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FINTECH AND FINANCIAL INCLUSION: OPPORTUNITIES AND PITFALLS

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Abstract

Financial innovation in the form of new delivery channels, products, and providers has helped push out the frontier of access to finance and thus increase the bankable and banked population. Mobile money and crowdfunding platforms are prime examples for this. The same financial innovation has also blurred the regulatory boundaries of the financial system, with nonbanks, including telecom companies and bigtechs such as Alibaba and Tencent, taking to offering financial services and increasingly moving into the financial intermediation business. This paper summarizes recent research on (i) financial inclusion, with a focus on developments in Asia; (ii) the extent to which advances in financial inclusion are driven by digitally driven financial innovation; and (iii) what the rise of fintech and bigtech implies for the structure of the financial system. It draws regulatory conclusions from this research but also points to future research avenues.

Keywords: financial inclusion, financial innovation, fintech, bigtech, mobile money, big data

JEL Classification: D14, G21, G23, G28, G41, G5, O16

Contents

1. INTRODUCTION

While financial innovation has been a feature of thriving and competitive financial systems through the centuries, recent technological changes give the impression that this time is different. Not only have technological advances related to mobile telephony, data processing capacity, and global interconnectedness reduced the costs of financial service provision enormously, they have also attracted new, nonfinancial players into the financial sector.

One important dimension where recent financial innovations have helped make big progress is financial inclusion, i.e., the access to and use of formal financial services by previously unbanked individuals and enterprises. The use of mobile phones for financial services has allowed developing countries to leapfrog the traditional model of brick-and-mortar branches and make substantial gains in financial inclusion. Platform-based lending models have emerged even in advanced countries in the wake of SME lending retrenchment by commercial banks after the global financial crisis. The entry of new players, however, has also raised challenges for regulators in terms of financial stability and consumer protection.

This paper discusses recent financial innovations and their impact on access to financial services by previously un- or underbanked households and small enterprises. Over the past decade or so, financial innovation in the form of new delivery channels, products, and providers has helped push out the frontier of access to finance and thus increase the bankable and banked population across the developing world. The same financial innovation has also blurred the regulatory boundaries of the financial system, with nonbanks, including telecom companies and bigtechs such as Alibaba and Tencent, starting to offer financial services and increasingly moving into the financial intermediation business. This paper summarizes recent research on (i) financial inclusion, with a focus on developments in Asia; (ii) the extent to which advances in financial inclusion are driven by fintech; and (iii) what the rise of fintech and bigtech implies for the structure of the financial system and the regulatory framework. The paper draws on an increasing empirical literature in this field as well as a legal and regulatory literature discussing these developments. Finally, compared to ten years ago, an increasingly large number of data sources allows observers to better document and analyze the changes in financial service provision and inclusion.

Recent developments in financial innovation and the consequent improvements in financial inclusion are important for researchers, practitioners, and policy makers alike. The leapfrogging in financial technology that we can observe in more and more developing countries beyond brick-and-mortar branch banking to agent- and mobile-phone based banking has provided large gains in terms of financial inclusion; the stronger focus on payment and savings services supported by telecom companies has questioned the NGO-driven microcredit movement of the late 20th and early 21st centuries. However, the entry of nonfinancial corporations into financial service provision also has regulatory implications, both for financial stability and for consumer protection. Finally, the increasing use of the exploding amount of personal data that individuals create across the globe by bigtechs and other companies raises important questions about consumer protection and privacy.

Before proceeding, I would like to offer a definitional remark. Recent financial innovations driven by digital technology are often referred to as *fintech*. There are different definitions, however, that put the focus on different elements. On the one hand, fintech can refer to the integration of technology into product and service offerings by financial service providers in order to improve their use and delivery to consumers. On

the other hand, it can also be understood as new technology-driven players that aim to compete with traditional financial institutions in the delivery of financial services. In the broadest sense, fintech refers to technology-enabled innovations in financial services that are often associated with new business models and providers, new processes, and new products, all of which might have a material effect on the provision of financial services, be it by incumbents or by new entrants into the financial sector. As I will discuss further below, another important distinction is between fintech institutions that use digital technology to challenge incumbent financial service providers with specific financial solutions and bigtech companies that use their data and network advantages gained in nonfinancial service provision to enter the financial sector.

The remainder of the paper is structured as follows. The next section focuses on the recent wave of financial innovations, which have had a positive impact on financial inclusion. Section 3 discusses the impact of these innovations on market structure in finance, especially banking. Section 4 concentrates on the implications of the availability of big data for financial service providers and customers. Section 5 discusses regulatory implications, and Section 6 concludes and points to future research questions.

2. FINANCIAL INNOVATION AND FINANCIAL INCLUSION

Financial intermediaries and markets arise to overcome market frictions of information asymmetries and the consequent agency conflicts between lenders and borrowers and to economize on transaction costs. At the same time, financial intermediaries are constrained by two important factors (which interact) – costs and risks. Financial intermediaries incur fixed costs for each transaction and each client, which implies decreasing unit costs as the number or size of transactions increases. Similarly, financial institutions incur fixed costs, such as their branch network, IT systems, and other support services. Such fixed costs even exist on the financial system level, for example in the form of the costs of regulation and supervision and the costs of payment systems. The resulting economies of scale at all levels make outreach to potential clients with small and few transactions very costly, often prohibitively so. It also makes outreach into small markets with few clients – such as rural areas – costly. Finally, it makes financial service provision in smaller financial systems excessively costly and expensive.[1]

Similarly, risks impose limits on the efficiency of financial intermediaries, by increasing costs and loan losses, and their ability to reach out to more opaque and riskier borrowers. On the one hand, there are systemic risk factors, including macroeconomic instability, weaknesses in the contractual and informational environment, and exposure to natural disasters. On the other hand, there are idiosyncratic risks of individual borrowers and projects, related, among other things, to agency problems between lenders and borrowers. Traditional instruments aimed at reducing such agency conflicts, including audited financial statements and collateral, might not be available for smaller enterprises, especially in developing countries. Rather than increasing interest rates for such risky clients working in the informal and/or rural economy, financial institutions ration credit (Stiglitz and Weiss 1981). Further, developing markets, especially smaller ones, face severe limitations in terms of possibilities to diversify idiosyncratic risks. The lack of agricultural lending in many developing countries has often been explained by the inability of financial institutions to diversify the high risk stemming from agricultural activity and therefore agricultural lending.

[1] For a more detailed discussion, see Beck and de la Torre (2007).

