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Cashless societies and their impact on the financial sector

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Introduction

Innovation shaped the way financial systems work and continues to do so to the present day. The invention and the spread of the automated teller machines (ATMs) is a classic example of how technology can change an industry. The first ATM was installed in London in 1967 but in less than a decade they became popular not only in Europe but also overseas. By the 1980s, most banks had adopted them. ATMs made financial services related to deposit and withdrawal of money much more accessible and eliminated the need for consumers to rely on a bank for such transactions. This had positive effects for banks since they could largely optimise their operations. On the other hand, however, some banks experienced a large reduction in their business since consumers did not need local banks anymore and small local banks now had to compete directly with bigger banks. This lack of the need for consumers to stay loyal to their local bank unavoidably led to the loss of business for the smaller, less modern and less efficient banks. The same reduction in the need for a local, physically present bank is happening now with the introduction of online banking that is allowing consumers to avoid a direct contact with their bank.

In recent decades, the pace of innovation has increased leading to the emergence and wide adoption of technologies such as artificial intelligence, big data, clout computing and the blockchain. Another example of the emergence of new products in the financial sector is given by the peer-to-peer (P2P) lending. This form of lending does not use a financial intermediary as a bank and borrowers are in direct contact with their lenders. Those kinds of products have been revolutionary for those agents such as small businesses or other small lenders who had limited access to bank loans.

Another area in which the Fintech revolution has shown its impact is in the payment facilities available to consumers. Payment transactions are among the financial services that are having the most apparent and visible changes. The Fintech developments have widened the payment options available to both consumers and businesses. Today there is in fact a large number of new payment systems such as Apple Pay that is becoming more and more widespread in the western world and Alipay or WeChat Pay that represent the

main way in which consumers in countries like China complete their purchases. All those payment facilities have gradually tried to replace the old and established payment systems such as cash and credit or debit cards by using as a tool a device that today is carried by the majority of the population: the smartphone. Those payment facilities have created for both businesses and consumers a faster and safer way to pay than traditional payment options. Societies having developed financial markets are still centred around payments based on bank accounts or with cash thanks to the high sophistication of the technologies and ease of use offered by big financial institutions. Conversely, and in some way counterintuitively, developing countries are among the first ones developing those new payment infrastructures.

Furthermore, the financial innovation has affected also the way in which financial markets operate. Companies like the Ant Financial Services Group which is now the most valuable Fintech business in the world, have successfully transitioned from representing solely the function of means of payment and medium of exchange to being chosen as store of value, thus entering in competition with banks, and as a broker to access market securities, thus competing with other financial intermediaries.

The financial sector and especially banks are now facing both opportunities and threats because of this Fintech evolution. New technologies could offer a way to better optimize and expand their businesses. The threat for those established financial institutions is the new competition they will face because of new market entrants. The monopoly that banks own in their ability to deposit accounts may soon experience an end. This will also be combined with the creation of new lending platforms that allow businesses to collect funds from the public without the need of using the bank as an intermediary (an example might be crowdfunding platforms). The possibility for businesses to borrow from these sources could also represent a threat to the lending business that banks have dominated since their establishment.

Even central banks are now under pressure and face similar conditions as central banks. Central banks have been the only providers of a stable and usable fiat currency. Now privately issued currencies represent a threat for central banks since they could establish a new parallel currency to be used in the economy. While privately-issued currencies have

always existed, they were never so significantly spread and stable as they are becoming now and, therefore, the central banks' monopoly was never really challenged up until now. This transformation in the financial system could lead to the worsening or complete loss of the control of central banks over the monetary system.

One of the most threatening developments for the financial sector as we know it today is the release of Facebook's own currency: Libra. Libra has the potential to be a new globally accepted provider for means of payment and store of value functions. Thanks to its large consumer base, Facebook has the right tools to represent a threat for traditional banks all over the world.

The purpose of this thesis is to analyse how cashless societies are implemented and which are the consequences they have on the financial sector. Firstly however, it is discussed what are conditions to be satisfied in order to establish something as money and how digital currencies fit in that definition. While the main goal is to analyse the financial sector, also the effects on other categories of agents in the society are taken into consideration. Topics such as financial inclusion are discussed in order to understand also how cashless societies can help reduce the gap between developing and developed countries. In particular the research is focused on the China case and Libra. The two are examples of situations in which private companies have the power to substantially affect the financial system. The distinction between those two cases is also drawn. In China the Ant Financial Service Group has substituted banks in providing a payment infrastructure, functions of store of value and lending services, but kept the system intact. In the case of Libra, not only the Libra Association would substitute banks but it would also fundamentally change the financial system due to the creation of a parallel currency. Briefly is also discussed what central banks can do in order not to lose their dominance as providers of a stable currency.

The research conducted wants to provide the reader with insights on the future of payments. It is important to realise how much a cashless society is now not only possible but also considered as normal in some parts of the world. In developed countries with established financial institutions, anticipating future trends and consumer needs is necessary to stay in business. The research wants to be a wake-up call for the financial

system as a whole and especially commercial and central banks. Those would in fact be the most affected parties by suffering the additional competition given by the establishment of other big players (as in China) or by the creation of a parallel currency (as in the case of Libra).

The research is divided in four main chapters. Chapter one: "Money and society", sets the basis for the following chapters by first establishing what can be considered as money. It then follows with a brief description of the characteristics and differences between e-money and digital coins. The difference between the two is essential in order to understand the different level of threat posed by the Ant Financial Service Group and by Libra on the financial sector. The first chapter discusses also the concept of financial inclusion. This is an extremely important concept when talking about the United Nations Sustainable Development Goals (UN SDGs). Those are taken into consideration because one of the reasons for which cashless societies are desirable is because they offer a more efficient way to help the financially weaker societies. The first chapter is concluded with a description of the four pillars characterising a fully digital society.

Chapter two: "The China case", is aimed at describing the Chinese society which is among the most advanced in the field of digital payments. The chapter analyses specifically the Ant Financial Service Group. The history of the Group is provided in order to understand how the Chinese digital payment infrastructure was built from the ground up. The Ant Financial Service Group is analysed not only because of the payment structure it provides, but for the multiple financial services that it offers now. What started as a provider for a payment infrastructure became a substitute for banks. The group offers traditional banking services such as store of value functions, lending and even acts as a broker for investors. Each one of the different branches of the Ant Financial Services Group is individually analysed and the reasons for their success are also provided. The chapter ends with an analysis of the consequences the Chinese cashless society has on the financial system. The discussion establishes also why, despite being technologically ahead of most other parts of the world in that aspect, the Chinese cashless society does not represent a real revolution for the financial sector.

Chapter three: “Libra” discusses the currency Facebook is planning to launch in 2020. This chapter, unlike the previous one, will not analyse therefore a phenomenon that is today affecting the financial system but one that has the potential of doing so. The chapter firstly analyses the reasons that make Libra different from traditional e-money and other digital currencies. It also describes the organisation of the Libra association and the Libra reserve which will have the objective to stabilise the currency. Subsequently, the chapter will take a close look at how Libra works and, at the same time it will compare it with Bitcoin. Finally, the chapter takes a look at why Libra represents a threat for the financial system as we know it today.

The last chapter: “How can central banks prevent losing their monopoly?” is focused on the measures central banks can use in order to prevent losing their control over the financial sector. Various strategies and also their consequences are described. Those strategies vary from the simple improvement of the financial sector by for example eliminating commission fees when transferring money across nations to the creation of a new central bank digital currency. The latter option is by far the most interesting and the one to which most of the analysis is devoted. Various options for digital currencies are also analysed. China is discussed once again because of the intentions of the PBOC to launch their own digital currency by the end of 2021. China is used as an example for a successful implementation of the strategy of cooperation rather than competition between public and private bodies.

