

Market Structure, Regulation and the Fintech Revolution

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Abstract: We analyze differences in Fintech developments across countries to understand the enablers of disruption and change with a focus on digital money and payments, the area where most activity has taken place. We find that the factors that better explain cross-country differences are the initial market power of incumbents, public policies related to regulation or the provision of an efficient payment infrastructure and the existence of digital networks that can easily migrate into financial services. Throughout our analysis we look at the response of incumbents, in particular banks, to changes in the competitive landscape.

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1. Introduction

Recent technological changes in financial and banking services are seen as potentially disrupting the traditional actors in these markets (banks, asset managers,...). These technology shifts are driven both by changes in the demand and supply side. On the demand side, customers are requesting immediate and costless transactions and an always-mobile experience. On the supply side, the online interactions facilitated by mobile technology, the availability of big data and processing power or the developments in new forms of electronic money and payments are all examples of technology opening up new possibilities.

From a market structure and competitive point of view there are different types of players, some driving these changes, some seeing them as a threat and needing to react to them. Traditional financial institutions, in particular banks, need to adapt to a more competitive and fast-moving environment. Fintech companies are bringing innovations from the technology side, either in specific services or as full competition to established institutions. Finally, BigTech firms that dominate platforms driven by ecommerce (Amazon, Alibaba), social media (Facebook, Google) or the mobile hardware (Apple, Samsung) are also venturing into this space, looking for ways to leverage those platforms while strengthening the reach of their ecosystems.

The degree of change and the type of disruption caused by these technology innovations varies across countries. These differences are partly the result of a different starting point when it comes to market structure but they are also shaped by the reaction of policy makers (regulators) to these new technologies. In many emerging markets we have seen mobile telecom companies becoming “banks”, due to the initial low level of banking and the omnipresence of mobile telephones. In Asia, mobile payments have grown at rates not seen anywhere else driven by companies that are looking to create overreaching ecosystems (Alibaba, Tencent, Grab). In Europe traditional banks are holding their position but open banking and new digital banks represent a significant challenge. And in the US, the dominance of the credit card culture and the power of the companies behind them has resulted in a slower pace of innovation on payments and a focus on other areas of finance (asset management or lending).

This paper provides an analysis of the Fintech cross-country experience using a framework that emphasizes the role of market structure and regulation as the key factors driving the shape and speed of disruption. We focus our analysis on the digital money and payments sector. This is a sector that is central to financial and banking activities and one where the attention and funding by investors as well as entry by new players are clearly ahead of the other activities. Although our focus is on digital money and payments, we also provide a brief discussion on how other parts of the financial system are changing and how those changes can be mapped into our analysis.

2. A Taxonomy of Fintech

2.1 Fintech: the reality behind a buzzword

The term Fintech is used to refer to a set of tasks, activities, new products, being implemented or developed in financial and banking services that integrate new technologies.¹ And where “new technology” is understood in a broader sense as a combination of processes and specific technology solutions that are either making current activities more efficient or adding dimensions to their services that were not present before.

Fintech has received a lot of attention in recent years and attracted increasing amounts of funding (Carstens (2018)). Like with any new technology development, Fintech can be seen as a too-generic term and possibly a buzzword that overhypes ongoing long-term trends. There is some truth to this. The use of technology, digital assets and processes in the financial sector is not new and like with any new technology we have witnessed some excessive euphoria. However, there are several trends that have come together in recent years that are possibly accelerating developments that have been in place for years. The changes are coming both from the supply and the demand side of the market.

On the supply side, while processing of large amounts of digital information has been central to financial institutions, the recent increasing ability of computing power partly through the use of cloud services represents an important change in the cost but also scalability of these tasks. Similarly, while online banking has been around for decades, the widespread use of smartphones has opened up opportunities that were not possible before. It is not just online, it is “always online” what matters. The ability of customers to constantly interact with financial institutions can truly be a game changer.

Also on the supply side, some new technologies can be seen as the ultimate enablers for financial markets of a promise of a decentralized world that the internet started more than 25 years ago. With the internet, the sharing of information via a browser led to an explosion of content creation and processing of information by individuals and companies that before did not have the means or the scale to do so. Developments in financial markets, such as cryptocurrencies or, more generally, distributed ledger technologies are seen as a large step in the direction of decentralization. These technologies have widened the access to financial services and produced a set of business ideas built on those platforms.²

On the demand side, the increasing use of new technologies combined with the growing importance of digital platforms and ecosystems in our daily life has changed both the profile of customers and their demand. The always online presence and the expectation of immediate outcomes has translated into demands for fast, efficient and costless financial transactions. The most obvious example here is payments where expectations of seamless

¹ See Financial Stability Board (2017) for a definition of Fintech.

² The fact that one can today create a financial service that handles monetary payments using a platform like Ethereum resembles the revolution of decentralized and small-scale information providers and ecommerce merchants that the internet created.

and instant transfers of money by clicking on a virtual button of a smartphone app are becoming universal. The recent global crisis caused by COVID-19 is likely to accelerate some of these trends. For example, when it comes to international remittances, we have seen progress in the use of digital remittances in the last two months that are equivalent to the progress of four years.³

2.2 Fintech activities

There are many areas in the financial sector that are being affected by new technologies, and these areas are linked by significant interactions between them when it comes to both the customers' side and the technologies being used. The traditional players in these markets, banks, have always operated in many business lines: deposit taking, loans, payments, wealth management and even insurance. While some of the innovations we are witnessing create new entrants in a particular segment, some of these new entrants might quickly expand into the rest of the market.

There are many different ways to create a taxonomy of Fintech activities and their origin (Ehrentraud et al. (2020) and International Monetary Fund (2019) are good examples). There is a set of new enabling technologies such as cloud computing, mobile access, APIs, cryptography or biometric authentication. These technologies are creating opportunities for new companies to enter particular business lines but also allowing incumbents to innovate and create new channels for their services.

These technologies are affecting all financial and banking services. Payment technologies are being disrupted by a variety of new technologies that allow for the seamless execution of payments using mobile devices. Cross-border payments are being disrupted by new players that propose solutions that are much faster and cheaper than the traditional channels. New forms of saving and wealth management services are appearing, in some cases by making use of P2P markets where savers and borrowers meet without intermediaries. In the area of wealth management, AI is allowing for the automation of the role of investment advisors. The same P2P networks and AI technologies are changing the way we borrow. Credit scoring can now be done by AI processes and intermediaries can be removed via P2P lending. Analysis of big data combined to better processing techniques can also help financial institutions manage risk better. Finally, there is large number of technology innovations affecting operational aspects of these businesses. From the ability to store and share information across lines of businesses or financial institutions to the use of technology to manage regulatory compliance.

In all these areas we see a combination of small Fintech startups, incumbents (banks, asset managers) reacting by innovating or partnering and BigTech companies making use of their technologies and the reach of their platforms to diversify into one or several financial lines of businesses.

³ See <https://www.forbes.com/sites/danielwebber/2020/05/28/how-money-transfer-companies-squeezed-four-years-of-digital-growth-into-just-two-months/>

In our analysis we focus on the area that has received the most attention and where larger disruptions are seen: digital money and payments. One of the reasons why we have seen more activity in the area of payments is that this is one of the most attractive segments with a higher return on equity. In addition, it offers one of the highest levels of engagement with customers and access to data. This is true both in emerging and advanced economies. Other similar activities with high engagement and high ROE are asset management and to some extent consumer finance. On the other extreme capital markets and investment banking or commercial and transaction banking are the areas where engagement and ROE are the lowest (McKinsey (2019)).

It is also the case that payments and digital money is central to most other activities in financial markets as payments have to be associated to any financial transaction. And it might potentially be the most disruptive one because it touches on the backbone of the banking system through its influence on bank deposits.

One final advantage of focusing in the area of payments is that this is an area where differences across geographies are large. This diversity will allow us to explore differences in market structure and regulation and how they play a prominent role in shaping innovations and disruption.

3. Digital, Money and Payments⁴

3.1 Innovations in money and payments

Digital money and payments have been around for many decades. The most common form of digital money has been a combination of a bank account (a digital record on the bank's databases) and a payment technology. The payment technology was usually a credit card or a debit card on the customer side and a point of sale terminal on the merchant side.

Innovations are happening both on the digital asset side and the payment technology. When it comes to the asset itself, new technologies allow for the creation of alternative representations of value that can serve the purpose of both a store of value and a means of payment. Innovation in these assets has taken two forms. First, cryptocurrencies, such as Bitcoin represented a radical deviation from traditional forms of money as they introduced their own unit of account with their own monetary policy. They relied on a technology where the transfer and ownership of the assets could be verified safely by a decentralized system. A second innovation has come from a variety of new forms of digital money (e-money, electronic wallets, stablecoins) that rely on the traditional unit of account but create new networks and channels through which the assets could be used.

