

In this context, as one of the specific projects proposed to address the challenges of FinTech, the Bank created a Technological Observatory in 2018. This initiative intends to be a catalyst for knowledge acquisition and the adoption of disruptive technologies

within the Bank. The observatory's primary goals are (i) to centralize and organize the information related to disruptive technologies; (ii) to manage and coordinate the Bank with other institutions concerning this matter; and (iii) to identify and prioritize eventual knowledge gaps and opportunities related to these technologies of which the Bank may conduct further analysis.

So far, through the observatory, the Bank has focused on the understanding of the Chilean FinTech ecosystem mainly through the organization of seminars, workshops, and meetings with FinTech firms. For the CBC, the observatory is the starting point in the development of knowledge and analysis related to disruptive technologies and FinTech, and it is the first step in analyzing a possible statistical dataset about FinTech.

Complementing the work of the observatory, the TechLab initiative was created in 2019. The purpose of this project to implement disruptive technologies in an experimental stage on cross-cutting processes within the CBC, and it has focused so far on proof of concept for blockchain, artificial intelligence, machine learning and APIs.

Banco de España

In Spain, the lack of an official register for FinTech firms and the ongoing innovations in this area have hindered the preparation of an exhaustive census of FinTech firms. Banco de España has designed an initiative aiming to lay the foundations for obtaining regular data on FinTech firms, thus enabling its performance to be measured and monitored.

In order to identify FinTech firms, it has drawn on several public and private sources: the Spanish National Securities Market Commission (CNMV), business associations (the Spanish FinTech & InsurTech Association and the Spanish Crowdlending Association), and private consulting firms (Finnovating).

Using these sources of information, almost 400 FinTech firms were included in a preliminary list, which contained, in most cases, no more than a trade name and a website link. Furthermore, this initial list did not contain information to separate entities resident in Spain from those non-resident entities providing services in Spain remotely.

To fill in data gaps of these primary sources, FinTech firm identification followed a three-step procedure.

First, the websites of all firms were searched to gather their formal identification. As a result, 250 resident and 30 non-resident entities were identified—that is, 70% of the initial list.

Second, the annual financial statements filed with the Mercantile Register were obtained for those entities resident in Spain for which tax identification numbers were available, enabling the gathering of qualitative and quantitative information.

Regarding qualitative information, the financial statements provided information such as their registered offices, corporate purpose, National Classification of Economic Activities (CNAE) code, and shareholder structure. In turn, this information made it possible to geographically locate these firms, which were mainly concentrated in Madrid and Catalonia (100 and 55 FinTech firms, respectively).

Regarding quantitative information, the total balance sheet volume for the identified firms amounted to approximately €1 billion at the end of 2018, a negligible amount compared to the overall Spanish financial sector (in excess of €4.5 trillion). During that year, net turnover reached €410 million, and the number of employees was close to 2700.

The third and final step was the institutional classification of FinTech firms in the National Accounts and, specifically, their correct assignment to the various financial and non-financial sectors of the economy. To this end, an action protocol was established to perform an in-depth analysis of the selected companies, focusing on their core businesses in terms of net turnover, corporate purpose, and the nature and structure of their assets.

The initial results clearly identified some 50 firms as belonging to the financial sector, specifically as financial auxiliaries—a category that mainly includes crowdlending and crowdfinancing platforms—,electronic money institutions, payment institutions, and securities dealers and brokers. The next step consisted of classifying the remaining 200 firms, seeking to identify those that actually provide financial services and should therefore be included in the financial sector and those that strictly provide technology services, thus remaining categorized under the non-financial corporate sector.

Of these 200 firms, one hundred were considered technology firms not exclusively linked to financial activity, thus not fitting the definition of FinTech. In addition, more than 10 of the active firms were neither financial nor technology operators. They were, for example, blogs or social networks on start-ups, entrepreneurs, and finance.

After this process, around 140 firms had been identified as genuine FinTech firms. In addition, they were classified into four analytical groups: i) finance: crowdlending and loans (more than 50 firms); ii) payment and foreign exchange services (almost 20 firms); iii) investment services (around 50 firms); and iv) other activities (around 10 firms).

Central Bank of Ecuador

In June 2018, the Department of Economic and Regional Integration published a FinTech Brief Analysis in which Central Bank of Ecuador identified 31 FinTech start-ups with high technological components operating in Ecuador, indicating that the country was heading toward the same sort of financial innovation registered by other countries in the Latin American region.

FinTech companies in Ecuador offer alternative solutions for payments. Most focus on the business finance management segment (32%), offering technological innovations for the implementation of best practices in business development. This document was supported by secondary sources such as *Finnovista 2017, FinTech radar*, and *CEMLA*.