1. Money and society

This chapter is focused on understanding the relationship there is between money and society. Firstly, the chapter discusses what can be considered as money is provided. In this discussion various theories about the nature of money and its origin are analysed. It is then considered how those definitions apply to e-money and digital currency. Those are two different types of money and the similarities and differences that are discussed in this chapter will be useful in the following chapters. Finally, a closer look is on the link between money and society is provided. This is accomplished by taking into consideration the United Nation Sustainable Development Goals (UN SDGs) and more specifically how Fintech can help reach a higher level of financial inclusion. The chapter is concluded with a description of the four pillars characterising a fully digital society.

1.1 The concept of money

In order to understand how the Fintech innovation can revolutionise the financial system, and in particular the payments industry, it is necessary to understand what money is and the conditions necessary to classify something as money. The first and most important condition necessary for the existence of money is trust. The word trust is used to indicate the idea that the same object or value that agents receive will be accepted by other agents in the future to enter in other transactions. Without trust, coins are worthless pieces of metal, banknotes pieces of paper and bank accounts meaningless numbers.

According to the societary theory of money[1], in order for something to be recognised as money, there are three conditions that have to be met[2]. The first one of those is the fact that the item can be used as a reliable store of value. In order to be a reliable store of value the item must preserve its value over time and will guarantee some form of purchasing

[1]The Concept of Money, Law Explorer (1970), https://lawexplores.com/the-concept-of-money/ (last visited Jun 14, 2020).
[2] Christian Hofmann, *The Changing Concept of Money: A Threat to the Monetary System or an Opportunity for the Financial Sector?*, 21 EUROPEAN BUSINESS ORGANIZATION LAW REVIEW 37–68, 43 (2020).

power for its owner in the future. Another important condition making an item a reliable store of value is its liquidity. The concept of liquidity takes into account various aspects of the item. For an asset to be classified as liquid it must be traded in a market, it should be sold quickly and without high transaction costs. The second condition an item must satisfy in order to be considered as money is the necessity for it to represent a unit of account used to measure the value of goods and services in the economy. This function is necessary in order to establish relative prices between goods. Finally, the item must be widely accepted as means of payment or medium of exchange[3]. This theory is focused on items that become money thanks to market forces and that are not imposed by an authority. This theory therefore regards as money anything that functions as money.

In the past the trust in money was mainly given by the fact that money could be converted in precious metals such as gold. The orthodox metallist theory of money is based on the concept of the fact that the value and the acceptability of money depends on the intrinsic value of the money itself[4]. Even if banknotes are not worth much, the possibility to exchange those banknotes with gold at any time gave some indirect intrinsic value to money.

Chartalist theories of money follow the development of financial systems that do not require anymore the possibility to exchange money with precious metals. The value of money is therefore though as coming from the authority issuing it and imposing its use a legal tender[5]. The legal tender is established by the law as being a means of payment that a creditor is required to accept from a debtor willing to discharge of his liability[6]. The concept of legal tender is what guaranteed stability in the money we use today. These theories that establish what functions as money as coming from the decisions of an authority are called the state theories of money. The concept of legal tender will be useful up to the level of influence of the authority establishing it since each legislation can

[3] Proctor Charles, *Mann on the Legal Aspect of Money*, FINANCIAL AND BANKING LAW (2012). paragraphs 1.29, 1.49-1.60. 3
[4] Alla Semenova & L. Randall Wray, *The Rise of Money and Class Society: The Contributions of John F. Henry*, SSRN ELECTRONIC JOURNAL, 5 (2015).
[5] Ibid.
[6] Geva, Benjamin, "Is Cryptocurrency Money and Why Does it Matter?". Articles & Book Chapters. 2707, 1,2 (2018).

choose to use any currency as a legal tender. Legal tender is generally not limited to physical cash but includes for example also means of payment in the form of book money. Furthermore, the requirement to accept a certain currency as means of payment does not mean that every transaction needs to be completed in that specific currency. The parties involved in a transaction can decide to settle the payment using any other currency of their choice. These might include foreign currencies used as legal tender in other countries or digital currency such as Bitcoin[7].

2.1.1 E-money and digital coins

Virtual money is defined as money that is not physically represented but that exists as a record in an accounting system. An example of virtual money is book money which is the monetary value deposited by the general public with commercial banks inside an account. Also, the money that banks deposit with their central bank is considered as virtual money. E-money is another kind of virtual money which takes a part in the traditional financial system of those countries that regulate and use it in order to transfer book money. The EU legal framework recognises e-money as "electronically, including magnetically, stored monetary value as represented by a claim on the issuer which is issued on receipt of funds for the purpose of making payment transactions […] accepted by a natural or legal person other than the electronic money issuer"[8]. In this case e-money is simply denominated in the central bank fiat currency and there is not the creation of a parallel currency.

The European Banking Authority (EBA) defines a virtual currency as a "digital representation of value that is neither issued by a central bank or public authority nor necessarily attached to a fiat currency, but is accepted by natural or legal persons as a

[7]Proctor Charles, *Mann on the Legal Aspect of Money*, FINANCIAL AND BANKING LAW, paragraphs 1.17-1.28 (2012).
[8] Directive 2009/110/EC [2009] OJ L 267/7, Art. 2(2)

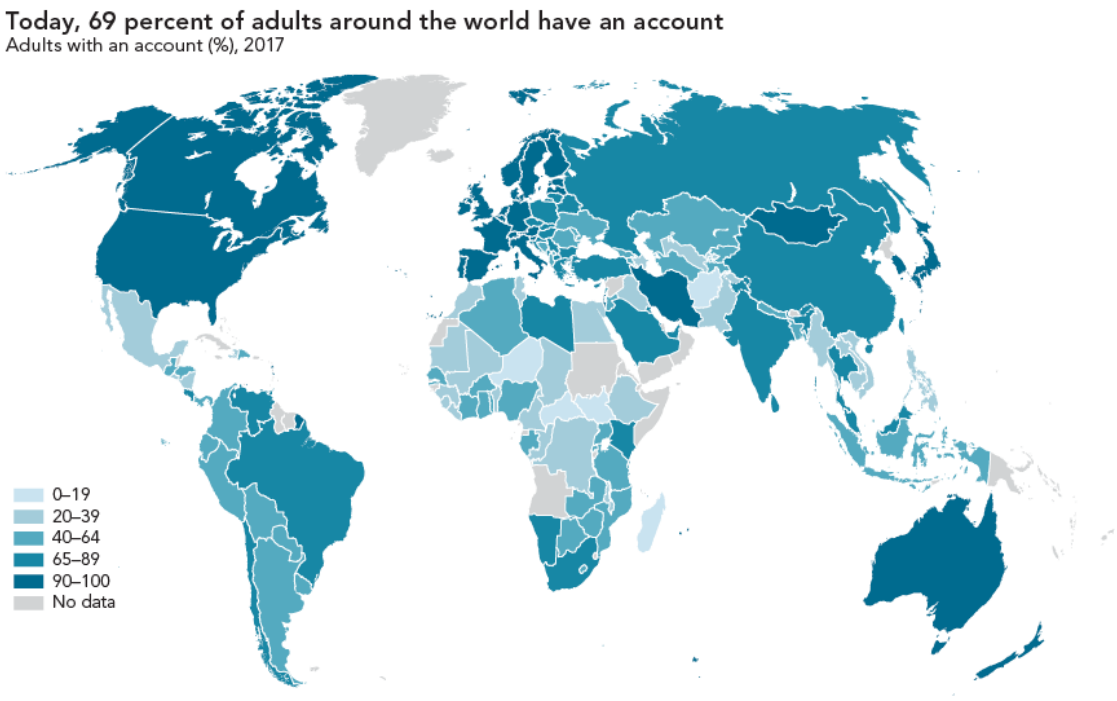
means of exchange and can be transferred, stored or traded electronically"[9]. Digital coins are different from traditional e-money. While e-money has a certain physical counterpart and is limited to one jurisdiction, digital currencies are only in digital form and can be present in multiple jurisdictions. Furthermore, the latter does not depend on the presence of a financial institution as an intermediary and often uses a public decentralised ledger in order to record transactions. This public decentralised ledger is represented in cryptocurrencies by the "Blockchain". There are no additional characteristics that are common to all digital currencies since they are privately issued and generally unregulated. Currencies such as Bitcoin, Ethereum and Ripple differ substantially in the way in which they are generated (or mined) and how transactions are executed[10]. The main difference between e-money and digital currency is that the latter is not pegged to a fiat currency issued by a central bank. The value of these currencies is therefore dependant on market forces. The high volatility that those currencies experience is the main reason as why they are not considered as being a good option as store of value. Those currencies are therefore mostly used as speculative investments and not as currencies available to the general public[11]. While presenting all the different digital currencies and means of payment available, it is also important to consider that choosing among different options is a luxury that many do not enjoy. People living in poor regions of the world still lack access to basic financial services. As it can be seen from the picture below (Figure 1), there is a sharp difference between the amount of people owning a bank account in developed and developing countries.