The payment technology was evolving fast even before the Fintech revolution. From the original credit card imprinter we had moved to the use of the magnetic card then to PIN codes and more recently to contactless payment. On the merchant side the ability to instantly query the customer bank for the existence of funds reduced the risk of the payment

⁴ This section is partially based on Fatas (2020).

not going through. More recently we have seen the use of QR codes as an alternative form of contactless payments and biometric authentication as a replacement of the signature or the PIN code used before.

But the true innovation in this space has happened when we combine the new forms of digital assets with a particular payment technology. After all, for money to be a medium of exchange you need a payment technology. Most of the Fintech startups in this area fall into this category. Electronic wallets are a way to combine a digital representation of value with a payment technology, one that is adapted to a mobile, digital form of life as the asset can be accessed via a variety of devices. These electronic wallets took over mobile payments in some countries (WeChat or AliPay in China), they became a way for individuals to gain access to electronic payments (M-Pesa in Africa), and became the entry point into banking (as in Revolut or Moneo in Europe) or a dominating force in ecommerce payments (PayPal).

3.2 From physical to digital money

Economics textbooks define money as an asset with three properties. First, money serves as the medium of exchange. Second, money is denominated in the unit of account and in some cases defines it. Third, money is a store of value. Strictly speaking, all assets are a store of value but we ask for money to be a *stable* store of value.⁵

This definition of money is anchored in the historical evolution of money and fits very well with physical currency. Banknotes define the unit of account, they are a good store of value (if inflation is properly managed) and they serve as a medium of exchange. The physical exchange of banknotes represents the transfer of value given in exchange for goods, services or other assets.

As we move from physical cash to bank accounts, two of the functions of money are still easy to identify. Bank accounts are denominated in the unit of account as they are redeemed at a fixed value (against banknotes). And because this value is guaranteed because of strict regulation as well as deposit insurance, this makes them a good store of value.

But the function of medium of exchange is less obvious. To use the value of a bank account in exchange for goods or services requires a payment technology. More modern forms of payment make use of technology that involves credit or debit cards, online banking or smartphone apps to transfer the value. In all these cases, all the information is transmitted via computers and networks, so we can refer to both the payment and the asset as digital. Many of these technologies have been used for decades, i.e. digital money is not really new.

Where things can get complicated is when we look at the details of payments. The payment technology used by bank deposits and other forms of digital money might require the participation of several other organizations or networks. As we will argue below, most of the Fintech innovations are about disrupting this complex, and in many cases inefficient, payment infrastructure. But, interestingly, by doing so they might also be redefining the

⁵ This is in many ways a desirable property but not a necessary one. Countries with high inflation are still using their currencies as money even if they are not a good store of value.

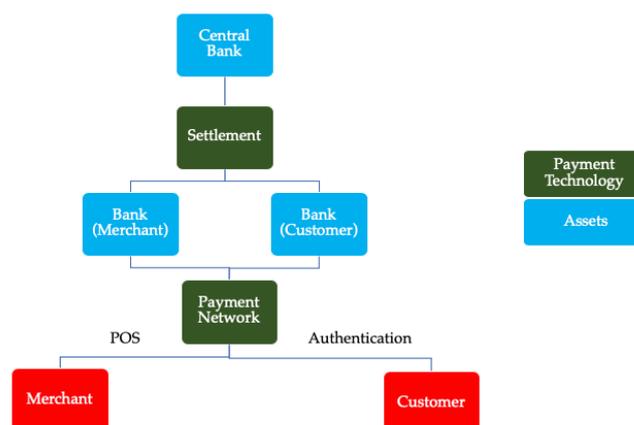
concept of digital money even if they do not fundamentally change the nature of the asset that underlie the transaction.

3.3 The traditional payment infrastructure

The traditional payment infrastructure consists of digital assets held in traditional bank accounts and a payment technology.⁶ These assets change ownership through settlements via the balance of banks at the central bank (reserve accounts). In the special case where the bank accounts of the payee and the payer are in the same bank, the payments or transfer of value does not require access to the central bank settlement. We will refer to this as a closed-loop network.

The two assets, bank deposits and accounts of commercial banks at the central bank, represent the backbone of modern payment systems.⁷ Banks can be seen as intermediaries in this process by providing access to central bank money to customers. A representation of this infrastructure is summarized in Figure 1.

Figure 1. Traditional Payment Infrastructure



To be able to execute a payment, there needs to be a payment technology that connects the two assets and executes the transfer of value. These technologies are complex and typically involve several steps. First, when the customer and merchant interact, there needs to be a process of authentication on both sides that connects them to their assets (bank accounts in this case). That process traditionally has been run through an infrastructure relying on credit card companies. This is typically a proprietary closed system requiring that both the merchant and the consumer have a technology or device that is part of that infrastructure. In the case of a merchant this is a point of sale terminal and in the case of a consumer a credit or debit card. As the payment goes through, the settlement will need to be executed, via the central bank.

⁶ In our analysis we typically refer to retail payments. But many of our arguments appear to wholesale payments. Developments in this area are similar to those of what we have seen in retail payments and they are motivated by, for example, the creation of a faster end more efficient securities settlement (see Bech et al. (2020)).

⁷ These two assets are the digital component of the monetary base and the money supply.

In most countries banks were not just at the center of the assets but also in control of the payment technologies. Visa or Mastercard were originally launched by a consortium of banks. And even when they became independent they have always been close partners of banks. In fact, in many countries credit cards are issued by banks even if they are branded under the name of the credit card company that controls the payment network. In addition, the final settlement takes place via the exclusive access that banks have on central bank accounts. In this environment, competition to banks was very limited.

3.4 Full disruption: Cryptocurrencies

Cryptocurrencies represent a complete challenge to the infrastructure described above. A new technology (Blockchain) delivered the creation of both a digital asset and a payment technology in an environment that did not require intermediaries but instead was running on a new decentralized governance structure.

Some of these changes came together for a variety of reasons. First, bypassing banks required the creation of a separate asset. For this asset to serve as a medium of exchange it needed to be connected to a settlement system. Access to the central bank was out of the question (it would require living with the same constraints as any other bank), so a completely new currency based on a new paradigm needed to be created.

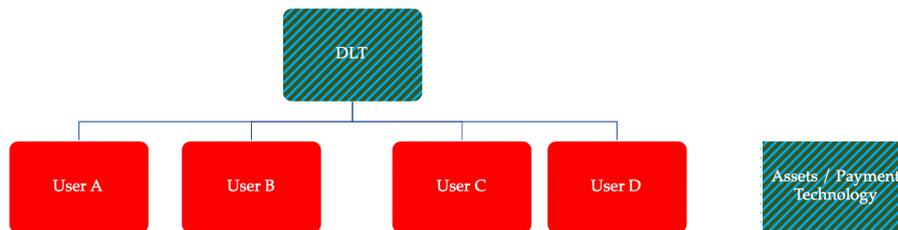
With a separate unit of account there was a need to decide how the value of the currency would be determined. The historical development of Bitcoin was such that not only it was a challenge to the intermediaries, banks, but also a challenge to the central bank. The paper published in October 31, 2008 that served as the white paper of Bitcoin made it very clear that central banks were part of the problem. *“The root problem with conventional currency is all the trust that’s required to make it work. The central bank must be trusted not to debase the currency, but the history of fiat currencies is full of breaches of that trust.”* (Nakamoto (2008)). What this meant is that the new currency would set a unit of account that would fluctuate according to the “monetary policy” rule stated in the Bitcoin rules. Behind that rule there was a view that a fixed supply, in the long-term, would create a very stable store of value.

We will ignore the macroeconomic assumptions behind bitcoin but the addition of a new currency and unit of account means that the store of value and the unit of account properties of money are not simply inherited from current forms of digital money. And a parallel unit of account means volatility that could limit its adoption. In a world with a dominant unit of account, assets based on a separate one will not be perceived as good store of value.

An interesting feature of Bitcoin is that it made the payment technology inseparable from the asset itself, taking us back to a feature of physical money. There is a single database using distributed ledger technology (DLT) of records where the value of balances is kept. Payments require changes in those balances through communication with the database. By

eliminating all intermediaries we have a closed-loop “centralized” system (in some sense we all bank with the same bank).⁸ Figure 2 summarizes this new technology.