Financial inclusion in developing countries is thus constrained by the limited ability of financial institutions to overcome cost and risk constraints. Lower-income segments of the population are often considered unbankable because of infrequent and small transactions and a lack of formal documentation. Small, often informal, enterprises constitute too high a risk for traditional financial institutions, given the lack of formal registration, formal financial information and assets that can be used as collateral. At the same time, banks react to high costs and risks with additional barriers, including high bank fees making bank services prohibitively expensive for large parts of populations in developing economies and documentation requirements that are too burdensome or even impossible to comply with (Beck, Demirgüç-Kunt, and Martinez Peria 2008). In a nutshell, the traditional banking model relying on a minimum degree of formality on the part of its clients, a minimum volume of transactions (either a few high-volume clients or a large number of low-volume clients), and a minimum set of risk management tools is not conducive to expanding financial inclusion in many developing and even emerging markets.

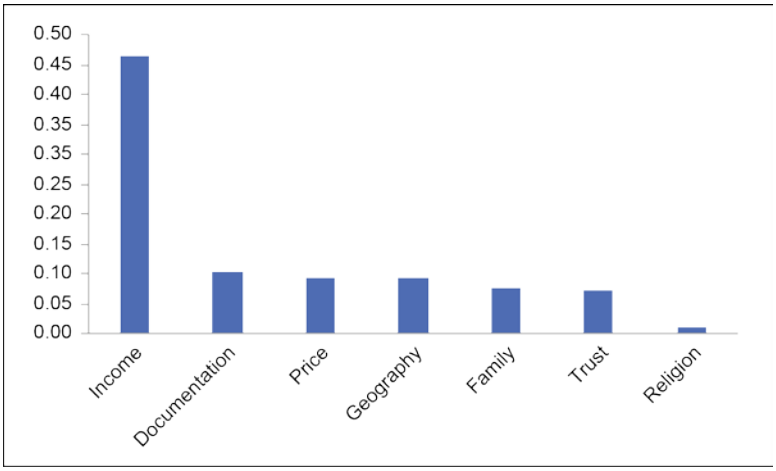
Figures 1 to 3 show barriers to account ownership for the median country across ADB member countries for 2011, 2014, and 2017, respectively, based on the Global Findex survey.[2] Specifically, individuals were asked for the reason that they did not have an account. The lack of money was by far the most prominent reason quoted, across all three survey waves, though the population share citing this reason decreased significantly between 2011 and 2014. The lack of documentation was the second most important barrier in 2011 and 2017, though not in 2014; the share of the adult population quoting this barrier, however, has increased over the years. Prohibitively high prices and geographic barriers are cited as important reasons across the three survey waves. A lack of trust is also quoted as a reason for not having an account, while religious reasons seem a relatively minor barrier, although this can vary quite a lot across countries. While family members having an account is stated as a reason for not having an account throughout the three survey waves, the share of the population stating that they do not have any need for financial services decreased quite prominently between 2014 and 2017 (not asked in 2011).

Given the inability of the traditional banking system to reach out to large population segments in the developing world, in recent decades, an NGO-driven microfinance model has aimed to expand financial services in developing countries, starting from institutions such as Grameen Bank in Bangladesh and BancoSol in Bolivia. The early successes of this approach were recognized with 2005 being declared the International Year of Microcredit and Muhammad Yunus and Grameen Bank being awarded the Nobel Peace Prize in 2006. While one can see the original microfinance model – based on group lending and joint liability, weekly repayments, and without reliance on marketable collateral – itself as a financial innovation, some of these mechanisms are based on the cooperative banking model of central Europe of the late 19th century (Banerjee, Besley, and Guinnane 1994). However, there has also been increasing criticism of a microfinance-led financial inclusion approach. First, it is labor-intensive and often not profitable and thus reliant on permanent donor funding (Cull, Demirgüç-Kunt, and Morduch 2009). Second, it focuses predominantly on credit, which might not be the primary financial service many unbanked individuals and households need. Related to this, it is built on the assumption that easing financing constraints will unlock the necessary entrepreneurship among the poor to overcome poverty traps. However, survey evidence has shown that a minority of informal self-employed in developing countries is of the aspirational or transformational entrepreneur type and

[2] The percentages are relative to the whole adult population. Multiple responses are allowed. The structure of the questions varies across the three survey waves.

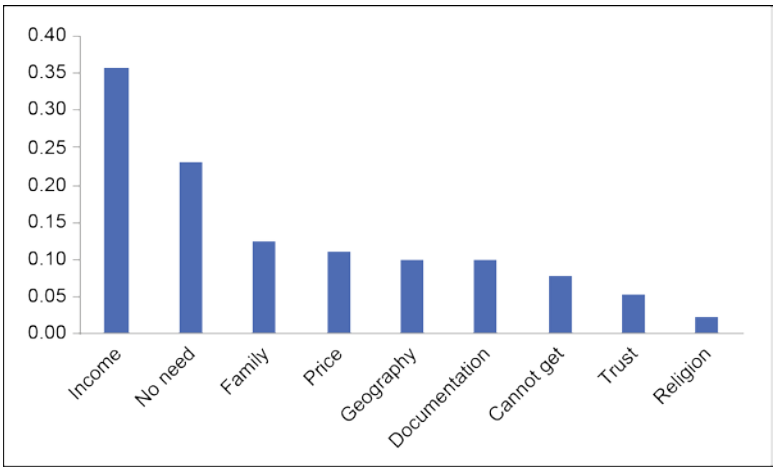
most are entrepreneurs out of necessity with only low growth perspectives (De Mel, McKenzie, and Woodruff 2010; Bruhn 2013). Third, evidence on the welfare impact of microfinance has been ambiguous: As summarized by Banerjee, Karlan, and Zinman (2015) in their introductory paper in a special issue of the *AEJ: Applied Economics* with six microcredit assessments also cited here, there is a "consistent pattern of modestly positive, but not transformative, effects."

Figure 1: Barriers to Account Penetration Across ADB Member Countries, 2011



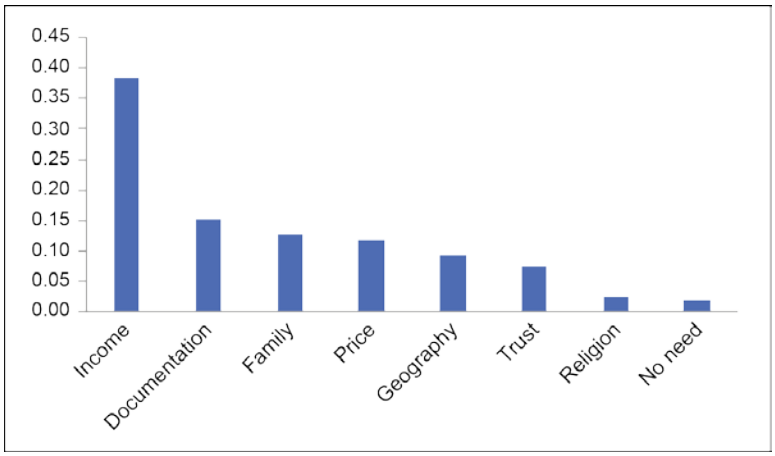
Source: Global Findex, World Bank.