[9]European Banking Authority (2014) EBA opinion on 'virtual currencies. London. Available at: https://eba.europa.eu/sites/default/documents/files/documents/10180/657547/81409b94-4222-45d7-ba3b-7deb5863ab57/EBA-Op-2014-08%20Opinion%20on%20Virtual%20Currencies.pdf?retry=1 . (Last accessed 23 May 2020).

[10] Christian Hofmann, *The Changing Concept of Money: A Threat to the Monetary System or an Opportunity for the Financial Sector?*, 21 EUROPEAN BUSINESS ORGANIZATION LAW REVIEW 37–68, p 45 (2020).

[11] Ibid.

Figure 1: Percentage of people owing a financial account by country



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The next section analyses how finance can be transformed in order to help those societies.

2.2 Fintech and financial inclusion

In September 2015, the UN set out 17 United Nations Sustainable Development Goals (UN SDGs) that represent a blueprint to achieving a better and more sustainable future. They are based on the principle of "leaving no one behind". The picture below (Figure 2) includes all the 17 goals that the United Nations is committed to achieve by year 2030.

[12] Source: Global Findex Database
[13] Home: Global Findex, HOME | GLOBAL FINDEX, https://globalfindex.worldbank.org/ (last visited Jun 14, 2020).

Figure 2: United Nations Sustainable Development Goals

[14]

By looking at the United Nations Sustainable Development Goals (UN SDGs) it is clear that in order to reach them, sustainable economic development is necessary. Today, there are three major approached used by financial regulatory policymakers to achieve those UN SDGs. The first approach considers the actions of companies on the environment and society as a potential risk and therefore propose as a solution one that is centred on disclosure of ESG matters. The second approach views the UN SDGs as relating to new sources of potential risk which should be mitigated. The solutions proposed in that case are centred in policy or regulatory changes aimed at risk management. The third and last

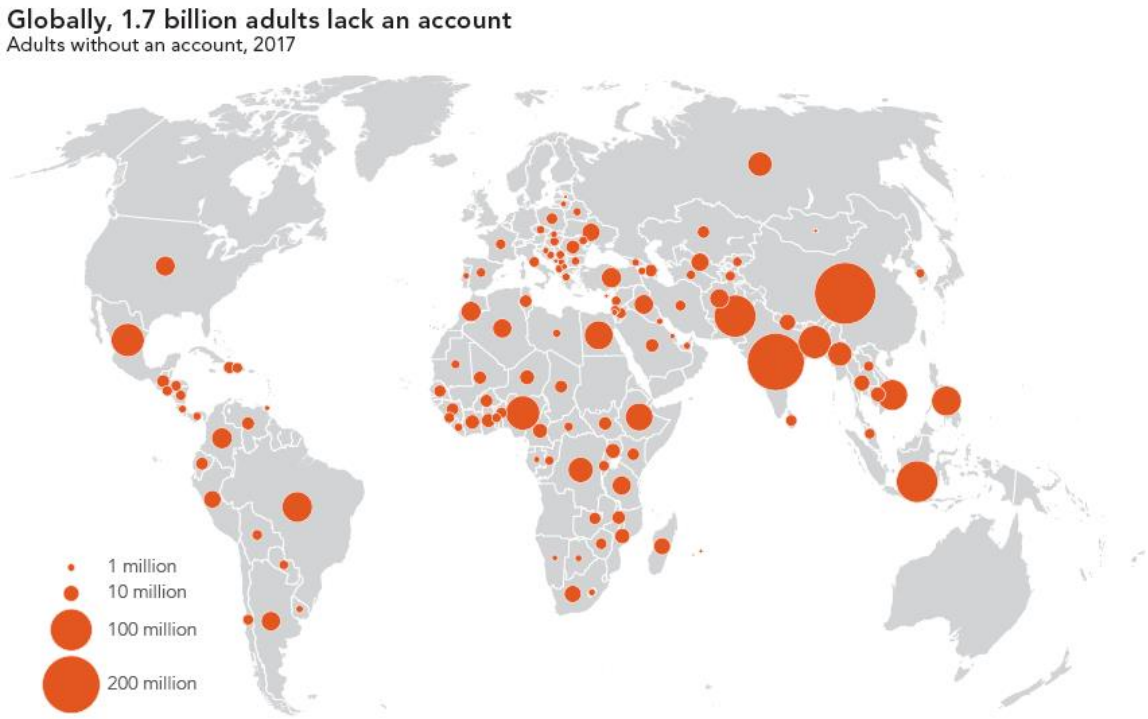
[14] Source: United Nations website

approach is focused on how to shape the financial system so to support the UN SDGs[15]. This last approach is based on the concepts of technology and financial inclusion.

Financial inclusion is centred on the ability of delivering affordable financial services to all the agents in a society[16]. Achieving a high level of financial inclusion is important because it promotes wider economic growth, contributes to reduce poverty and allows people to fulfil their obligations more easily[17]. All these positive results come from the fact that the access to an efficient financial system allows people to facilitate savings and investments that can be used in their education, entrepreneurial processes and health. Furthermore, a well-functioning financial system having also a digital infrastructure allows people to complete more efficiently their tasks involving any sort of payment. Financial inclusion also supports economic growth by increasing and often allowing in the first place the funding of those small and medium enterprises (SMEs) that are not able to access credit in less developed financial systems. The picture below (Figure 3) represents the geographical distribution of adults who in 2017 still lacked a financial account. Clearly the distribution of those agents is not even across nations but is, as it could be imagined, concentrated in the poorer regions of the world. As a reference, the population of the world in 2017 was around 7.5 billion. The picture shows 1.7 billion of people who in the same year did not have a financial account. Those people represented almost 23% of the world population.

[15]Douglas W. Arner et al., *Sustainability, FinTech and Financial Inclusion*, 21 EUROPEAN BUSINESS ORGANIZATION LAW REVIEW 7–35 (2020).
[16] Financial Action Task Force (FATF), *FATF guidance: anti-money laundering and terrorist financing measures and financial inclusion*. February 2013. 1, 12 (2013).
[17]Center for Financial Inclusion (CFI) (2019). Available at: https://www.centerforfinancialinclusion.org/research (Accessed 18 May 2020).