Figure 2. DLT Payment Solution



Bitcoin was the first currency using this model but, soon after, many other cryptocurrencies that used a similar model followed.⁹

In summary, the idea of reducing intermediaries, the notion of an always-on and real-time payment system was a fundamental driver of this innovation.¹⁰ However, the volatility of the value of the new units of account was too large of a deterrent for the new digital forms of money to be adopted.

3.5 Electronic wallets

A second innovation, also geared towards streamlining the set of intermediaries in the payment infrastructure, is the creation of repositories of value, which we will call electronic wallets (sometimes referred to as e-money).

Electronic wallets can be seen as closed-loop payment systems, in that sense similar to Bitcoin. These wallets can be accessed easily and can be used to execute payments or transfers between individuals or companies. The big difference is that they are denominated in the traditional unit of account and have a fixed redemption value.

The classic example of this development is M-Pesa and similar initiatives in several African countries. Access to banks was limited in these countries while mobile phone contracts reached everyone. The large network created by the mobile phones combined with a technology that can easily handle the payments makes it an ideal case for the development of these new forms of electronic money.

⁸ In practice, some intermediaries (cryptocurrency exchanges) were created to manage interactions with the ledger. They facilitated the communications and the technology of keeping the asset safe.

⁹ There are more than 5,500 digital coins that are listed on exchanges although only about 40 of them have a daily trading volume of more than \$50 Million. Source: <https://coinmarketcap.com> as of June 19, 2020.

¹⁰ There were of course some technical limitations including scalability and the delay in validation so that it was not a true real-time payment system.

Mobile payments in China started as a natural extension of the social media networks or ecommerce platforms created by large tech companies. WeChat Pay started as a P2P transfer platform within their network. AliPay started as a payment platform within the ecommerce system of Alibaba. As the payment systems gained acceptance they migrated to transactions outside of their original platforms. Similarly Paypal's growth was associated by its acquisition by eBay and later developed on the heels of the growth of ecommerce transactions.

3.6 Stablecoins

A third type of digital money was born as an attempt to exploit the potential advantages of distributed ledger technologies without the volatility associated to cryptocurrencies such as Bitcoin. From an economic point of view Stablecoins can be redeemed at a fixed value relative to a traditional currency. Conceptually, this fixed value redemption is not different from the one found in electronic wallets or even bank accounts. In all these cases there is an asset that can be exchanged at a rate of 1:1 for a regular currency. \$1 stored in a checking account at Citibank or at a Paypal account or at a Stablecoin with a fixed redemption value to the US dollar can all be seen as interchangeable assets. There can be however several differentiating elements:

- The technology being used. Is the asset relying on traditional storage technologies managed by intermediaries or is it using a decentralized DLT? While this question might be relevant for some important regulatory issues, from an economic point of view there is not much to say about the underlying database technology. What really matters is the risk incorporated into the asset and the possibility of enforcing standard regulations on those assets (including, for example, resolving disputes on payments).¹¹
- Whether there is a separate unit of account (at least nominally). Unlike in the case of electronic wallets that rely on the traditional unit of account, stablecoins tend to have their own unit. The newly proposed LibraUSD for retail payments or the JP Morgan Coin for wholesale payments come with their own unit of account. But this unit of account has a fixed 1:1 value relative to the US dollar. What is the economic difference? From an economic point of view what matters is the credibility of the redemption value (more on this below) not the name.
- The potential use as money (i.e. its ability to be used as a medium of exchange). The possibility of using stablecoins as a medium of exchange relies on their ability to connect to standard payment networks. Many of these coins are immediately available for P2P payments within their platforms but executing transfers or payments outside of the platform requires a bridge to the existing infrastructure. The fact that there is such a restriction is sometimes by design. What these coins

¹¹ In addition, the separation between these technologies have become blurry over time. The definition of what constitutes a "blockchain" or even a decentralized technology is a source of endless and not very fruitful debates that we will ignore it here.

represent is an attempt to create a particular exclusive platform where access requires holding the asset.¹²

- The trust in the redemption mechanism. This is a key issue for these new assets although the logic is not different from any other asset. Some of the stablecoins claim to rely on a system that mimics that of a fixed exchange rate commitment of currencies. For example Tether originally based the logic of its fixed redemption value on the 100% backing by USD assets, resembling a currency board type of arrangement.¹³ But the parallel is not exact. Fixed exchange rates are abandoned because they are unsustainable from a political point of view not just because of economic reasons.¹⁴ There is no obvious parallel to stablecoins here. There is no monetary policy associated to these coins, there is no government in desperate need of seignorage, so the possibility of a “devaluation” must be associated to a failure of the business model to maintain the value of the assets or just fraud. In many ways this resembles more the enforcement of the commitment of any financial institution to honor its liabilities denominated in a traditional currency, in particular those that resemble money. Reneging on a fixed redemption value by a stablecoin can then be seen similar as a bank reneging on the value of the deposits it holds. Addressing this issue requires the proper regulation for all these assets that treats the same risks with the same regulatory constraints. We will discuss this later in the paper.

One final interesting development in the world of stablecoins is the launch of global stablecoins. The original Libra proposal was focused on the creation of a global stablecoin whose value was fixed relative to a basket of currencies. From an economic point of view there are many similarities between a single currency stablecoin and one based on a basket of currencies. However, there are fundamental differences when it comes to volatility relative to the local currencies. In addition, in countries where there are concerns about their currencies could see this as a threat because it can create a parallel currency and challenge monetary policy (Fatas and Weder di Mauro (2019)).

3.7 Fintech and the plumbing of the payment system

Electronic wallets and stablecoins are new forms of digital money that can be used for payments. But in order to be a medium of exchange, they need to be connected to a payment technology. The payment infrastructure is complex, with multiple parts controlled by different institutions. In this section we explore the payments networks and the processes that link all their parts together. We stress how the success of new forms of money relies on the efficiency and convenience of the payment technology associated to them. Also, the issue of interoperability between different networks becomes key to define the competitive landscape. An important insight is that market power shifts as innovation transforms some services into commodities while making other parts central to the new technology.

¹² There are some interesting economic considerations about whether launching stablecoins which are restricted to a particular platform can be beneficial to companies. See You and Rogoff (2019) for an analysis of this issue.

¹³ Libra also makes use of the currency board parallel in its white paper.

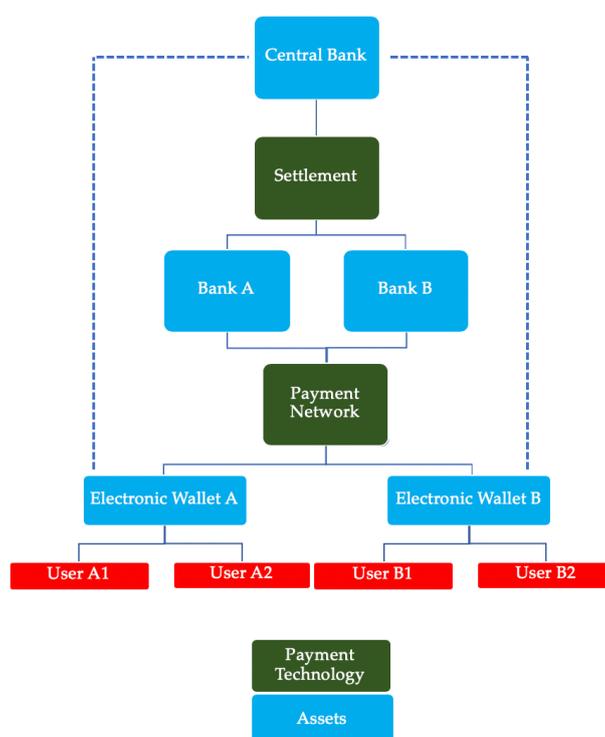
¹⁴ Hanke (2002).

3.7.1 Connecting the networks

An electronic wallet such as the proposed LibraUSD in the US or a WeChat wallet in China can always execute real-time payments within its network and the costs and speed can be fully controlled by the Libra association or WeChat. But when a transfer or a payment is done to a different wallet, it requires a connection to the rest of the system.

Figure 3 schematically represents this interconnected set of networks. Overall the system has become much more complex with additional layers of intermediaries for some transactions. Separate networks can connect to each other using banks and the traditional payment infrastructure. Alternatively, if the central bank gives them direct access the settlement can happen straight at the central bank level without the need for banks to intervene.