Figure 2: Barriers to Account Penetration Across ADB Member Countries, 2014



Source: Global Findex, World Bank.

Figure 3: Barriers to Account Penetration Across ADB Member Countries, 2017



Source: Global Findex, World Bank.

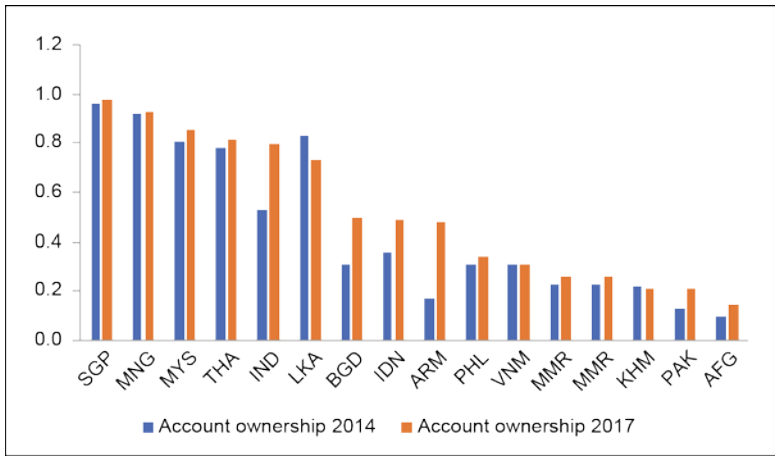
Over the past decade, technology-driven financial innovation has changed this landscape dramatically by reducing the costs of financial service provision and by allowing a more effective risk management. Specifically, new or improved financial (1) products and services, (2) production processes, and (3) organizational structures that can better satisfy financial system participants' demand and reduce costs and risk processes have helped expand financial inclusion across many developing countries. Digitalization allows transactions across larger distances and at a faster speed, it allows transactions without having to rely on personal relationships, and it increases transparency. Over the past decade, a digitalization-led approach to financial inclusion has provided important gains in expanding access to, and use of, financial services across the developing world.

One of the most important financial innovations in developing countries has been "mobile money." In 2007, Safaricom launched the most successful of these products – M-Pesa – in Kenya, which is a service that allows customers to convert cash into electronic M-Pesa deposits (and vice versa) at specialized agents known as "M-Pesa kiosks." The take-up of this service has been rapid, with a majority of the banked population using mobile money accounts. Between 2006 (the year before the introduction of M-Pesa) and 2019, the share of banked population in Kenya more than tripled from 26.7% to 82.9% (Central Bank of Kenya, Kenya National Bureau of Statistics and FSD Kenya 2019). In 2019, 79.4% of the population used mobile money accounts. Most countries in Africa now have a mobile payment service provider, although the penetration has not reached the same level across the continent as in Kenya. Mobile money transactions offer several critical advantages over other delivery channels. First, they help reduce variable costs significantly, leveraging the fixed costs of the already existing mobile network, which implies that even customers who undertake small and few transactions are commercially viable, unlike transactions through conventional banking channels. Second, mobile phone banking does not rely on a branch network, but rather on a much less costly agent network, reducing geographic barriers for clients substantially. Third, if accompanied by appropriate risk-based regulation that exempts clients with a smaller number and size of transactions from cumbersome documentation requirements, money transactions become accessible to large parts of the population living in the informal economy. Fourth, trust between customer and financial service provider can be built much more easily by reducing the risk from the customer's and the provider's viewpoint. Finally, the success of mobile money also indicates a shift away from a credit-led inclusion approach,

the hallmark of the original microfinance movement, towards a payment-led inclusion approach. This approach addresses people's most immediate need for safe, rapid payments. It is also in contrast to the traditional bank-led model found in advanced countries, which – as discussed above – does not lend itself to the circumstances of most developing countries.

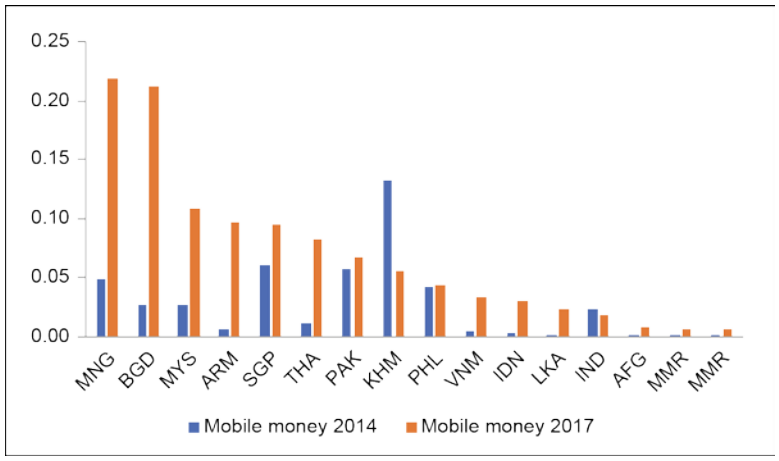
Across almost all ADB countries, account penetration increased between 2014 and 2017 (the two years for which we have data on mobile money account penetration), as shown in Figure 4, but only in a few countries is this driven by mobile account expansion, most notably Mongolia and Bangladesh, as shown in Figure 5.[3] While the relatively low and only slowly increasing mobile money penetration in high- and upper-middle countries, such as Singapore, Malaysia, and Thailand, is not surprising, given the relatively high bank account penetration to start with, it is surprising to see that few of the countries with relatively low account penetration have seen an increase in mobile money account penetration.

Figure 4: Account Penetration Across ADB Member Countries



Source: Global Findex, World Bank.

Figure 5: Mobile Money Account Penetration Across ADB Member Countries



Source: Global Findex, World Bank.

[3] Please note that in these two figures, I only include countries for which we have data on account and mobile money account ownership for both 2014 and 2017.