Figure 3: Number of people without a financial account by country



[18]

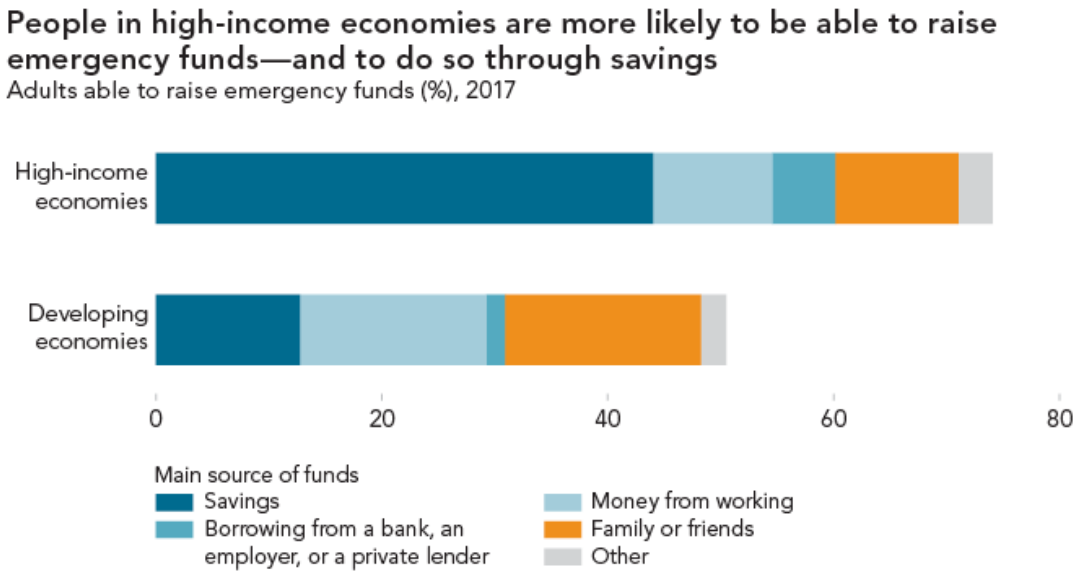
Being able to access financial systems allows to reduce various risks such as poverty, crime or unemployment[19]. A simple example of that would be given by individuals that are not able to deposit their money in any virtual account and who, therefore, need to store their monetary assets in terms of physical currency. Coins and banknotes are not efficient means for a store of value. This is because, despite being the most liquid assets available, they can be stolen, lost or damaged. Clearly, a deposit with a bank is a much safer way to store monetary value. People who can access financial products can plan better for the long term and effectively invest their money in order to provide education

[18] Source: Global Findex database. Note: Data are not displayed for economies where the share of adults without an account is 5% or less.

[19] Douglas W. Arner et al., *Sustainability, FinTech and Financial Inclusion*, 21 EUROPEAN BUSINESS ORGANIZATION LAW REVIEW 7–35 (2020).

for their children. The lack of access to financial services makes people more prone to spend money in the long term and not save or invest for the long term. The picture below (Figure 4) represents data on people from developing and developed economies when talking about the possibility they enjoy of building an emergency fund that could help better prepare them for future expenses.

Figure 4: The difference between high and low-income economies in the possibility of saving money



[20]

The link between technology and finance has always been present. Today, because of the fast development of technologies such as Artificial Intelligence, Big Data and cloud

[20] Source: Global Findex database

storage technologies, it is possible to witness how strong is the link between the two[21]. The development of new digital means in which people can access financial products increases financial inclusion. This directly affects and promotes the UN SDGs. For example, in 2017 around 30% of the world population did not have the possibility to access a financial or mobile payment account[22]. In the years from 2010 and 2017, 1.2 billion people accessed financial or mobile accounts for the first time. The majority of these new participants in the financial markets are located in developing countries[23]. Among the most famous examples of highest inclusion in financial systems we can list Kenya, East Africa[24], India and China. In India, hundreds of millions of people accessed their first bank account thanks to the creation of India Stack, a digital infrastructure having the objective of bringing the Indian population in the digital age[25]. The China case will be later analysed since in a short period of time it passed from having an inefficient financial system to being the world's most digitalised one[26].

2.2.1 Financial literacy as a way towards financial inclusion

If we define financial literacy as the ability to self-manage personal finances without the need of a financial advisor, in 2014 only 33% of adults worldwide were considered as

[21] Zetzsche DA, Buckley RP, Arner DW, Barberis J From FinTech to TechFin: the regulatory challenges of data-driven finance. NY Univ J Law Bus 14(2):393–446 (2018) and Arner DW, Barberis JN, Buckley RP FinTech, RegTech and the reconceptualisation of financial regulation. Northwestern J Int Law Bus 37(3):371–413, 373 (2017).

[22] Asli Demirguc-Kunt et al., *The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution*, (2018).

[23] World Bank Findex - The Global Findex Database 2017, , https://globalfindex.worldbank.org/ (last visited Jun 15, 2020).

[24] GSMA | Mobile Money as a driver of financial inclusion in ..., , https://www.gsma.com/mobilefordevelopment/blog-2/mobile-money-driver-financial-inclusion-sub-saharan-africa/ (last visited Jun 15, 2020) and Ashenafi BF, Kingstone M, Roelof G, Matthew E, Nikki K (2016) *The role of mobile money in financial inclusion in the SADC region*. FinMark Trust, December 2016. Pol Research Paper No 03/2016.

[25] Douglas W. Arner et al., *The Identity Challenge in Finance: From Analogue Identity to Digitized Identification to Digital KYC Utilities*, 20 EUROPEAN BUSINESS ORGANIZATION LAW REVIEW 55–80 p 55, 64 (2019).

[26] Key lessons for policymakers from China's financial inclusion experience, World Bank Blogs, https://blogs.worldbank.org/psd/key-lessons-policymakers-china-s-financial-inclusion-experience (last visited Jun 16, 2020).
and Zhou W, Arner DW, Buckley RP (2015) Regulation of digital financial services in China: last mover advantage? Tsinghua China Law Rev 8(1):25.

financially literate[27]. The percentage is higher in the EU where 54% of adults were considered in the same year financially illiterate. In the EU there is also an alarming amount of people who are technologically illiterate. 37% of people over 65 have never used internet[28] and 20% of consumers in the UK lack the technological skills to use digital financial services[29]. Those data are considered as alarming because today banks are closing their local branches and their relationships with clients are conducted more and more on an online basis. Under this scenario, being technologically illiterate causes financial exclusion.

After the 2008 financial crisis, the G20 tried to create a more resilient global financial system. One of the ways in which this objective was pursued was the creation of the Financial Inclusion Experts Group (FIEG)[30], the Global Partnership for Financial Inclusion (GPFI)[31] and the establishment of the Financial Inclusion Action Plan in 2010. In particular, the GPFI recognised the fact that in order to facilitate global financial inclusion, the distribution of digital financial solution would be critical[32]. In order to guide and push governments into developing digital means that would facilitate financial inclusion, the G20 developed the High-Level principles for Digital Financial Inclusion (HLPs)[33]. Developing countries also moved in that direction by creating in 2008 the Alliance for Financial Inclusion in 2008[34].

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[27] Leora Klapper, FINANCIAL LITERACY AROUND THE WORLD: INSIGHTS FROM THE STANDARD & POOR'S RATINGS SERVICES GLOBAL FINANCIAL LITERACY SURVEY RESPONSIBLE FINANCE FORUM (2015), https://responsiblefinanceforum.org/publications/financial-literacy-around-the-world-insights-from-the-standard-poors-ratings-services-global-financial-literacy-survey/ (last visited Jun 16, 2020).

[28] UK Financial Conduct Authority (UKFCA) Access to Financial Services in the UK, , https://www.fca.org.uk/publication/occasional-papers/occasional-paper-17.pdf (last visited Jun 16, 2020).

[29] Ibid.

[30] Innovative Financial Inclusion. Principles and Report on Innovative Financial Inclusion from the Access through Innovation Sub-Group of the G20 Financial Inclusion Experts Group., ATISG Report, https://www.gpfi.org/sites/gpfi/files/documents/Principles and Report on Innovative Financial Inclusion_0.pdf. (Last accessed 12 May 2020).

[31] Ibid.

[32] G20 Financial Inclusion Indicators, GPFI, https://www.gpfi.org/news/g20-financial-inclusion-indicators (last visited Jun 16, 2020).

[33] G20 High-Level Principles for Digital Financial Inclusion, GPFI, https://www.gpfi.org/publications/g20-high-level-principles-digital-financial-inclusion (last visited Jun 16, 2020).