Figure 3. Payments with multiple networks



As the system becomes more complex, the connection of each of these networks raises both technology and competitive issues. From a technology point of view, while the redesign of the system is driven by customers' demand for speed, convenience and low cost, the increasing complexity might make that goal more difficult. Of course, the widespread use of fast internet connection and newer and faster protocols should facilitate this task. From a competitive point of view, each of the players might have incentives to limit these connections to maintain their market power.

As an illustration we can think about electronic wallets. They could potentially manage payment across networks using the traditional infrastructure of credit card companies. For example, if you want to add balance to your PayPal account from your bank account you

could do so using a credit card. But the credit card fee and potentially the speed of the transaction might not be what the customer is expecting and what ultimately PayPal wants to deliver. Similarly, if you want to use an electronic wallet to execute in-store purchases, you need to be connected to the POS of the merchant that is likely to be exclusively run by credit card or debit card companies.

This is why innovation by FinTech companies has been redirected to the creation of the new “plumbing” of the payment system. A set of additional “pipes” that link networks and help new entrants bypass the market power of incumbents. A good example is the creation of additional channels for bank-to-bank payments. Transfers of value between bank accounts can simplify payments and transfers as they bypass the credit card company infrastructure. Electronic bank-to-bank transfers using online banking have been around for decades but there were always initiated by the holder of the account and they typically relied on settlement systems that were too slow (and potentially costly).

The first necessary innovation was to improve the settlement system, which partially relies on the central bank. In many countries central banks have responded to the task and quickly launched instant payment systems. In other countries, such as the US, the slow response of the central bank has led to the creation of a parallel real time settlements network run by banks (via The Clearing House).

The second improvement is to ensure that FinTech players can connect to this settlement system and the pool of assets held at bank accounts. For P2P transfers the task requires access to bank accounts for executing orders. Some of this involves fast pipes between banks (Zelle in the US is a successful example of the creation of these pipes). In other cases it is about creating an interface that allows FinTech apps or software access to the bank accounts of their customers. This might require regulatory action (such as open banking) or the willingness of banks to collaborate with these new initiatives. Banks might be willing to collaborate in order to maintain their current position in the market as holders of deposits. Unless customers feel that those deposits can be used seamlessly for payments in transactions they will explore using alternative forms of digital money. As an example of these new processes, many countries have moved fast into the creation of QR-codes payment systems. This allows for easily identification of the accounts of merchants (and possibly buyers) that together with a layer of software can execute a bank-to-bank transfer as an in-store payment.

An important insight from all these examples is that we are building these new “pipes” by relying on an existing infrastructure, the internet. All of us have devices connected to the same network (the internet). We then build a software-based infrastructure of payments to replace the traditional proprietary based point of sale infrastructure. This infrastructure benefits from standardization of digital IDs, authentication that allows for interoperability. The combination of all of this allows for atomization of payment services and the co-existence of multiple players.

3.7.2 *The nuts and bolts of the payment infrastructure*

As the different networks get connected there is an increasing number of parts that play an important role. The importance of each of them can be affected by both technology and regulatory changes. These changes affect the relative power of each of these players and can lead to shifts in the market power away from the traditional institutions, such as banks.

As an example, connections to the network requires a device. On the customer side that device used to be the credit card. But increasingly the device is simply the smartphone. This can be used for P2P transfers or for in-store payments via contactless payments (QR codes, NFC chips). The smartphone can come with features that are controlled by the company producing the hardware. One of these features is the ability to use biometric authentication. This represents today a key piece of the payment process but it might become even more relevant in the future as biometric identification becomes required for all forms of financial transactions. As an example, many regulators are already recognizing the importance of these authentication methods and allowing for higher limits of payments when a biometric technology is being used in a payment.

Samsung, Apple or Google have entered this space by offering their own forms of payment (Samsung Pay, Apple Pay or Google Pay). Initially, none of these solutions have relied on the creation of separate electronic wallets. The digital asset remains the deposit on the bank account and the payment makes use of the credit card infrastructure. While the disruption is limited, it allows these BigTech companies to control a unique part of the process. If they are successful, it might be natural for them to then develop electronic wallets where the asset is held and potentially disrupt other parts of the financial system (the Apple credit card is an example of this).

A second example is the increasing number of Fintech companies working on connecting different pieces of information via APIs (application programming interfaces). Some of these are offered as a service to banks, some are used to build consumer-friendly apps. Plaid in the US builds APIs for financial institutions to plug them into a network of partners. Lenders are then able to collect information on the financial history of their applicants to better assess their risk. In Europe, with regulators pushing for open banking, we see the growth of aggregators of bank account information.

4. The Regulatory Response

4.1 The policies

The introduction of new forms of digital money and payments has led to a rethinking of the role of regulators and more generally the role of government intervention. There are several dimensions to consider. First, financial markets are heavily regulated and any new product can alter the competitive landscape and create instability in the financial system. In addition, some of these products can mislead investors because of their novelty. How should the regulatory framework be adapted to deal with these new products and players?.

Second, central banks play a central role in digital money and payments. The reference in digital money is the reserves of commercial banks at the central bank. They can be exchanged at parity for physical currency and together they anchor the value of the unit of account. But reserves are not offered directly to individuals and businesses, banks are required as intermediaries. As digital forms of money and payment are becoming more common, should the central bank offer direct access to reserve accounts? This is what is known as central bank digital currency (CBDC). Also, central banks manage the settlements system and can influence the competitive nature of the market by changes in the efficiency of the system or by broadening access to a larger set of financial institutions.

Finally, there are a set of other regulatory issues around the issuance of bank licenses, setting of standards and interoperability that are becoming more relevant as new entrants bring different technology solutions.

4.2 Regulation of assets

When it comes to money and payments, regulation has been designed around the business model of banks. (BIS (2018)). A bank holds deposits that can be redeemed by central bank notes at a fixed value of 1:1. Banks are engaged in maturity transformation through lending and purchases of other assets and the liquidity and solvency risks are minimized via regulation and deposit insurance. This strict regulation leads to a perception in most countries of bank deposits as being a digital equivalent of physical money.

There are other assets that are being perceived as similar to bank deposits. Money market funds appeared in the 1970s and were immediately seen as a potential threat to bank deposits. Under some conditions they offer similar money properties as bank deposits (access via debit or credit card) and they offer a higher rate of return with similar risks. The risk involved in maturity transformation and losses on assets held was minimized through strict regulations, regulations that were strengthened during the global financial crisis.¹⁵ Money market funds do not offer deposit insurance but they might be perceived as safe as bank deposits.

And then, there are many other assets that cannot be considered money because they are not as liquid and carry a much higher risk. Mutual funds or ETFs or any risky security will fall into this category and is subject to very different regulation.

Regulators have typically followed an approach to new forms of digital money by trying as much as possible to fit these new assets into the previous boxes, as an example, the Swiss regulator (FINMA) guidelines on stablecoins makes it very clear the principle: “substance over form” and “same risks, same rule”. Other regulators have followed a similar approach.

As an example, let’s think about electronic wallets, an activity that we have seen growing in many countries. Given that they are presented as a form of money and payments they should receive a treatment similar to current forms of money. The simplest approach is to

¹⁵ In the US, a new regulation (Rule 2a-7) required that money market cannot longer have average maturity exceeding 60 days and there were also stringent criteria on ratings.

have those new assets inherit the properties of an asset that is already known and regulated. Requiring electronic wallets to keep funds in custody as a deposit in a bank account or as a deposit at a central bank makes that process as transparent as possible and creates the necessary safety for these assets to be used as payments. In January 2019 the People's Bank of China became the custodian of deposits from payment groups. In many countries (from Colombia to Indonesia) electronic wallet funds need to be backed 100% by bank deposits. In Europe the funds need to be in custody at bank accounts or safeguarded by private insurance. In other countries assets backing the account balance can also be safe and liquid assets such as government bonds (UK, US, Brazil). In all these cases we are taking a known asset (bank deposit or a deposit at the central bank) and passing its properties to the new electronic form of money.

As we move away from electronic wallets, we find a world of many other assets that promise money-type properties (liquidity and safety) and they also provide a return based on the assets they hold. But while there can be some interesting innovations on the technology behind these assets, from an economic and financial point of view there is nothing new. The liability side of the balance sheet must inherit the properties of the asset side. If assets are less liquid and riskier, and there is a mismatch in maturity, safety of the value of the liability being issued would require that these institutions are subject to a regulation similar to banks. At the end of the day many of these proposals look like securities and they should be regulated as such (FINMA (2019)).