There has been a small, but rapidly expanding, literature on the effect of mobile banking on household welfare and enterprise growth, most of it focusing on Africa, given the pioneering position of that region's financial systems in adopting mobile money. First, there are studies that have focused on financial behavior and the real sector effects of mobile money accounts: Mbiti and Weil (2016) find that the increased use of M-Pesa lowers the use of informal savings mechanisms and raises the propensity to save via formal bank accounts, while Kikulwe, Fischer, and Qaim (2013) show that small farmers in Kenya that use M-Pesa purchase more inputs, sell a larger proportion of their output in markets, and consequently have higher profits. Wieser et al. (2019) show that mobile money agent rollout significantly increases remittance transactions and nonfarm employment in Uganda, while Aggarwal, Brailovskaya, and Robinson (2020) find that mobile money adoption raises saving rates and leads to a reallocation of labor from business to agriculture among microenterprises in Malawi. Suri and Jack Suri (2016) document that M-Pesa has reduced the poverty rate in Kenya by 2%. Second, several studies have shown the positive effect of mobile money use on consumption smoothing. Jack and Suri (2014) find that income shocks lower consumption by 7% for non-M-Pesa users while the consumption of M-Pesa users is unaffected, a result confirmed for Tanzania by Riley (2016). In Mozambique, Batista and Vicente (2016) find that mobile money improved consumption smoothing among treated households, i.e., they became less vulnerable to adverse weather and self-reported shocks. Blumenstock, Eagle, and Fafchamps (2016) show that mobile money allowed risk sharing across geographic distances in the case of the 2008 earthquake in Rwanda, as mobile money users sent a considerable amount of mobile money to affected friends and families. Finally, and looking beyond the effects of mobile money on household welfare, Beck et al. (2018) show that the adoption of M-Pesa by small entrepreneurs in Kenya to pay their suppliers was associated with increases in trade credit, with positive repercussions for firm and aggregate growth.

While payments via mobile phone (using a variety of different providers) has enabled a move away from cash and has facilitated easier and more effective cash flow management by small businesses, there might be a limit in terms of the costs. Another innovation, introduced in the People's Republic of China (PRC), has been the use of QR codes, where customers pay through a mobile phone app exposed to a QR code specific to the merchant.

While mobile money services have been initially limited to payment and transaction services, there is an increasing use of mobile phones for other financial services. In 2012, M-Shwari was launched as a cooperation between Safaricom and Commercial Bank of Africa, linked to M-Pesa, comprising both a savings account and access to a small 30-day loan at 7.5% interest per month. Bharadwaj, Jack, and Suri (2019) show, using regression discontinuity around the credit score threshold for credit approval, that access to a credit facility reduced consumption volatility and that M-Shwari credit did not substitute for other credit. Habyarimana and Jack (2016) examine the impact of encouraging parents of elementary school students to use mobile savings accounts to save for the transition to high school and find that the use of an account led to higher savings and credit utilization and, ultimately, to a higher probability of children enrolling in secondary school. It is important to note, however, that the expansion of mobile phone-based financial service provision into credit also carries certain stability risks with it. Kaffenberger and Totolo (2018) discuss survey evidence for Kenya and Tanzania, with 35% and 21%, respectively, of mobile phone users having taken out a mobile loan. A large proportion of borrowers have been late with repayments or have even defaulted on their loans (12% in Kenya and 31% in Tanzania), and a significant number have borrowed to repay loans or reduced their food consumption.

Digitalization has also allowed the introduction of new insurance products. As in the case of credit services, providing agricultural insurance is prohibitively expensive in large parts of the developing world, given the very small policy (and claim) amounts and high verification costs in rural areas. Rainfall index insurance is crop insurance against drought or excessive rainfall, which relies on information gleaned from local rainfall gauges, rather than individual customer information. Specifically, weather index insurance relies on objective rainfall data taken from gauges close to policyholders, which reduces verification costs of events for insurance companies. Being able to rely on objective rainfall data from nearby weather stations reduces both risk and cost management problems for insurers. First introduced in India in the early 2000s, rainfall insurance has been tested and implemented across a number of developing countries. Where offered, however, the take-up of weather index insurance products has often been surprisingly low. For example, Karlan et al. (2011) find no significant variation in take-up between a standard credit product and a credit-cum-crop price insurance product for a group of maize and eggplant farmers in rural Ghana. Farmers are as likely to take up one as the other, which might reflect expectations of being forgiven debt in the case of default. Giné, Townsend, and Vickery (2008) show that in India, rainfall insurance take-up increases with the riskiness of the crops and with income and decreases with households' credit constraints. On the other hand, risk-averse households are found to be less likely to buy insurance, contrary to predictions of a basic neoclassical framework predicting a positive relationship between risk aversion and demand for insurance products.

Beyond the use of the mobile phone and mobile money for financial service provision, the use of the mobile phone for communication via text can also have important effects for financial service providers and their customers. Reminders sent via text messages can have positive impacts on credit repayment (e.g., Karlan, Morten, and Zinman 2012) – though only if the name of the loan officer is included – or on savings behaviors, especially if they mention savings goals and financial incentives (Karlan et al. 2016).

Another innovation that builds on digitalization of the economy is the use of platforms to connect market participants. An early example is that of a factoring platform in Mexico. In 2001, the development bank NAFIN launched an online system to provide reverse factoring services to SMEs. In the area of small business lending, reverse factoring is promising – a financing form that allows small enterprises to discount invoices for larger enterprises, thus effectively financing themselves based on their larger buyers' reputation than their own (often not existing) credit record (Klapper 2006).

In summary, the digital revolution has pushed out the access possibilities frontier by providing tools to overcome the scale of, and risk barriers to, widespread financial inclusion across the developing world. While originally limited to payment services, offering financial services using mobile technology has now been expanded to other services. It is important to note that most of this innovation has been driven by new entrants into the financial sector rather than by governments, and by profit rather than social interests, which differentiates this approach from the NGO-driven microfinance approach to financial inclusion. One challenge, however, is that there has been an initial focus on the number of accounts opened rather than on the actual usage of these accounts. Over the last few years, the discussion has therefore moved away from maximizing the share of the adult population having an account to the actual usage for their daily transactions, both among policy makers and practitioners.

3. FINANCIAL INNOVATION AND MARKET STRUCTURE

How does financial innovation come about? While regulation can provide an enabling framework for innovation, one would expect financial intermediaries to innovate under competitive pressures to reduce costs, increase revenues, or expand market shares.[4] However, given the limited competition in most banking and financial systems around the globe, incumbent financial institutions are often less interested in innovation and it is rather new entrants into the financial system that introduce new products and services. It is hard to predict such innovation, as it can come from unexpected quarters, even in traditional banking. One interesting example is Equity Bank in Kenya, which transformed itself from a failing building society into an innovative full-service bank that is now the largest bank in the country in terms of clientele. This growth was accomplished by moving beyond the brick-and-mortar branch network to the use of mobile branches, by targeting previously unbanked population segments, and by increasing the quality of service delivery, for example by offering services in minority languages (Allen et al. 2020). These experiences suggest that an open, contestable banking system is needed and that new providers might come from outside the group of established incumbents. Bruhn and Love (2014) discuss a similar case for Banco Azteca in Mexico and how its expansion has reached previously unbanked segments of the population.