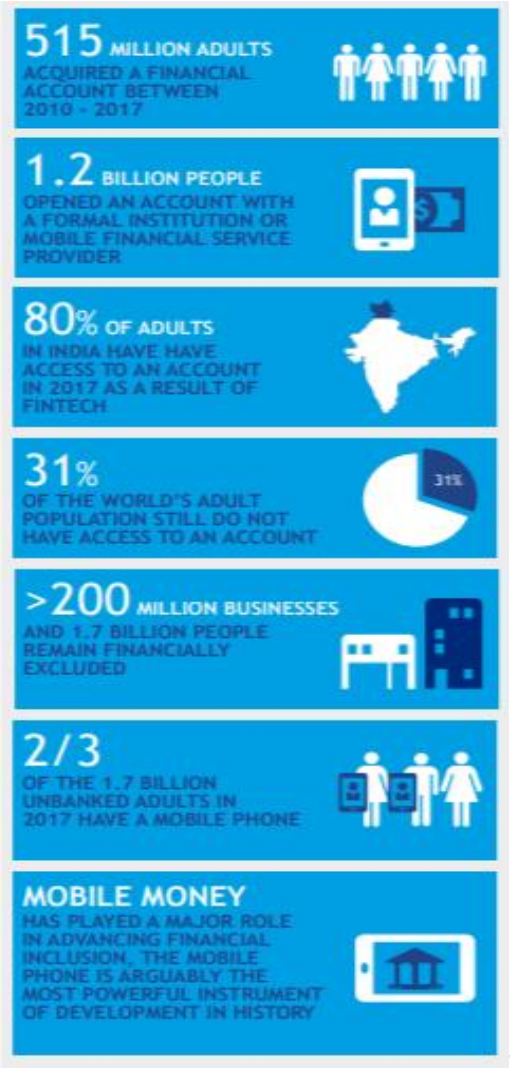
[34] Maya Declaration | Alliance for Financial Inclusion ..., , https://www.afi-global.org/maya-declaration (last visited Jun 15, 2020) and Maya Declaration continues to evolve with financial ..., , https://www.afi-

2.2.2 Reaching UN SDGs by using Fintech innovation

Fintech innovation can help achieving UN SDGs in three major ways. The first of them being the more efficient allocation of the already existing financial resources in the economy in order to achieve a more sustainable development. This can happen for example by using policies and incentives in order to redirect resources to those agents that engage the most in sustainable objectives such as Green investment strategies. The second way in which Fintech can help achieving UN SGDs is focused on expanding the amount of resources available in the financial systems. This objective can be achieved by pursuing financial inclusion and improving the efficiency and stability of the financial sector especially in developing countries. A higher number of people participating in financial transactions will increase the amount of savings and investments that could be used productively in order to pursue sustainable development. The last way in which SDGs can be pursued thanks to Fintech innovation is by using new technologies to design better financial and regulatory systems that would directly achieve those objectives. The picture below (Figure 5) represents some key data published by the World bank in 2017 that confirm how Fintech has helped increasing financial inclusion especially in those areas of the world where financial markets are not advanced. The central role of the smartphone as a tool to interact with banks is also stressed. The data of the World bank are represented below.

global.org/news/2017/11/maya-declaration-continues-evolve-financial-inclusion-commitments-66-countries (last visited Jun 15, 2020).

Figure 5: Data on FIntech and financial inclusion



[35]

[35] Source: The World Bank.

2.3 The 4 pillars of digital financial transformation

As briefly discussed in the Introduction above, the word Fintech today has a very broad definition: it could be referred to methods of payments, the use of big data, artificial intelligence and many more innovations that could be applied in the financial sector. It is important when having such a wide spectrum of possibilities to focus on the ones having the most effective results when talking about UN SDGs. As said, financial inclusion represents one of the main and direct ways in which the financial sector can support those goals. The innovations that have the most influence on financial inclusion are the ones aimed at granting access to online means of payments and store of value. In order to support digital financial transformation however, there are other aspects that should be taken into account. In order to achieve the creation of an efficient and inclusive digital infrastructure, economies should focus on the following four pillars: Digital ID and eKYC, electronic payment systems, electronic provision of government services, design of financial market infrastructures that improves access, usage and stability[36].

2.3.1 Digital ID and eKYC

The first pillar which represents the base for the others is the presence of a Digital ID and eKYC. The challenge of developing a digital ID infrastructure is especially difficult in developing countries. It is often the case that in those countries formal identification documents are not present at all. In India, the government has implemented a digital ID system called India's Aadhaar which represents the first level of India Stack, the digital infrastructure mentioned above. India Stack provides a digital ID given in the form of a 12-digit randomized number that can be used in order to access government services. The

[36] Douglas W. Arner, Ross P. Buckley & Dirk Andreas Zetzsche, *Fintech for Financial Inclusion: A Framework for Digital Financial Transformation*, SSRN ELECTRONIC JOURNAL (2018).

most secure implementation of a digital identity system would be one relying on identification through biometrical data.

The UN adopts the IrisGuard identification system in order to provide financial aid in developing countries. This system is based on the conversion of the image of an iris into a unique code used to identify the person. The platform was established in 2016 and since then has helped the UN distribute financial helps in the form of food vouchers and by giving the possibility to complete simple transactions like withdrawing cash. EyePay is used together with the Ethereum blockchain to extend financial inclusion to refugees in Jordan. The EU implemented in 2014 the eIDAS regulation. This provides European citizens mutually recognised digital identity for cross-border interactions. Member states are required to notify the European Commission when they set up their digital ID system and the other states must recognise it as valid also in their national territory[37].

The objective of having a digital identity infrastructure is the one of offering people the possibility to open accounts in a simple, cheap and fast way. Clearly the benefits of this kind of infrastructure are high only if the adoption rate of these technologies is high. In India, the digital identity system has been used to develop a paperless eKYC[38]. The first Indian bank to offer an eKYC facility was Axis Bank which in 2013 reduced the time needed to open a bank account from seven days to just one[39].

2.3.2 Electronic payment systems

A well-functioning payment system is essential to financial development and to allow money to flow in the real economy. Thanks to technology, developing countries that do not have well established financial systems, can bypass the requirement of a bricks and

[37] The Identity Challenge in Finance: From Analogue Identity ..., , 55–80 section 4.3. https://link.springer.com/article/10.1007/s40804-019-00135-1 (last visited Jun 15, 2020).
[38] KYC stands for Know Your Costumer. It is extremely important for financial institutions and it involves knowing a customer's identity, their financial activities and the risk they pose.
[39] Axis Bank introduces a paperless, eKYC based a/c opening, https://www.indiainfoline.com/article/news-top-story/axis-bank-introduces-a-paperless-ekyc-based-a-c-opening-114030300116_1.html (last visited Jun 15, 2020).

mortar banking structure and seamlessly participate in the financial system digitally. Thanks to the spread of mobile money, people can use their phones to pay for expenses, invest their funds and store them safely. Despite the high success of mobile money schemes like the one described in the China case analysed below, the success of these infrastructure is not consistent across countries. This could be due to several factors. The first reason why mobile money schemes do not have the same success in countries where they are developed is because of different consumers' needs across countries. The companies providing these digital payment schemes might be unable to adapt to other markets[40]. Another reason is the tendency of central banks to overregulate these services. This occurs because, despite the fact that those schemes play an important role in achieving financial inclusion especially in developing countries, the implementation of such a scheme poses various regulatory challenges. While, in their initial phase those infrastructures do not pose a real threat to the financial system, they have the potential to grow rapidly. When the services offered by those companies achieve a high adoption level, the financial system might experience a shock and commercial and central banks could quickly lose any power within the economy[41]. In China, where the digital payment system provided by the Ant Financial Service Group is the payment method of choice for the vast majority of Chinese consumers, the necessity of developing ad hoc regulation became clear. Since 2017 the People's Bank of China (PBoC) has increased mobile wallet payments to higher levels of regulation[42]. Mobile payment institutions are for example now required to use a centralized clearing house in order to process payments. This centralised clearing house is called the China Nets Union Clearing Corporation[43]. In order to protect consumers, the People's Bank of China has also increased the reserve funds ratio that those companies have to retain. The ratio was increased from 20 to 50 percent.