There can be some innovations that can potentially offer some additional value but they are less related to the technology and more to inefficiencies in the current offering of assets. One possibility is that banks still have enough market power to offer too low interest rates on bank accounts. This, of course, only matters in countries where interest rates are positive. As an example, in the years 2016-2019 the US central bank raised interest rates, but banks were slow in passing these higher interest rates to their customers. If Fintech companies had access to the central bank they could have passed to customers the properties of that asset (safe and liquid) but also its interest rate (which was higher than what banks were offering). A startup tried to reproduce this scheme ("The Narrow Bank") but the US federal reserve did not allow them to get access to reserves at the central bank. We highlight the role of this decision next.

4.3 The payment infrastructure provided by the central bank

Payments today heavily rely on the infrastructure created by the central bank. Central banks manage the unit of account and provide both a physical form of money and a digital one via the reserves account of banks at the central bank that are redeemable at a 1:1 for physical currency. Access to these accounts represents the backbone of the settlements system where finality of most payments is reached.

Central banks might also set or regulate standards for different parts of the payment system. Because of the network effects of payments these standards can be key to improve the competitiveness of the market. For example, standards for QR codes, digital IDs or the

protocol for payments can make a large difference when it comes to creating an environment conducive to innovation.

Related to standards is the issue of access and interoperability. For example, providing access to the central bank to payment services providers might weaken the exclusive position banks hold in many jurisdictions. Also, facilitating the conditions under which new players can obtain a bank license can change the competition to banks. For example, in several countries we are seeing the creation of separate virtual or digital bank licenses for institutions operating fully online. Similarly, requiring banks to provide access to its customers' accounts to third parties can weaken the position of banks. Open banking initiatives of this type are in place in many countries and we will discuss them in the next section.

Finally, as BigTech companies enter financial services they raise fundamental issues about enforcing competition. The network effects coming from the dominance of their ecosystems and the regulatory treatment of ownership of data become very important. Some of these issues are new to the regulatory framework of financial markets and will require some rethinking on the side of regulators.¹⁶

There is a particular part of the infrastructure that has received attention in recent years, the possibility of providing access to all to central bank accounts, what is known as central bank digital currency (CBDC).¹⁷ There are several arguments made in favor of the creation of a central bank digital currency. Simplifying the payment system in order to remove intermediaries and address the inefficiencies of the traditional payment system is one of them. Related to this, the fact that not every citizen has access to bank accounts limits the possibility of moving towards a fully digital payments system. Finally, as physical cash is less in use, the payment system falls into the hands of the private sector without a backup provided by the state in the form of bank notes.

While there are good arguments for CBDC, there is an ongoing debate as the creation of CBDC also comes with costs and risks, among them the possibility of bank deposits shifting to CBDC during times of crisis.¹⁸ One of the points made by critics of CBDC is that addressing the shortcomings of the current system does not necessarily require central banks to create a CBDC. The current payment system is already becoming more efficient and regulators could facilitate and speed up these improvements. Also, one could potentially create something very similar to CBDC by using banks as intermediaries, what is known as synthetic CBDC.¹⁹ Finally, access to central bank balances by electronic wallet providers could in some sense provide the same service. This is a practice that is already in place in China and England where payment providers have access to central bank balances.

In practice, many central banks have started pilots exploring the possibility but no central bank today offers such a possibility. The People's Bank of China has launched an actual pilot

¹⁶ See Claessens (2020).

¹⁷ See BIS (2020) for a recent summary of the state of CBDC.

¹⁸ See Fernández-Villaverde et al. (2020).

¹⁹ See Griffoli et al. (2018).

and seems to be the closest to making that step. But details on how the system would work are not yet fully available.

5. Changes in the Competitive Landscape

5.1. Market structure and regulation as a framework

In this section we compare the development of Fintech across several regions or countries in order to understand the factors that make its growth and success more likely. As we did in previous sections we focus on digital money and payments.

Our framework for our cross-country comparison starts by understanding the strong network effects of payments and, as a result, of different forms of money. For money to be used it has to be an efficient medium of exchange. And in today's world efficient means always-on access, immediate execution and low cost. These features dominate the traditional "store of value" property of money (partly because we take that property for granted).

But payments require interconnectivity. Traditionally this was done by a closed proprietary network of banks, credit card companies and the central bank as the ultimate settlement. What technology has done is open up possibilities of creating closed-loop parallel networks or creating pipes that can connect us faster via our traditional bank accounts. Here is where banks are being disrupted via payments.

The creation of additional closed-loop networks such as electronic wallets or even cryptocurrencies was initially the easiest way to create a competing payment infrastructure. But to be successful, these networks must meet three criteria. First, there must be an easy technology for individuals and merchants to connect to these networks. The foundation of this technology was created by the internet and the spread of mobile telephony. Second, these networks need to reach a critical mass. The value of the network is a function of the number of users. Where is the network coming from? In most cases from alternative platforms. As our life has become more digital, our presence on the internet, social media platforms or messaging platforms become the natural networks where payments are developed. Finally, there needs to be an easy way in and out of the network assuming that the network does not fully dominate the market. Here is where the role of regulation becomes crucial. The ability of new entrants to make use of parts of the existing network will be fundamental for their success. Also, the creation of efficient and widely available standards will be a strong force behind adoption.

As we discuss the role of new entrants (FinTech and BigTech) we also provide insights on the response of banks. How can banks respond to these new competitive threats? Do they try to stay ahead by innovating or by partnering with new entrants? As we discuss below, the answer to this questions will also be different across regions and will once again depend on both the competitive and regulatory environments.

5.2. Cross-country comparison

We now provide an analysis of some of the developments observed in different regions around the world through the lens of the framework developed in the previous section.

5.2.1 *The explosion of mobile digital money in Africa*

The first ingredient of this case is an underdeveloped banking system that leaves many individuals out of any form of digital payments. Then the mobile phone technology becomes widespread providing individuals with a device to access an omnipresent network. Mobile phone companies had an easy way to authenticate users and create repositories of value based on the pre-paid balances of their customers (Safaricom and Vodafone launched M-Pesa in Kenya). What was needed was simply a process to make use of the device to engage in payments and P2P transfers. One of the pivotal moments of the project was when the balances were allowed to be used to buy minutes of airtime, this increased engagement and use of the wallet. M-Pesa was originally launched in Kenya but it then spread to many other countries in Africa and later to other parts of the world.²⁰

From a regulatory point of view a central issue is how to protect the value of the funds deposited in these accounts. In every country where mobile digital money has succeeded regulators have imposed restrictions on the funds held by the companies. Those restrictions require the funds to be kept in a trust account that is separate from the operational accounts of the business.²¹ These trust accounts can be deposits at banks. This allows the new forms of money to inherit the properties of a bank account.

A second regulatory issue is the need to abide by know your customer regulations. In most cases regulation was lax at the time the projects were being developed but the requirements got tighter as the system became successful. For example, as of 2017 M-Pesa is required to use photo ID to validate the identity of users.²²

From a competitive point of view, the small presence of banks and their inability to replicate the technology and network of the telecom providers means that there was very little they could do to stop new entrants. Their only options for banks was to develop alternative payment systems for their customers (those who already have bank accounts) or find ways to partner with the new entrants. Some of these partnerships were dominated by the network operator, such as M-Shwari in Kenya, a partnership between Safaricom and CBA, relying on the M-Pesa infrastructure. In other cases the partnership was driven by banks as in Equitel (partnership between Equity Bank and Airtel in Kenya). Of course, banks can also improve on the existing infrastructure of payments using mobile phones (banks in South Africa have followed that route).²³

²⁰ International Monetary Fund (2019).

²¹ See Reserve Bank of Malawi (2019).

²² See <https://techweez.com/2017/07/10/m-pesa-new-kyc-photo-id/>

²³ See <https://www.mckinsey.com/industries/financial-services/our-insights/mobile-financial-services-in-africa-winning-the-battle-for-the-customer>

5.2.2 The dominance of BigTech in China

The market structure of China and in particular the role of BigTech has led to a very different outcome. The developments of new forms of money and payments started via the ecommerce platform of Alibaba (Taobao) in 2003. Platforms dedicated to ecommerce are a natural environment for new forms of payment to develop. By definition, stores and customers are already connected and because the payment has to be facilitated by the platform, there is the need to keep an infrastructure for managing the liquidity. In this particular case there was the need to build the trust between the buyer and the seller about the execution of the payment. Once those balances were in place, creating a digital wallet was a natural next step. And once critical mass was reached, the use of that wallet was extended to payments outside of its own platform.