More recently, however, innovation has come mostly from outside the incumbent banking system in the form of new financial service providers. Again, this is not a new phenomenon. Financial history has been characterized by the emergence of many new institutions and intermediaries over the centuries, often addressing new demands or regulatory constraints. The early 20th century saw the rise of investment banks to fund railroad expansion in the US, while the 1960s saw the rise of money market funds in response to Regulation Q, which prevented banks from paying interest rates on demand deposits. Similarly, digitalization has brought new intermediaries in the form of peer-to-peer lending platforms, but also allows nonfinancial companies to enter the financial service markets, with mobile network organizations (MNOs) and bigtech companies (such as Ant Financial, Amazon, Facebook, etc.) being prime examples. Peer-to-peer lending platforms are often regarded as having filled market gaps left by banks' SME lending retrenchment after the global financial crisis in the UK and the US.

Safaricom launched M-Pesa, the world's most successful mobile money provider, in 2007 in Kenya, building on its dominant position in the mobile telephony market and against strong lobbying efforts by the banking system. Building up an impressive agent network of over 100,000 made it the channel of choice for most people in Kenya to send payments to friends and families and pay bills within a few years. While Safaricom initially challenged incumbent banks, ultimately banks started operating with Safaricom and other MNOs. Specifically, and as discussed above, a few years later Safaricom partnered with a pan-African bank to offer savings and credit services, a partnership that the same bank subsequently replicated in other countries across the continent (see Suri 2017 for details). Several companies have started mobile loans based on a machine-learning algorithm that uses data scraped from the applicant's phone, social network data from Facebook, and contact lists. In 2017, the Kenyan Treasury launched a pilot version of a digital government bond (M-Akiba), a three-year infrastructure bond that is purchased over mobile phones. The last decade has thus seen a flurry of innovation in the mobile finance space. Over the past decade there has been a debate as to whether the expansion of mobile money is more effective with an MNO-led approach (as in Kenya),

[4] Another impetus for financial innovation can be regulatory constraints that lead to attempts at regulatory arbitrage to circumvent these constraints. I will come back to this below.

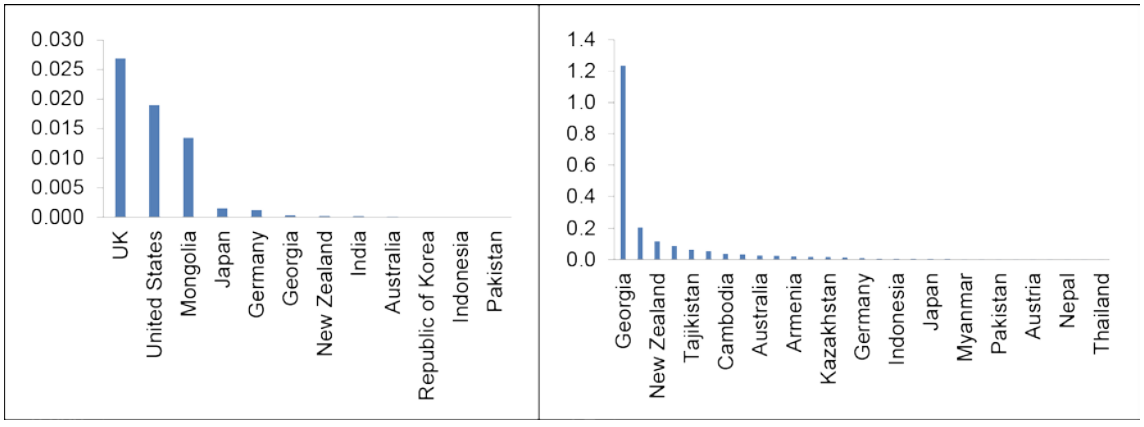
an approach where banks lead, or a mix (Claessens and Rojas-Suarez 2016). While there is no clear evidence on which model is the best, an approach that allows challenge and disruption of existing structures seems important.

P2P lending platforms that match lenders/investors and individuals or small firms looking for external funding have emerged over the past decade. Typically, applicants register on the platform, are subject to a standardized screening (including credit score or a platform-specific proprietary score), and investors can choose whether or not and for how much they are willing to fund different requests. The lending platforms work primarily as a conduit and generally have no direct exposure themselves to the credit risk of the loans; they principally generate revenue from loan origination and servicing fees. While originally it was mostly individual investors that were active on these platforms, most of the funding is provided nowadays by institutional investors. Balyuk and Davydenko (2019) document with data from the two largest P2P platforms that less than 10% of P2P funding is provided by retail investors and that platforms have moved towards "reintermediation," with platforms choosing loans rather than investors deciding through an auction process.

In some countries, fintech lenders have achieved a significant share in specific business lines. For instance, online lenders like Quicken Loans now account for about 8%–12% of new mortgage loan originations in the United States (Buchak et al. 2018; Fuster et al. 2019) and Quicken Loans became the largest US mortgage lender in terms of originations at the end of 2017. Fintech lending accounts for about a third of personal unsecured loans in the US (Balyuk 2019, citing TransUnion data). One of the attractive characteristics of fintech lenders is that they process loan applications more quickly and have a more elastic loan supply (Fuster et al. 2019).

Figure 6 shows cross-country variation in the flow of lending by P2P platforms (a subset of fintech lending) for 2013 and 2017, for Asian countries and several non-Asian economies, based on data from Rau (2019). While some countries, including in the region, have shown quite an increase in marketplace lending, most countries in the region still show a very nascent market, at least they did in 2017. It is important to note that these data are flow- rather than stock-based, which makes comparison with bank credit data somewhat difficult. Even so, lending by P2P platforms is rather small compared to traditional bank lending.

Figure 6: P2P Lending Across Countries in 2013 and 2017, Relative to GDP

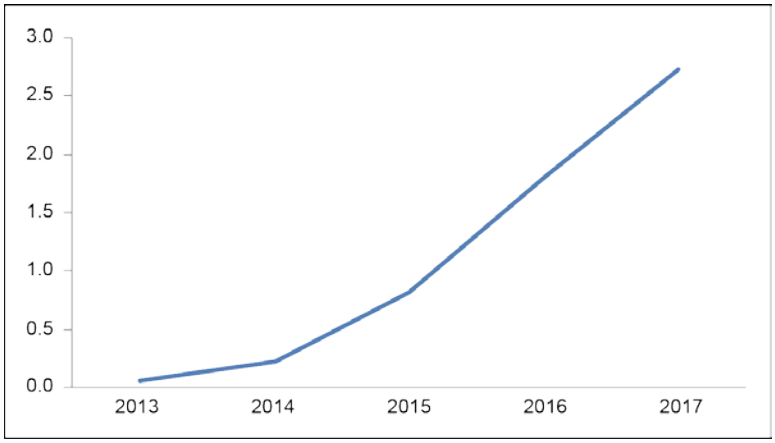


Source: Rau 2019. Data are expressed in percentage.