[40] FinTech in Developing Countries: Charting New Customer p151-159 ..., , https://www.researchgate.net/publication/313365057_FinTech_in_Developing_Countries_Charting_New_Customer_Journeys (last visited Jun 15, 2020).
[41] See section 3.3 of this paper.
[42] Regulation of Digital Financial Services in China: Last ..., , p25, 28 https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2660050 (last visited Jun 15, 2020).
[43] How China's Central Bank Is Clamping Down On The Mobile ..., , https://www.forbes.com/sites/jinshanhong/2017/08/18/how-chinas-central-bank-is-clamping-down-on-the-mobile-payment-industry/ (last visited Jun 15, 2020).

Because of their high presence in the financial market, those payment providers should be subject to an appropriate level of regulation.

2.3.3 Electronic provision of government services

This pillar is effective only if the first two are already in place. While various governments attempted in the past to provide their services in a digital way, the infrastructure provided in the first pillars and experience of citizen with digital tools is essential. An effective digital infrastructure for governments is not only beneficial for the government itself thanks to the improvement in the efficiency in processes like tax collection but also for citizens. Services like the national pension system could be one direct example of the added ease of use that a digital infrastructure would provide. In particular, when talking about the relationship between government and the poor, a digital infrastructure could provide three main benefits. The first way in which governments can take advantage of a digital infrastructure is to provide cash transfers to the poor in an effective way rather than providing assistance by providing goods and services[44]. Secondly, third parties could take advantage of those accounts in order to complete payments. Finally, the state could be the factor that allows a smoother transition between cash to digital money.

2.3.4 Design of financial markets infrastructures that improve access, usage and stability

By using as the first three pillars a base, an efficient digital financial infrastructure can improve the access to finance, stability and integrity of the markets. Furthermore, a digitalised financial system allows a greater access to financial products. An example where both investors and companies can take advantage of a digitalised financial system is given by the case of small and medium enterprises (SMEs). Those enterprises were generally unable to access credit. This is because credit risk analysis was conducted by

[44] On-Ramp to Financial Inclusion?, CENTER FOR FINANCIAL INCLUSION 1–32 (2020).

specialised banks that required collateral in order to grant a loan. In developing countries, it might be difficult for those SMEs to provide the level of collateral asked by banks. Thanks to digitalised financial systems, credit risk could be assessed simply by using pasta data revealing the credit worthiness of the individual. By using large amounts of data, credit could be provided to more agents and credit providers could make better, more informed decisions[45]. Digitalization can also increase the savings rate of investors and, by doing so, strengthen capital markets. Finally, digitalization could lead to more people investing in capital markets and therefore increase the funds available for productive purposes such as business development, supporting innovation, improvement of infrastructures and human capital.

[45] Zetzsche DA, Buckley RP, Arner DW, Barberis J (2018b) From FinTech to TechFin: the regulatory challenges of data-driven finance. NY Univ J Law Bus 14(2):393–446

3. The China case

The first chapter analysed the link between money and society and how Fintech has the potential to improve financial inclusion. This chapter is more specific and focuses instead on analysing China which is now considered among the most advanced countries in the field of digital payments. The chapter analyses specifically the Ant Financial Service Group. The chapter starts by analysing the history of the group in order to understand how Fintech has modified during the years the financial sector in China. Subsequently, given the numerous services offered by the Ant Financial Service Group, each one of its branches is analysed individually. Finally, the chapter provides an analysis of the consequences the Chinese cashless society has on the financial system. The discussion establishes also why, despite being technologically ahead of most other parts of the world in that aspect, the Chinese cashless society does not represent a real revolution for the financial sector.

3.1 Fintech and the evolution of financial payments in China:

In the early 2000s, China experienced a first growth in online shopping. The main problem consumers faced during those years regarding this kind of purchases was regarding the security in the payment system. There was in fact a widespread lack of trust on the side of consumers who did not know each other. In 2003, Alibaba launched Alipay in order to work as a support for Taobao.com the company's shopping platform. The goal of the company was the one of trying to reduce the uncertainty and lack of trust that was characterising those online purchases[46]. In the beginning Alipay was conceived as being only as a safe payment method which had a basic functioning process in which Alipay worked as an intermediary between the purchaser and the seller of a good.

[46] How a Little Ant Challenges GiantBanks? The Rise of Ant Financial(Alipay)'s Fintech Empire andRelevant Regulatory Concerns, RESEARCH GATE 1–20, 14 (2018).

When a good was purchased on TaoBao, the money of the consumer was first transferred to Alipay. Once Alipay received the money, the seller was notified of the transfer and instructed to dispatch the good. Once the consumer received the good, a confirmation was sent to TaoBao and Alipay transferred finally the money to the seller. The security offered by Alipay was one of the main factors that led to the supremacy in the Chinese online shopping of TaoBao when compared to eBay[47].

Alipay transitioned from being only an online shopping guarantee to being an independent payment system in 2004 when Alipay's website went officially online. In 2005, the Chinese e-commerce industry, registered a sudden expansion and the annual transaction volume increased by roughly 40% passing from $65.96 billion in the previous year to $92.94[48]. Alipay was however at the time mainly used by TaoBao users and, in order to expand its customer base, it started to work with some of the major players in the sector of online transactions such as airline and hotel booking websites, other online stores and even gaming platforms. The result was that the number of vendors allowing their consumers to pay thanks to Alipay increased to 300.000 in 2016[49]. The number of consumers registered with an account on Alipay was 33 million the same year and doubled in the following year. [50]

In 2008 the company decided to expand its operations outside offering a secure means of payment. The company started offering credit services to the sellers on TaoBao who had the possibility to borrow an amount of money up to roughly $15.000. This was just the first step since during the 2010s the company started expanding the number of services offered becoming a comprehensive financial services provider. Alipay's goal was to become the tool of choice for every daily action Chinese people conducted. Alipay's

[47] M. Green et al, "The case study: How Taobao bested eBay in China: Dealing with a powerful new rival", Financial Times, 13 March 2012, p.10.
[48]Lerong Lu, 'How a little ant challenges giant banks? The rise ..., , supra note 46 p15
[49] Over 300,000 businesses accepted Alipay (1 February 2007), Beijing Times available at: http://tech.sina.com.cn/i/2007-02-01/03591363850.shtml last visited Jun 15, 2020.
[50]Number of accounts registered on Alipay 2012 - Statista, https://www.statista.com/statistics/249062/number-of-accounts-registered-on-alipay/ (last visited Jun 15, 2020).

services started to be employed in many different occasions such as the payment of administrative fees and utility bills and even for charity donations.

In 2010, the People's Bank of China agreed to grant Alipay together with other 26 companies a license for an official recognition of third-party payment system provider[51]. The transition from an online only payment service provider to also an offline one occurred in 2011 when Alipay launched the "Barcode Pay" service thanks to which consumers could use an App on their smartphones in order to make payments. Thanks to this new service, retailers could receive payments from their costumers by simply scanning a barcode generated by the app. The wide adoption of this technology is given by the ease of use for both consumers and businesses. Furthermore, the crucial characteristic of this service is the fact that required little investment from the retailer's side. Unlike credit and debit cards that require the use of a magnetic card reader, the codes could be scanned by a smartphone or by barcode-reading gun. In mid-2012, Alipay started also functioning as a means of payment for investment fund companies which now started receiving funds from their clients through the app.