Similarly, WeChat Pay is the outcome of a digital platform. In this case a messaging platform that creates a network that can be used to launch a simple and seamless P2P transfer system based on electronic wallets. As the system grew, and as it happened with Alipay, it was natural to broaden the reach of the payment system beyond the network.

The growth of these two BigTech companies was partially possible by a lower penetration of banks and also by the lax regulatory approach by Chinese regulators. Chinese regulators had as a priority to increase financial inclusion since 2005 (Zhou, Arner, and Buckley (2018)). Digital means of payment or financing was seen as a driver of these goals and the regulator had regularly encouraged these new developments. As time passed and the BigTech giants started dominating payments and expanding into many other parts of the financial system, regulation tightened. At that point regulators stressed the need to balance stability and the development of new technologies. For example, since 2015 payment providers face strict constraints on the use of funds collected from customers (to be deposited at the central bank), they are required to verify users' identity, all of this matching the regulation we see in other countries.

China is a great example of how BigTech firms make use of their ecosystems and platforms to dominate financial transactions. No doubt that the initial weaker position of banks helped them gain market share but now that they have expanded their offerings to a large variety of financial services, it is hard to imagine banks or new entrants being able to challenge their dominant position. Payments and its network effects serve as a great point of entry but as critical mass is reached, other aspects of the BigTech ecosystem reinforce their competitive position. In particular the data they collect from users and transactions can allow them to improve on certain services (lending) and tailor their offerings better to the characteristics of the customers. Finally, their familiarity with technology makes them more likely to be innovative and stay ahead of the game. Because of all these reasons, financial regulation must now operate with a broader perspective that includes issues around competition, technology, the role of network externalities and the ownership of data.

5.2.3 The dominance of "super apps" in Asia

In several countries in Asia we see similarities to what we witnessed in China. Regulators were keen to improve financial inclusion and a move towards digital payments and finance.

Digital platforms were growing based on a host of services that could be ordered or consumed via a smartphone app. From messaging to food delivery to car rides or dry cleaning. What we witnessed in these countries is the growth of some large players that became aggregators of these services (the super apps). The critical mass of these networks combined with the fact that they needed to manage payments creates once again an ideal environment to launch a payment system based on the account balance of buyers and sellers (in many ways this is not too different from the story of M-Pesa in Africa or AliPay in China). Internal transfers can be executed seamless and at no cost, a technology that is clearly superior to the alternative of using credit card payments that are not only expensive but not as widespread as in other regions, like Europe. GoJek (Indonesia), Grab (Malaysia and Singapore) or Kakao (Korea) are good examples of these dynamics.

In several of these countries the internal online payment system also spread to in-store payments through the use of new technologies to identify users (QR codes). In some cases, such as Singapore, regulators created a standard for QR codes, one that identifies the merchant and its bank account. The standard is open for any application to use, facilitating the creation of safe and fast payments. The fact that the central banks also adopted real time payment facilities was also a key point in the development of these payment technologies.

The experience of India also reinforces this logic. A country where banks have limited reach and where the government encouraged financial inclusion via the use of digital payments. The creation of a real-time payment systems with a common standard for payments (Unified Payments Interface) as well as standardized QR codes (Bharat QR) or digital ID (Aadhaar) has opened the door for the growth of multiple digital payments initiatives. Some of them have also taken advantage of multi-service platforms to build a stronger ecosystem.

What has been the response to banks in these countries? The response has varied depending on the country and is very much a function of the initial position of banks and their ability to react. In a country like Singapore the initial strong position of banks combined with their ability to keep up or even lead innovations means that new entrants have not gained substantial market share. Banks are under pressure to innovate, they might partner with providers of new technologies but the disruption is limited. There was no obvious BigTech platform that could serve as a disruptor and the entry of SuperApps, while successful, is limited compared to the experience of China. The role of the central bank, providing a infrastructure of real-time payments has allowed banks to compete with the electronic wallet solution proposed by new entrants.

In India the starting position was very different. Low penetration of bank accounts and digital forms of payments. The government had as a goal to reverse this situation by creating an infrastructure of standards in digital ID but also payments.²⁴ Today a variety of alternative forms of digital payments coexist and electronic wallets and UPI payments account for about 50% of all digital transactions, a share that is larger than those controlled by debit and credit cards. FinTech entrants such as Paytm have been early leaders in this

²⁴ By 2017 80% of the population in India had access to bank accounts, up from 35% in 2011 (<https://ftalphaville.ft.com/2019/12/15/1576438221000/India-s-payments-revolution/>)

area but now they face competition by BigTech firms (such as Google, Amazon or even Walmart, through Flipkart).

5.2.4 The dominance of banks in Europe

The competitive framework in Europe was characterized by a strong presence of banks when it came to both deposit taking and provision of loans. In addition, regulation was very much designed around banks and bank stability.²⁵ But alongside protection of banks we also have a strong pro-competitive regulatory stance coming from competition policy (e.g. Open banking). Finally, through either national initiatives there was an early investment in modern payment systems via the use of PIN-based credit and debit cards, later replaced by contactless systems. Europe was ahead of other countries in the use of debit-card based payments.

New entrants had to compete with a well-run infrastructure providing almost-universal access. The only way to enter was to use new technologies that allowed for faster, more convenient payments and fully integrated into other digital platforms. While the banks infrastructure was functional, it lacked the features that more technical-savvy customers were demanding.

Many of the new entrants followed this path. Monzo started with the launch of prepaid debit cards managed by a smartphone app. Within its network P2P transfers could easily be made via the app. Outside of the network, Monzo relied on the traditional debit card infrastructure. As time passed Monzo applied for a regular banking license given the limitations it faced. Similarly, Revolut or N26 were new entrants that today operate as “digital banks” (with banking licenses). They compete with traditional banks on the same level-playing field except that they can be more focused on certain segments and take advantage of the lower costs of lack of physical presence and possibly superior technologies than the legacy systems of banks.

Why didn't these Fintech companies launch parallel payment systems of closed-loop networks as we saw in other countries? First, the regulation of credit card and debit card fees in Europe has kept the interchange fees at a very low level. Instead of the 2-3% seen in other countries, fees can be as low as 0.2%. Given the low cost and the presence of these technologies everywhere, there was no incentive to create a parallel system. In addition, these entrants are not coming from a social media or a messaging media platform (as in China). Without critical mass, the idea of creating a separate network is much less attractive.

A significant factor for this development is that central banks made quick improvements in the existing settlement infrastructure. For example, as of November 2018, a new system was introduced (TIPS) at the European level that can handle real time gross payments at a negligible cost.²⁶ Given the efficiency and cost of this infrastructure, the room for disruption was much smaller.

²⁵ See Vives (2017).

²⁶ There were other similar developments in individual countries, sometimes pushed by association of banks. The Vipps payment system in Norway, the payment infrastructure in the Netherlands using

An additional important development in Europe was the open banking initiative to ensure a competitive environment for banks. As an example, banks are required to provide access to customer's deposits to be used for payments to any application that is granted access by the owner. This has led to an explosion of startups trying to profit from both the information and access to bank accounts. For example, one could imagine a payment-based infrastructure that makes use of the assets stored at banks. Managing payments could be an interesting value proposition as it would not require the regulatory hurdles of the bank and it could provide with potential revenues from payment fees but also from the data involved in the transaction.²⁷

In summary, in Europe banks started with a strong dominant position. A friendly regulatory environment combined with a development of a good infrastructure for instant payments allowed them to quickly adapt and compete with new entrants. These entrants exploited in the early years the backwardness of the traditional banking services but as banks reacted they found themselves broadening their services and transforming themselves into digital banks competing with banks on the basis of leaner, more modern and more focused business models. Both banks and new entrants rely on the same payment infrastructure that has evolved through a combination of central bank initiatives and projects run by association of banks. The type of seamless, always-online access via mobile devices has become the norm in many of these countries as banks had to quickly adapt to a new environment. What about BigTech in Europe? The absence of a pan-European social media or ecommerce platform limited the ability of these players to be a strong disrupting force. This played to the advantage of banks that as a result have managed to keep their dominant position in payments, deposits, wealth management or loans. This does not mean that they did not suffer the consequences of the competitive threat through pressure on margins because of reduction in fees and the need to accelerate investments in technology.

5.2.5 The dominance of credit cards in the US

The digital payment infrastructure in the US was and still is dominated by credit card companies. The domination comes from their strong partnership with banks, their control of the payment infrastructure and a pricing structure that does not favor competition. Consumers face identical store prices regardless of the method of payment used to purchase goods and services. But many consumers take advantage of different discounts and rewards associated to the use of credit cards. These rewards are funded by very high fees paid by the merchant. In this environment, creating a parallel payment system via the use of electronic wallets or QR codes facilitating bank transfers in the US was unlikely to happen (Klein (2019)).