Currently, the Department of Monetary Management does not have statistical information on this kind of entity (FinTech). This department focuses on collecting information from savings and credit cooperatives in sectorization and balances for different products of the Central Bank.
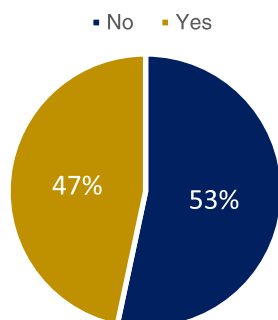
Graph 1. Regular cooperation between authorities on FinTech.
Source: Own elaboration based on IFC Survey on FinTech Data from LAC countries.
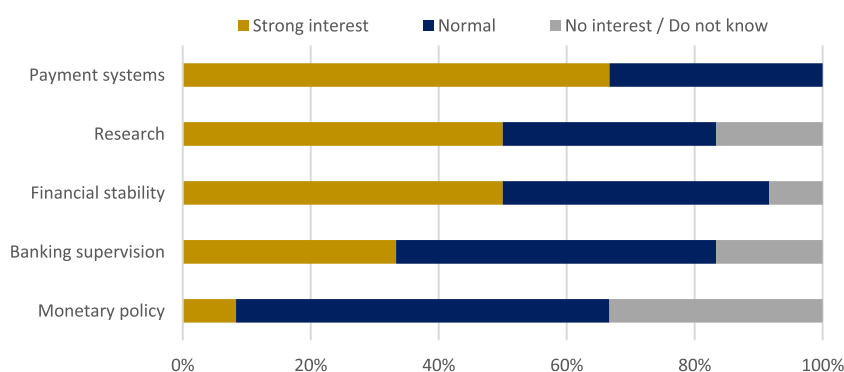
Graph 2. FinTech data needs in the following business areas (in percents).
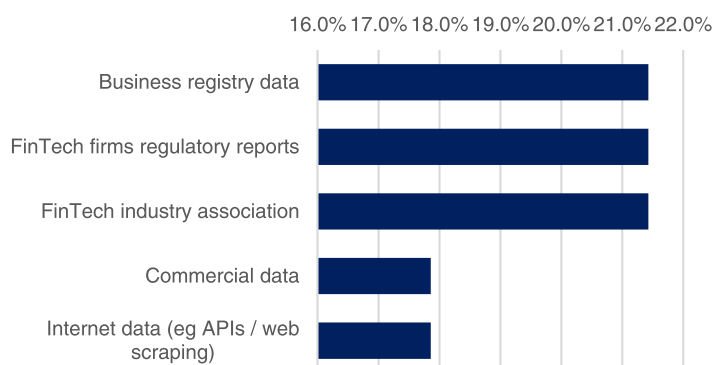Source: Own elaboration based on IFC Survey on FinTech Data from LAC countries.
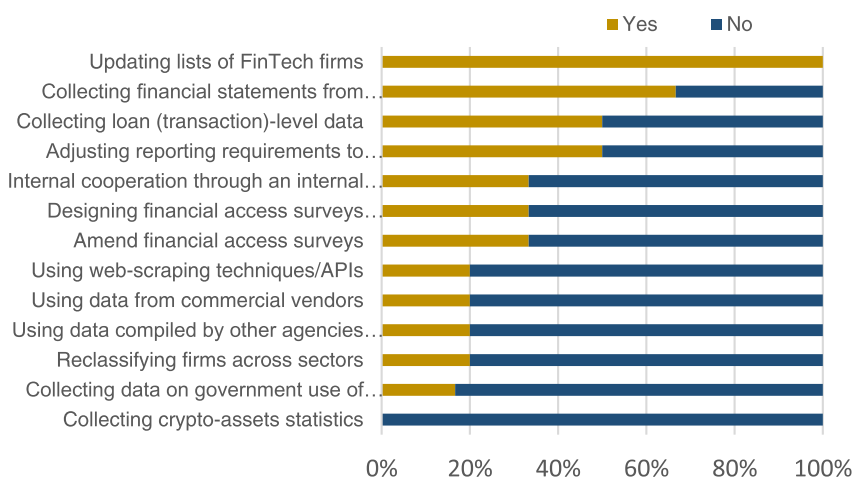
Graph 3. Initiatives your Central Bank is implementing to close FinTech data gaps (in percents).
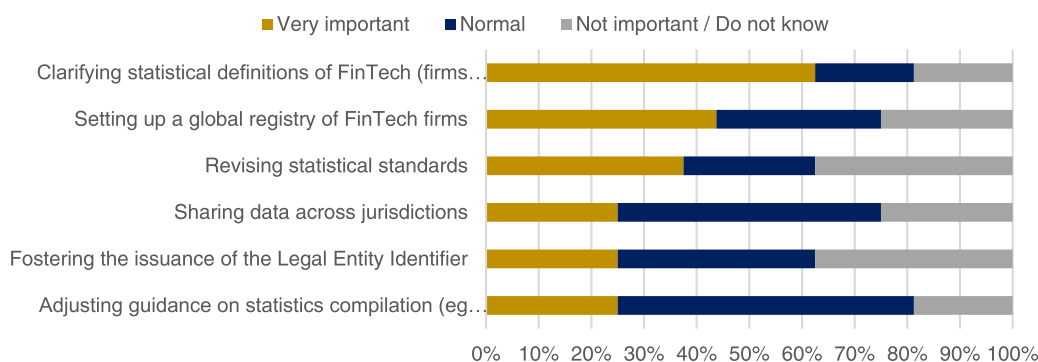Source: Own elaboration based on IFC Survey on FinTech Data from LAC countries.

In order to collect this information, it is currently necessary to carry out a process of technical visits and surveys to know the relevance of this kind of entity, including information from FinTech statistics.

Appendix 3. Figures

Graph 1, Graph 2, Graph 3, Graph 4, Graph 5

Graph 4. From which data sources are you collecting data on FinTech firms?
Source: Own elaboration based on IFC Survey on FinTech Data from LAC countries.

Graph 5. The importance of interntational initiatives to close FinTech data gaps, according to LAC countries (in percents).
Source: Own elaboration based on IFC Survey on FinTech Data from LAC countries.

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