One of the most important years for the company was 2013 in which Alipay launched Yu'E Bao (Left-over Treasure) which was a mobile wealth management product[52]. Yu'E Bao received immediate success and in less than six months reached 30 million users. By using the service, consumers could obtain a 5% annualised return in 2013. This result was achieved because the money deposited in Yu'E Bao is invested in money market funds which are managed by Tianhong Asset Management Company. Furthermore, users could deposit and withdraw funds at any time and use the deposit for buying goods online. All those characteristics made it a valid substitute to traditional tools used as store of value such as bank deposits for many people and especially young generations.

In 2014 Alipay expanded again the services offered by creating a new banking business called MyBank. Alipay was able to do so because in the same year it obtained a licence

[51] Third party payment licences in China – are they within the grasp of foreign investors?, JD SUPRA, https://www.jdsupra.com/legalnews/third-party-payment-licences-in-china-69969/ (last visited Jun 16, 2020).

to do so by the China Banking Regulatory Commission[53]. The main difference between Maybank and traditional banking institutions is that the former does not have any kind of brick-and-mortar structure[54].

In the same year, Alipay was incorporated by the Ant Financial Services Group and became one of the many different branches of the latter. Thanks to this incorporation, the Ant Financial Services Group became the largest Fintech company in the world[55].

3.2 The various branches of the Ant Financial Service Group

As illustrated in the previous chapter, what started as a provider for secure payments became over the years a true financial institution offering products such as banking or brokerage services. Nowadays, the Ant Financial Services Group is in fact one of the major players in the world when looking at Fintech. The Ant Financial Services Group was the result of innovation aimed at offering traditional financial services in cheaper and more efficient ways and to create new financial products. This chapter is focused on exploring more in detail how each of the various major branches of the Ant Financial Services Group works and the services it offers. In particular the focus will be on the four pillars characterising the group: Alipay, Ant Fortune, MyBank and Sesame Credit.

3.2.1 Alipay: the fast and safe mobile payment system

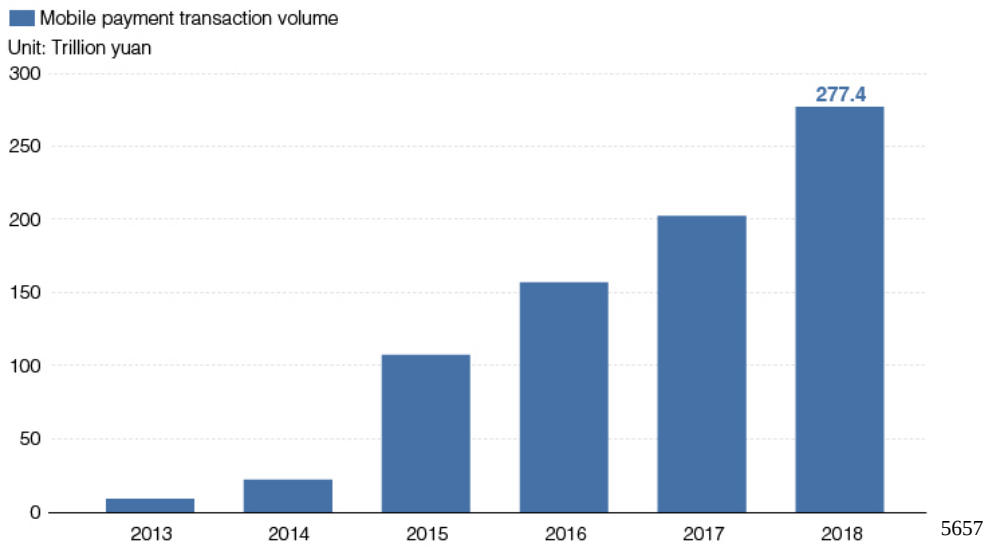
Alipay is the branch of the Ant Financial Services Group dedicated to the means of payment both online and offline. The process and services that Alipay offers in order to provide users with secure online payments has been discussed in the previous chapter. The focus now is to describe how Alipay allows consumers and businesses to complete and receive monetary payments in real time in the real offline world. As said before,

[53] G. Wildau, "China's First Online-only Lender Launched", Financial Times, 6 January 2015), p.16
[54] Private Banks in China: Origin, Challenges and Regulatory ..., , p 585, 592 https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2828184 (last visited Jun 15, 2020).
[55] Lerong Lu, 'How a little ant challenges giant banks? The rise ..., , supra note 46, p14.

Alipay expanded its payment business from online to offline in 2011. In that year the company launched its smartphone App for both IOS and Google Android which represent the main operative systems used by the vast majority of the smartphones today on the market.

The picture below (Figure 6) shows how, thanks to the implementation of cashless payment methods, the volume of transactions conducted via mobile payments has increased substantially over the years from 2013 to 2017.

Figure 6: The rise of mobile payments



The vast majority of physical stores such as restaurants, supermarkets, food delivering apps in China accept Alipay as a medium of exchange. As an example, we can list Starbucks the famous American multinational chain of coffeehouses which accepts

[57] Source: Chart of the Day: China's Mobile Payment Transaction ..., , https://www.caixinglobal.com/2019-03-22/chart-of-the-day-chinas-mobile-payment-transaction-volume-hits-4151-trillion-in-2018-101395789.html (last visited Jun 15, 2020).

Alipay in all of its stores across China[58]. Alipay's payment services are used in other countries outside of China. Japan, Australia, South Korea and the United States are all examples of countries in which Alipay can be used even if it has a much lower adoption rate than it has in China[59].

Alipay uses a unique way of processing payments when compared to other digital payment providers such as Apple Pay or Samsung pay. While Apple Pay and Samsung Pay adopt the Near Field Communication (NFC) technology, Alipay uses the Quick Response (QR) code technology. This kind of technology is a two-dimensional barcode that was firstly used in Japan in the automotive industry. The advantage of the QR over the NFC technology employed by Apple, is the fact that the QR code has a lower infrastructure threshold. What this means is that Alipay has a cheaper and easier way to reach a higher number of consumers and businesses because almost no investment is required to adopt this new technology.

When using Alipay to process their purchasers, all a consumer needs to do is open the Alipay app and the app will generate a one-off QR code that will be scanned by the retailers' staff thanks to either a smartphone or a barcode reading gun. Once the QR code has been scanned, the transaction is completed and the money is transferred from the buyer to the seller. Alipay also allows the opposite functioning mechanism: retailers can print a QR code representing their account on Alipay and let consumers scan the code in order to complete the transaction. This is an even more efficient and cheaper way to complete the payment since the retailers are not even required to purchase a new smartphone used by the staff or the barcode reading gun. This method is extremely useful when considering small vendors, street artists and other sellers that want to minimise their

[58] Lucas, "Tencent grabs mobile pay share from Alibaba", Financial Times, 2 May 2017, p.14

[59] Justina Crabtree; special to CNBC.com, HOW ALIPAY IS HELPING LONDON STORES CASH IN ON CHINA'S GOLDEN WEEK CNBC (2016), https://www.cnbc.com/2016/10/06/how-alipay-is-helping-london-stores-cash-in-on-chinas-golden-week.html (last visited Jun 16, 2020).

expenses[60]. In the end, Alipay has created a cost effective and easy way of processing payments for both consumers and retailers.

One of the main factors that have to be taken into consideration, is the level of security offered. Clearly, if the tool provided could easily be hacked and the money stolen from people's savings, it would be unreasonable for consumers. Alipay uses various measures in order to prevent those situations to happen. First, as said before, the QR codes generated by the app when consumers are completing a transaction, is a one-off. What this means is that the code used is constantly changing and therefore a QR code authorising a transaction cannot be used by a third party to enter into more transaction with the consumers' money. Secondly, nowadays most smartphones have biometric scanners to check for security. Most manufacturers include in their smartphone fingerprint scanners or face recognition scanners like the ones used by Apple in their latest Face ID security systems employed in their products. Alipay takes advantage of those biometric scanners in order to verify the identity of the user and proceed with the payment. Therefore, even if a phone gets stolen, it will not be possible for a third person to access the Alipay wallet.