While the recent expansion of lending platforms seems to have reached a certain plateau in the Western world, there has already been a growth and retrenchment cycle in the

PRC. Lending platforms grew rapidly both in numbers and lending volume until 2017, before they contracted their lending in 2018 and 2019, as a series of defaults and platform failures took their toll on the sector. From a peak of 3,600 platforms in November 2015, the number dropped to 343 in December 2019, and no new platform has entered since September 2018 (Cornelli et al. 2020). Figure 7 shows the rapid increase in P2P lending in the PRC between 2013 and 2017.

Figure 7: P2P Lending in the PRC Between 2013 and 2017, Relative to GDP



Source: Rau 2019. Data are expressed in percentage.

There has been an expanding literature assessing new financial service providers, specifically on whether fintech companies, such as P2P lending platforms, and traditional banks are substitutes or complements. Tang (2019) exploits a regulatory change in the US in 2010 that reduced affected banks' small business lending and mortgage approval rates, showing that borrowers shifting from banks to the platform LendingClub were of lower quality than existing borrowers on the platform, suggesting that banks and lending platforms are substitutes rather than complements, though lending platforms can complement banks with respect to small loans, as borrowers migrating from banks to P2P platforms applied for larger loans than did existing platform borrowers. Similarly, De Roure, Pelizzon, and Thakor (2019) find for Germany that P2P lending increases when banks reduce lending due to regulatory constraints and riskier borrowers shift to platforms. Balyuk (2019) finds, using application data from Proper Marketplace, that obtaining a platform loan leads to easier access to bank credit for consumers, with an overall increase in credit supply, suggesting that P2P lending provides a certification function for bank credit; Chava, Paradkar, and Zhang (2019) show similar effects using credit bureau data. Buchak et al. (2018) find that fintech shadow banks stepped into the mortgage market in the US, where banks reduced lending for regulatory reasons, charge a premium of 14–16 basis points, suggesting that they appear to provide convenience rather than cost savings to borrowers.

There are critical differences between these different players that I would like to focus on in the following. Most fintech companies are smaller players, often start-up companies that focus on specific services (e.g., payment services or small-firm credit). They typically use digital technology to offer a specific financial service targeted at a specific clientele, which they perceive as under- or nonserved by incumbent financial service providers. While they were initially regarded as competitors to incumbent banks, there seems to be more of a complementarity, with banks offering start-up fintech accelerator hubs and investing in fintech companies or acquiring them. From the banks' viewpoint, the advantage of buying fintech solutions in the form of start-ups rather than developing such

solutions in-house is that innovative activity often requires a different culture than that prevalent in the banking sector.

Bigtech (or techfin) companies, on the other hand, are existing digital platform companies that expand into financial service provision. Examples include Vodafone's M-Pesa in East Africa, Egypt, and India, expanding from mobile telephony into payment and other financial services; Mercado Libre in Latin America, an e-commerce platform with growing financial activities; and in the United States payment services offered by Amazon, Apple, Facebook, and Google (Frost et al. 2019; Zetzsche et al. 2017). However, it is the PRC where bigtech companies have so far gained the largest market share. In the PRC, Ant Financial' subsidiary MyBank, Tencent's (part) subsidiary WeBank, and Baidu's (part) subsidiary Du Xiaoman provide lending to millions of small and medium-sized firms (Frost et al. 2019).[5]

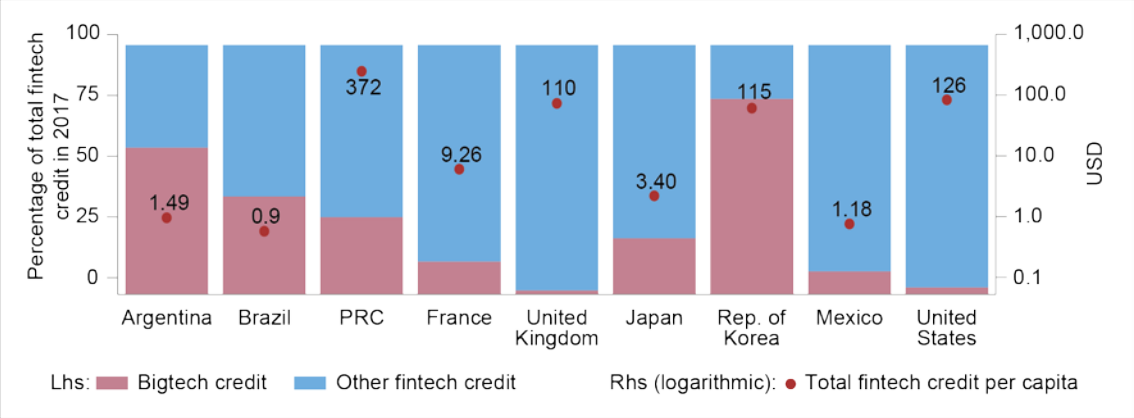
One striking advantage of bigtech companies vis-à-vis fintech companies can be captured by data analytics, network externalities, and interwoven activities (summarized as DNA by BIS 2019). There are strong network externalities as participants' value from participating on one side of a platform (for example, as an online merchant) grows with the number of users on the other side of the platform (for example, buyers). At the same time, a larger number of users allows more data to be collected and analyzed. Such analysis, in turn, can improve existing services and attract further users. This also makes them a dominating provider in their respective business line and allows them to extend into new business (including financial services) through an envelopment strategy. Artificial intelligence, including machine learning, allows them to turn the vast amount of data, including soft information, into (credit) scores and targeted and tailored offers to clients.

There are different factors that can drive the emergence of fintech and, more specifically, bigtech. On the one hand, there might be a gap in financial service provision and thus unmet consumer demand. Before Safaricom launched M-Pesa, domestic remittances were mostly made informally. One of the critical success factors for M-Pesa was that it met this demand. On the other hand, the regulatory framework can be critical for allowing new entrants into a market. M-Pesa's launch in 2007 provides the best example of this, as it was not based on new regulation, but rather on a letter of comfort and against the (self-interested) concerns of banks.