Where competition is possible is in P2P transfers. Credit card companies are not part of that space so discounts and rewards cannot stop competition. In addition, the payment

Maestro cards or Swish in Sweden are all examples of modern, fast and costless payment systems used by traditional banks.

²⁷ Yapily is one of most advanced entrants offering a variety of services to companies when it comes to access to accounts across multiple banks for information, payments or lending.

infrastructure of the US banking system has been lagging relative to other countries. While we had seen an increasing number of central banks adopting wide-reaching real-time payment systems, the US Federal Reserve was not one of them. This means that bank-to-bank transfers remained slow, cumbersome and costly. The use of alternative assets that sit outside of the banking system for those transfers led to companies like Venmo or PayPal to become some of the most successful Fintech companies in the US.

The slow development of a fast payment system was also behind the creation of a parallel private settlement system driven by banks (the Real Time Payments network hosted by The Clearing House). And also driven by banks, new pipes have been created to facilitate P2P transfers within the bank infrastructure. Zelle is now dominating these transfers. The success of Zelle reveals how banks can coordinate to compete with the new entrants. Adopting a standard in identifying bank accounts and using that standard to make transfers more convenient is enough to meet a large part of the digital consumers' demand.

An interesting development in the US has been the late entry of BigTech firms in payments. In particular those that are behind the social media platforms (such as Facebook). Given the reach of these platforms in the US we could have imagined a development that was similar to what we have witnessed in China. We already mentioned earlier that the strong role of credit cards was an impediment to the development of any form of electronic wallet. But there is something else: in the US Facebook was not a dominant messaging platform. Initially SMS and later other proprietary platforms (like iMessage for iPhone users) became the ultimate mobile messaging platforms for many users. The acquisition of WhatsApp by Facebook gave them access to a large messaging network but mostly outside of the US. This explains that entry into payments was much less obvious for Facebook than for WeChat in China. Recently, Facebook has launched Facebook Pay (a wallet within the Facebook ecosystem) and has been part of the launch of Libra, a stablecoin to be integrated into a payment infrastructure. But they are late to these developments and the integration with mobile digital life and messaging is still to be defined.²⁸

In many ways, the experience of banks in the US resembles that of Europe. When it comes to payments they have managed to keep their dominance because of their strong initial position. There are, however, some differences. In Europe, innovations in payment spread faster, led by public intervention on the infrastructure and the regulation of credit card fees. This allowed banks to compete with new entrants. In the US, those innovations have been slower but banks have managed to exploit their partnerships with credit cards to protect their business. It was only in the case of P2P transfers where disruption could happen and banks have been forced to partner with technology companies to maintain their competitiveness. Of course this is just about payments. In other financial services, new entrants have gained significant market share, for example in residential lending. We discuss these other financial services in the next section.

²⁸ Facebook Pay is being integrated into WhatsApp in countries where WhatsApp is the main messaging platform, such as Brazil. Interestingly the regulator has recently banned the launch (<https://www.reuters.com/article/us-brazil-central-bank-visa-mastercard/brazil-suspends-whatsapps-new-payments-system-idUSKBN23V042>)

6. Beyond Payments

In our previous sections we have focused on innovations in payments and digital money. In this section we briefly describe developments in other markets. Our goal is to highlight the role of the initial market structure and the regulatory framework to explain the outcomes we observe.

6.1 Wealth management

The wealth management industry went through a large disruption decades ago with the explosion of online brokers after the adoption of internet technologies. A combination of much smaller fees, the increase in ability of investors to acquire information and the easiness to instruct and execute orders represented a large deviation from the traditional model.²⁹

The shift towards a more mobile world has now pushed this model to the next level as users are expecting all this information and possibilities in all places at all times. In addition, improvements in the trading and information-processing technologies have resulted in even lower trading fees (in some cases reaching 0 for common trades).

But the biggest change we have seen is the use of automatic trading strategies, what is known as rob-advisors. The idea is to create algorithms that are tailored to investors' profiles and can make trading and rebalancing decisions automatically. This is a technology that relies on the availability and low cost of processing power and increasing use of artificial intelligence. Whether the technology is truly disruptive or simply part of the regular progress in the wealth management industry is an open question. Clearly some strong players have become large by using these new technologies (e.g. Betterment) but it is also the case the traditional players have quickly adopted these new strategies.

From a regulatory point of view, brokerage firms, regardless of the technology used face the same regulation (Ehrentraud et al. (2020)) In comparison to payments, this is an area where there has been much less need to adapt our regulatory framework.

When we look across countries we see cases like the US, where the brokerage sector was already very developed and also competitive. But entry of new firms pushing fees towards zero or relying on robo-advisor technology has forced traditional players to follow these innovations. In Europe, the sector is much less developed and institutional investors play a stronger role. Relative to the US, fees remain large and while there has also been entry into the sector by similar players, their impact has been much more limited. In the case of Europe, the strong role of banks as the channel for saving limits the scale of disruption. In Asia we see again the entrance of BigTech into this segment of the financial sector through the creation of a variety of saving instruments that were attractive to small investors, as it was the case of Yu'e Bao in China. In other countries in Asia where banks had a stronger

²⁹ Prior to the internet, the rise of discount brokers in the 1980s had already been a warning to the traditional players.

presence (Singapore), there has been much less entry and banks continue to control this market while bringing innovations to their in-house operations.

6.2 Insurance

When it comes to investment in technology, the insurance sector has typically been behind the banking sector. One of the potential reasons is that the move towards digital banking was warranted by the daily interactions individuals have with payments, while in the case of the insurance industry the interactions tend to be much less frequent. But as with the other industries, a more tech-savvy pool of customers increased demand for similar access to this market. On the supply side, the ability to analyze data became a potential competitive advantage (IAIS (2017)).

The developments in this industry have been similar to those in other sectors: from digital platforms to data analytics, automated personalized recommendations, etc. Also, the technology has allowed for the development of aggregators or consolidators via those digital platforms. In addition, the nature of the technology has also seen the growth of niche players that offer on demand insurance for particular and time-restricted needs (e.g. Slice). And a few startups have exploited the possibilities of peer-to-peer insurance (e.g. Lemonade).³⁰

A final innovation in this market is the use of the “internet of things” capabilities. The information potentially contained in devices located in your home, your car or your wrist could be valuable to insurers to assess risk and tailor their offerings. This is an area under development with still many unanswered questions about its true potential as well as the ethical and privacy issues it might raise.

Overall, the disruption in this industry is a combination of data analytics on the companies side and their ability to produce customer-friendly platforms when it comes to access of information plus the flexibility of insurance contracts that fall outside the traditional rigid ones offered by the regular players. Some of these new technologies can be incorporated by the traditional insurers that will make use of their brands and history to retain their comparative advantage.³¹ An open question is whether the technology fundamentally changes the insurance market towards segmentation and where the incumbent companies might lose the control that they have today.

From a regulatory point of view there was also much less need to rewrite the existing framework. New entrants are simply being subject to the existing licensing regime and regulatory requirements.

³⁰ The label of P2P insurance is less clear than in other P2P models like lending. Pooling risks is the way insurance always works. The difference between these new P2P players and traditional insurers is what happens with the residual of the premia being paid.

³¹ In fact, some of the new Fintech startups are creating tools for incumbents to incorporate these new technologies (Clientdesk, Snapsheet or Zywave).

6.3 Lending and fund raising

The lending and fund-raising space is one where we have also seen significant innovations, some of them requiring significant rethinking of our regulatory framework.

The use of data analytics for lending is part of the overall trend for better use of big data in financial decisions. This is not new to lenders, but an increasing digital life leads to big pools of data that can allow for better models. To take advantage of these models one needs to knowhow but also companies need to have access to data. While banks are used to collect the usual credit-risk data, new competitors have access to data that is not available to banks. This is particular the case for large technology companies (BigTech) running big social media or ecommerce platforms. The growth of lending by these players in China is an example of the advantage of these organizations.

More fundamentally, we have also witnessed the growth of different forms of peer-to-peer lending and crowdfunding (including ICOs).

P2P lending was created on the idea of the elimination of the intermediary to reduce costs. While the idea of eliminating intermediaries in lending was seen as some as challenging, P2P lending took off in some markets and became a success story of FinTech. In the US, P2P lending originates more than \$62 billion in consumer loans (LendingClub and Prosper being the market leaders). And we have also seen fast growth in other regions, in particular Asia (Lendit in Korea being such an example). While these players position themselves as competitors to banks, in some cases they can be seen as complements as they might provide banks with additional information on credit worthiness (Balyuk (2019)). While the growth of these platforms has been impressive, they remain small relative to the overall volume of lending and it is still unclear whether disintermediation can be the model for the future of lending.