The importance of fintech and bigtech varies substantially across countries, as documented by Frost et al. (2019) and illustrated in Figure 8. Claessens et al. (2018) find that fintech credit volumes are higher in richer countries and economies with a less competitive banking system. Fintech credit volumes are also greater in countries with less stringent banking regulation. Frost et al. (2019) find that these are even more important in countries with significant bigtech credit activity. Focusing specifically on crowdfunding, Rau (2019) finds that it is more prominent in richer and larger economies and countries with strong regulatory regimes and more efficient legal systems.

[5] See BIS (2019) for an overview of bigtechs that have gone into financial service provision.

Figure 8: Fintech and Bigtech Credit in Selected Countries



Note: The bars show the share of bigtech and other fintech credit in selected jurisdictions in 2017, while dots show the total fintech credit (sum of bigtech and other fintech credit) per capita.

Sources: Frost et al. (2019), based on the Cambridge Centre for Alternative Finance and research partners; BIS calculations.

4. BIG DATA – ENABLING BETTER ACCESS TO FINANCE VS. EXTRACTING CONSUMER SURPLUS

As financial intermediaries, banks collect and process information about their clients, including their borrowers, both hard and soft information, and both public and private information (see survey by Liberti and Petersen 2019). This function has given banks a critical but also privileged role in the financial sector and the broader economy. The fixed (and sunk) costs of investing in long-term relationship with borrowers is the backdrop for theories and empirical evidence that limiting competition in banking might increase outreach to opaque borrowers. Bundling financial services gives banks not just a cost but also an information collection advantage (Norden and Weber 2010). Going beyond hard information, soft information, defined as private nonverifiable information, is the basis of long-term relationships. The existence of such soft information can also help banks maintain lending and borrowers keep access to funding during recessions and crises (Bolton et al. 2016; Beck et al. 2018).

Fintech and bigtech companies rely on easily available data that they can obtain from their clients' digital footprint or by scraping the Web. Bigtech companies can even go a step further – they have data readily available on potential customers from their nonfinancial transactions with them; artificial intelligence also allows them to convert soft information collected through social media or other means into hard information. Finally, the network advantage allows them to access more data, improve their models, and ultimately increase their outreach further.

Several studies have shown the advantage that fintech and bigtech companies can have in predicting default using their platform data compared to banks relying on credit registry data. Björkegren and Grissen (2020) show that information from mobile phone call records outperforms credit bureau information in terms of predicting loan default. Frost et al. (2019) show that the loan default prediction model of Mercado Libre in Argentina, an e-commerce platform, is more effective than a model with credit bureau data. Using this information can also expand the borrower population: If the credit decision process were based solely on local credit bureau information, 30% of the target audience for Mercado Libre in Argentina would be assessed as "high risk" and therefore excluded from the credit program. Jagtiani and Lemieux (2018) compare loans made by

LendingClub, a large fintech lender, and similar loans that were originated by traditional banks and show that LendingClub credit scores are more informative for loan performance than FICO scores, showing the usefulness of additional information sources used by fintech lenders. Berg et al. (2020) show that the "digital footprint" data used by a German e-commerce company are very useful for consumer loan decisions; further, a model that uses only digital footprint variables equals or exceeds the information content of the credit bureau score, and using both information sources improves the prediction of loan performance. Iyer et al. (2016) compare the prediction power of credit scores with information available to individual lenders on the lending platform prosper.com. They show that lenders on the platform (who do not see the credit score) substantially outperform the credit score in terms of predicting default; specifically, the interest rate set by lenders predicts default 45% more accurately than the borrower's credit score.

So far, we have taken the view that more data and thus more information is better. We can call this the "rational" or "credit constraints" view of the effect of digitalization on access to finance. However, one can also take a behavioral (myopic, literacy) view, as more data allow financial institutions to better exploit behavioral biases among consumers. Marketing tools, including deceptive advertising, can have a major impact on consumer decisions, as a randomized control trial in South Africa shows (Bertrand et al. 2010). Loan offers were mailed to some 50,000 customers but differentiated with randomized interest rates and different advertising material. Loan demand was sensitive to the quoted interest rates, but also to several features of the advertising. For example, including a photograph of a woman in the accompanying literature (as opposed to a man) was, in terms of the influence on loan take-up, equivalent to lowering the rate of interest by over 4 percentage points per month.

More (granular) data also allow financial institutions more consumer-specific targeting and thus a better discrimination. Ru and Schoar (2017) show that access to detailed customer data allows credit card companies naïveté-based price discrimination, in the form of different credit card offers to different segments of the population. The main differentiation in credit card offers sent to more and to less educated households is in shrouding important information and in front- vs. back-loaded costs. Less educated consumers receive more back-loaded and hidden fees (which only kick in when late for payment), and more shrouded credit card offers.

As more information about (potential) customers becomes available, combined with the increasing use of machine learning and artificial intelligence, more precise targeting will become possible at a lower cost, exploiting behavioral biases. It might also result in cream skimming and crowding out, such as in insurance, where *ex ante* riskier (albeit exogenously) individuals might be excluded from insurance policies.

This raises the important question of defining the ownership of personal data. Tang (2020) shows – using an experiment with an online lending platform in the PRC – that loan applicants attach a positive value to personal data; lower disclosure requirements significantly increase the likelihood that online applications are completed. While the monetary values that she attaches to personal data might be specific to this setting, it is clear that people value (including in monetary terms) privacy and thus control over their personal data. The Open Banking Initiative in the EU allows customers to share data across different banking institutions, while bigtechs are not included in this requirement. As the use of personal information becomes more and more valuable and politically sensitive, further discussions and regulatory and legal changes in this area can be expected in the coming years (BIS 2019).

5. THE ROLE OF REGULATION – FROM REGULATORY SANDBOX TO REGULATORY PERIMETER

As already discussed above, regulation cannot drive innovation; however, it can encourage or prevent it depending on the regulatory approach towards innovation. The traditional regulatory approach is that of first adjusting legislation, then adapting regulation before financial intermediaries are allowed to introduce new products and services. This traditional process, however, can take years and thus not only delay the introduction of new services and products but even make the new regulatory framework obsolete by the time it is finalized. An alternative approach is one of "try and see" or "test and see," as, for example, applied by regulators in Kenya with respect to M-Pesa. Such an approach is not to be confused with a laissez-faire approach. It rather consists of an open and flexible regulatory attitude that focuses on the balance between the need for financial innovation and the need to watch for fragility emerging in new forms.[6] Such an approach would be nimbler in light of the fact that innovations are often unexpected. As argued by Claessens and Rojas-Suarez (2016), reaping the benefits of financial innovation requires a risk-based and functional approach to regulation, ensuring that functionally similar service providers are treated equally as long as they pose similar risks to the consumers of the service or the financial system as a whole. For example, payment services should receive identical treatment whether the provider is a bank or a mobile network operator (MNO) and whether it operates online or from a brick-and-mortar office. This also implies that different types of services should be subject to different intensities of regulation, with only deposit-taking institutions that are (perceived to be) part of the financial safety net being subject to the same kind of prudential regulation as banks.