Crowdfunding platforms represented a mixture between funding of new business ideas and in-advance ordering. Under some assumptions, they can be an efficient funding platform because of the commitment of lenders to also be customers of the products.

Finally ICOs represented an alternative form of funding where the mechanism of funding is done through tokens whose valuations is related to the success of the business. ICOs are closely related to crowdfunding platforms, because in both cases the investment is linked to the use of the company's product in a way that helps companies and markets better gauge the potential demand for the service and it also creates a degree of customer commitment (Howell, Niessner, and Yermack (2018) and Cong and He (2018)).

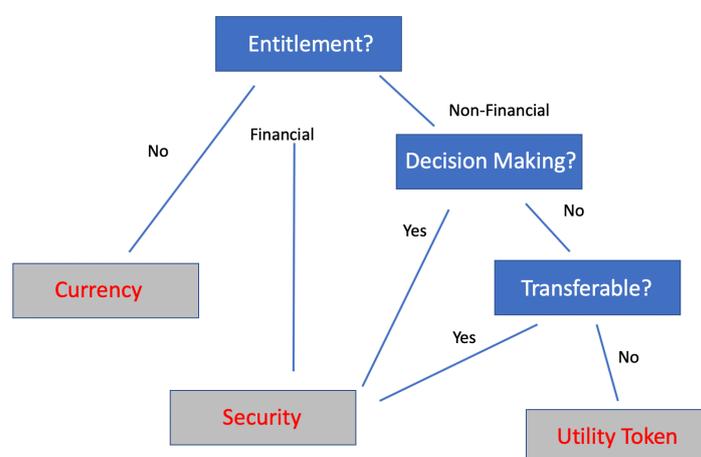
ICOs have faced intense scrutiny from regulators. Issues of investor protection were at the heart of the discussions among regulators.³² Here we have witnessed very different responses depending on the country. Some regulators took a radical view and simply

³² Given the small size of the market, financial stability issues are currently not so relevant, but for instance ESMA, the European Market Authority is only concerned about risks of fraud, cyberattacks, money laundering and market manipulation (ESMA (2018)).

prohibited ICOs and shut down exchanges trading fiat money for cryptocurrencies. A notable example of such radical action was China. Japan started regulating exchange platforms after one of the largest (Mt Gox) suffered a huge theft of bitcoins it was holding on behalf of customers and became insolvent. Other regulators, like Switzerland and Singapore who wanted to develop a strong Fintech sector, have tried to balance the risks with the potential benefits of providing some space (sandbox) for ICOs with light regulation.

However, the main question all regulators have is about the right level of investor protection, i.e. should ICOs be regulated like securities? There was not a simple answer to this question as ICOs came in different flavors. To summarize the analysis of regulators, we can draw the decision tree of Figure 4.³³

Figure 4. Regulatory treatment of ICOs



The summary from this chart is that there are three types of crypto-assets that should receive different treatment.

- Those whose goal is to be a means of payment. They are not attached to any particular service and they are accepted as means of payments to purchase goods and services. They are considered as currency and Bitcoin is the perfect example of this.
- Those that are almost identical to a traditional security because they offer a financial entitlement (dividend, expectation of appreciation) and they are tradable (in some rare cases they also offer decision making in the business). In this case there is unanimity among regulators that they should also be treated like standard securities.
- The third type of tokens is where the grey area is. These are tokens that promise access to a service. In principle these are labelled as “utility tokens” and are similar to pre-purchasing a certain amount of goods or services. In reality, it was less clear cut. Some of these ICOs were tradable and in addition they were sold under the promise of a return (as the market demand for the service increases). For this reasons the US regulator, the SEC, moved in the direction of labelling most ICOs as a

³³ This decision tree comes from Allen, Fatas, and Weder di Mauro (2019).

security. In Europe, there is a variety of views, depending on the country, but at the European level (see ESMA (2018)) there seems to be a consensus to move towards a similar interpretation. This would mean that the regulatory scrutiny of ICOs would increase but so would investor protection.

Regulation matters for the developments of ICOs across markets but it also matters in other aspects of lending. As an example, residential lending in the US has been shifting away from banks. Shadow banks and Fintech lenders now represent a significant share of the residential lending in the US. The reason for this growth is partly the regulatory changes banks faced after 2008 that made lending in these markets more difficult. Interestingly, both shadow banks and Fintech still rely in the government guarantees that are present in this particular market (Buchak et al. (2018)).

6.4 The wider universe of Fintech initiatives

Fintech has touched on many other segments of financial markets. For example, the area of enforcing regulations such as anti-money laundering (AML) and know your customer (KYC) regulations has received attention from companies that promise to streamline and simplify the regulatory compliance (Fenergo is such an example). In real estate, in addition to further development of platforms for transactions, we have seen initiatives to link the idea of renting to purchases of real estate assets (Divvy) or to fractionalize ownership through the creation of specific assets or tokens. Finally, the area of information gathering and aggregators of either investment positions or banking activity is also a fruitful area of innovation. In some cases this is partly the result of regulations (such as open banking) that requires financial institutions to provide APIs to allow alternative apps or platforms to access the information of a customer.

7. Concluding Comments

In this paper we have provided an overview of recent technology-related changes in the financial and banking industry. Our focus has been on the area of payments and digital money where developments have been fast and in some cases disruptive.

By comparing the experience of different countries we highlighted the role of the market structure, the weight of banks and the decisions made by regulators and central banks.

There are several patterns that come out of this analysis. First, network effects are central to payment systems. Traditional payment systems were dominated by banks, their access to central bank settlements and partnership with credit card companies. The existence of closed networks and proprietary protocols created inefficiencies. Competing with established payment networks was difficult as entering these networks required cooperation from incumbents. The alternative path followed by many entrants was to create parallel networks. They took the form of electronic wallets managed by FinTech, BigTech or even mobile telecom companies.

The second insight is that for these parallel networks to become successful they need to attract critical mass, they need to find a way to overcome the switching costs and network externalities of existing systems. The success stories we describe combined an environment characterized by a weaker position of incumbents, a technology that created an alternative platform that provided the critical mass for the new payment systems and a light regulatory approach to new forms of payments in the early phases of development. In Africa, the fact that not everyone had access to banks made the switch easier. This combined with the natural network that the mobile telecom companies already have and could exploit.

What lies ahead for banks? Fintech has become a disruptor for banks. In all markets new innovations from Fintech entrants have reduced bank margins and push banks to invest in competing solutions. This dynamics are already visible in the most profitable segments, payments being a good example. Banks can make use of the market power they derive from their deposits and their strong customer relationships (Drechsler, Savov, and Schnabl (2018)). The biggest threat to banks comes from BigTech companies that control ecosystems with network effects and switching costs that are as large as those that banks are trying to use in their favor. The experience of China shows the risk that BigTech companies dominate financial services. But that experience is quite unique because of a combination of weak banks, loose regulation and very strong BigTech platforms.

In Europe and the US, banks and credit card companies started with a much stronger position and managed to exploit the strong network effects of widespread networks of payments limiting the entry of new players. Fintech startups relied on their adaptability to new technologies and new consumer habits and as time passed many of them partnered with banks or became banks themselves competing head to head with the incumbents. Where banks were strong, they reacted to these innovations. In some cases with the help of regulators and central banks that upgraded the payment infrastructure so that it can now compete with the lighter and more consumer-friendly payments promised by Fintech and BigTech.

Where banks quickly adopted new technologies, they allow them to remain competitive. But these technology improvements come with a risk to traditional players. As the networks become faster, more open and easier to interconnect, the ability of entrants to disrupt parts of the payment ecosystem increases. For example, as standard QR codes are established for payments, it makes banks more competitive, but it also facilitates the entry of other payment providers. Money can easily move between bank accounts and electronic wallets, to execute a payment from the buyer to the seller. Who captures the value will depend on many factors. And once again the implications of technology on market power combined with the regulatory response will be key to predict the future landscape. As an example, biometric authentication might become a key piece of the payment system. Today it is being controlled by hardware companies producing smartphones. Without a regulation that opens up access to those tools, it will be hard for banks or any Fintech entrant to compete with these new technologies. Regulators must ensure that standards remain open and that interoperability is possible so that not a single player can become dominant when it comes to payments.

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