Ensuring a level playing field and competition is another important challenge for policy makers. In the case of mobile money provision, interoperability between different providers is important, in terms of transactions between providers and access to agents (Claessens and Rojas-Suarez 2016). Different market situations call for different policy solutions: In Kenya, M-Pesa gained an early market domination and was forced through the threat of regulatory action to open up its agent network; in neighboring Tanzania, where several competing MNOs dominate the market, there was a voluntary agreement between different providers. In the case of bigtech companies, the control over personal data will be important for the future. To what extent can users share their personal data collected by one bigtech with other financial service providers?

Another challenge is Know-Your-Customer (KYC) requirements in countries with a large incidence of informality. Rigid KYC requirements have excluded large shares of the population in many developing countries from the formal financial system; risk-based KYC requirements (which exempt customers below a certain threshold of the number and amount of transactions) can be helpful in this context. At the same time, such requirements allow large parts of the population to be pulled into the formal market economy, opening up additional opportunities for them but also for the government and public service provision. This is certainly a trade-off, which will be defined differently across different countries and societies.

[6] See Burns (2018) for an in-depth discussion on the regulatory attitude of the Central Bank of Kenya as a decisive factor in the success of M-Pesa.

The objective of financial inclusion has prompted authorities to offer regulatory sandboxes – regulatory frameworks that allow the time-bound testing of new financial products, technologies, and business models under a set of rules and supervisory requirements, with appropriate safeguards. Such frameworks can be a win-win-win situation for everyone involved. Supervisors learn about financial innovations, fintech companies can experiment with legal certainty, and the broad population of customers will be exposed to providers and products only once they are vetted. The objective of such sandboxes is to allow the product to see the light of day with a lower initial regulatory burden. Jenik, Schan, and de Montfort (2019) report that most regulatory sandboxes are dominated by payment, market infrastructure, and wholesale innovations, but most of these innovations do not target excluded or underserved segments of the population. UNSGSA (2019) concludes that regulatory sandboxes are "neither necessary nor sufficient for promoting financial inclusion," and there might be more efficient and less costly and complex tools to foster inclusion-targeted financial innovation, such as innovation offices that facilitate regulator-innovator dialogue and engagement. Different from regulatory frameworks are innovation facilitators, hubs, or accelerators, private facilities that allow innovators to test their products.

A very different challenge from the regulatory sandbox is to define the regulatory perimeter, i.e., institutions and market participants that fall under financial-stability regulation and supervision and thus also under the financial safety net.[7] Ample experience has shown that tighter regulation leads to evasion efforts by financial market participants and shifting of risky activities outside the regulatory perimeter. Over the past ten years (partly as a reaction to the global financial crisis) expanding the regulatory perimeter towards shadow banks has been high on the agenda. Recent financial innovations might pose new challenges in this respect. On the one hand, lending platforms that connect investors/lenders and borrowers are clearly outside the regulatory perimeter and thus should not be covered by the financial safety net and deposit insurance. But what if the investor population on these platforms grows to a size that makes them all but "too many to fail"? Similarly, bigtech companies might pose a similar challenge for regulators as they move into financial service provision. Even if such provision is made via a regulated subsidiary, there are risks of spillover from the nonregulated nonfinancial part of the business to the regulated financial part. An additional concern is that many of the bigtech companies are international in nature, while financial sector regulation is – with few exceptions – national in nature.

Beyond stability concerns, consumer protection is critical as financial innovators introduce new products and services and extend the banked population. The lack of trust in financial services has been an important demand-side constraint for financial inclusion, partly related to fraudulent activities and crisis experience. Effective consumer protection in financial services focuses on four key areas: (1) consumer disclosure that is clear, simple, easy to understand, and comparable; (2) prohibitions on business practices that are unfair, abusive, or deceptive; (3) efficient and easy use of recourse mechanisms; and (4) financial education that gives consumers the knowledge, skills, and confidence to understand and evaluate the financial information they receive (Rutledge 2010).

[7] Examples of institutions that were outside the regulatory perimeter and caused significant financial fragility include LTCM in 1998, whose failure forced regulators to have all counterparties agree to a resolution that stabilized the system. The failure of Lehman Brothers in 2008 is considered the trigger of the global financial crisis.

One important issue is the institutional responsibility for financial inclusion and consumer protection. In many developing and emerging markets, financial sector authorities (often the central bank) have responsibilities for both stability and financial inclusion, while in advanced countries these authorities focus mostly on stability (though the Bank of England has competition as a secondary objective), with consumer protection in separate institutions. While this is not the place to embark on a discussion on regulatory architecture, the responsibility for consumer protection should be separate from the institutional responsibility for stability and protected from undue political and industry interference.

6. CONCLUSIONS

This paper has summarized recent developments in technology-driven financial innovation and how they have affected financial inclusion. It has discussed the enormous opportunities that recent financial innovations offer, but also the risks that might come from them. It is important to note, however, that any discussion on the state of financial innovation can only be a snapshot, as the financial service landscape is moving rapidly. This puts a higher burden on regulators across the globe as they constantly have to re-evaluate the trade-off between efficiency and inclusion, on the one hand, and stability, on the other. A dynamic regulatory framework is most apt to deal with such challenges.

What will be the impact of COVID-19? The trend towards digitalization might increase even further in the wake of the pandemic, as social distancing (which should be renamed “physical distancing”) might become the new norm and personal interactions between banks and clients carry even higher costs. In addition, bigtech companies are likely to come out of the crisis further strengthened, with a large cash pile and in a strong position (and possibly a strong appetite) to expand into financial service provision. This might put additional competitive pressure on banks in their core business lines.

We have learned a lot over the last few years, but the quickly moving financial innovation also raises lots of new questions: Over the last century, banks have bundled different financial services, but to what extent is such a bundling necessary or can financial services be unbundled and offered by different providers? To what extent is soft information and face-to-face contact necessary for efficient financial service provision or can financial service provision be reduced to arm’s-length digital decision-making? Where is the trade-off between an open and contestable financial system and the necessary regulatory framework? There is a wealth of questions to be answered in the coming years, hopefully with cooperation among academics, regulators, and practitioners.

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