Alipay is a service that can also be liked to debit and credit cards issued by third party banks thus offering the function of a simple mobile e-wallet. The wide adoption of Alipay is given by the fact that China has experienced a considerable increase in the adoption of the smartphone technology. 95% of the internet users today in China use their smartphone as their main web surfing device[61].

The main factor that made Alipay so widely adopted is the convenience, its ease of use and the interconnection between the various services it offers. None of the services offered by Alipay is unique. There are many different apps in the world that allow people to safely process payments. An example of those is PayPal. There are also many alternatives available to consumers when talking about using a mobile digital wallet on a

[60] Third party payment licences in China – are they within the grasp of foreign investors?, JD SUPRA, https://www.jdsupra.com/legalnews/third-party-payment-licences-in-china-69969/ (last visited Jun 16, 2020).

[61] In fintech, China shows the way, THE ECONOMIST, https://www.economist.com/finance-and-economics/2017/02/25/in-fintech-china-shows-the-way (last visited Jun 16, 2020).

smartphone like Apple Pay or Android Pay. Finally, consumers can transfer money between each other thanks to apps and online platforms such as Facebook Messenger. What makes Alipay unique is that all those different services have been combined in a consumer-friendly way in one platform.

In China even beggars and in rural areas, using digital payments is preferred to cash[62]. Furthermore, 14% of Chinese no longer carry any cash when they go out, whilst 26% carry less than 100 yuan ($15)[63].

Adoption of mobile payment technology is impressive in China when compared to the rest of the world. In China, the users of mobile payment technology in 2019 were 577.4 million[64]. To put this number in perspective, the number of people in the US using mobile payments in the same year were around 64 million[65] and 6.7 million in Germany[66].

3.2.2 Ant Fortune: the mobile wealth management platform

Ant Fortune was among the first services launched by the Ant Financial Services Group thanks to which the company expanded its operations in the financial services sector. The objective of the group with Ant Fortune was to become one of the leading players in the online financial services providers. The platform allows users to invest their money in a variety of products such as investment funds, money market funds, crowdfunding projects and others without being charged a commission fee. Already in 2015, Ant Financial

[62] 陈子琰 , CHINA'S MOBILE PAYMENT ERA: COSTS AND BENEFITS CHINADAILY.COM.CN, http://africa.chinadaily.com.cn/china/2017-05/11/content_29295067.htm (last visited Jun 16, 2020).

[63] 于小明 , ABOUT 14% PEOPLE CARRY NO CASH IN CHINA ABOUT 14% PEOPLE CARRY NO CASH IN CHINA[1]- CHINADAILY.COM.CN, http://www.chinadaily.com.cn/business/tech/2017-09/06/content_31633683.htm (last visited Jun 16, 2020).

[64] More People in China Will Be Making Proximity Mobile Payments, EMARKETER, https://www.emarketer.com/content/china-is-moving-toward-a-cashless-society (last visited Jun 16, 2020).

[65] US Mobile Payment Users 2019, EMARKETER, https://www.emarketer.com/content/us-mobile-payment-users-2019 (last visited Jun 16, 2020).

[66] Alina Brentnall, GERMANY MOBILE PAYMENT USERS 2019 EMARKETER, https://www.emarketer.com/content/germany-mobile-payment-users-2019 (last visited Jun 16, 2020).

offered more than 900 different investment products provided by 80 different financial institutions[67].

Ant Financial therefore acts as a broker and not as a direct provider of these financial services. By not being involved in any of the investments, those financial institutions providing the securities should not see Ant Financial as a direct competitor.

However, Ant Financial has successfully lowered the entry barriers to access those financial products. Thanks to the mobile wealth management platform in fact, also people who possess little or no experience in financial products or possess very limited capital, can now invest in those instruments. This platform became popular among the Chinese population especially in its youngest part in a very short period of time. Already in 2016, the services offered by Ant Fortune were used by 25 million people of which 81% were 35 or younger[68].

Among all the products offered by Ant Financial, the most famous one is Yu'E Bao, which was launched by the company in 2013. The peculiarity of this fund is that it is operated by Ant Financial indirectly through the Tianhong Asset Management Company. The returns offered by investing in this fund are much higher than the ones offered by banks. The comparison between the fund and a bank deposit is fair if we consider that the fund is invested in very liquid assets and which, because of that, can be deposited or withdrawn effortlessly in any moment[69]. The fund, because of its integration with Alipay, the relatively high returns offered and its liquid characteristics obtained immediate success. Soon after its launch it became the primary store of value tool used by tens of millions of customers. The picture (Figure 7) below represents the value of the assets under management of the fund and it gives a perspective on the popularity and rate of expansion of the fund among the Chinese population. The picture shows the amount of money managed by Yu'E Bao over the years between 2014 and 2019. The funds managed

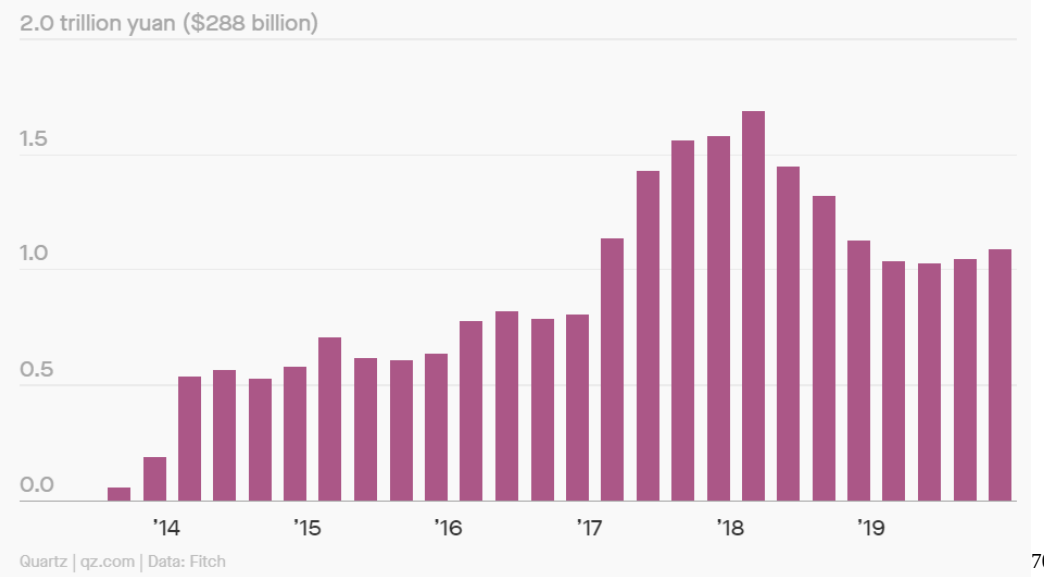
[67] Alibaba Finance Affiliate Launches Fund Investment ..., , https://www.forbes.com/sites/ywang/2015/08/18/alibaba-finance-affiliate-launches-fund-investment-smartphone-app/ (last visited Jun 15, 2020).

[68] Ant Financial gears up for more wealth management ..., , http://www.chinadaily.com.cn/business/2016-09/09/content_26748923.htm (last visited Jun 15, 2020).

[69] Foe or frenemy?, The Economist (2014), https://www.economist.com/finance-and-economics/2014/03/01/foe-or-frenemy (last visited Jun 16, 2020).

over the years by Yu'E Bao grew in all those years reaching its maximum in 2018. During 2018 however, the fund experienced a substantially reduction in its assets under management.

Figure 7: Yu'e Bao money market fund asset under management



[70]

In the end of 2015, the fund largely contributed to the record-breaking achievement of $659 billion in valuation of money market funds in China[71]. This created a challenge for banks which lost many of their clients because of the new competition created by Fintech firms. Yu'E Bao became in 2017 the largest money market fund available in the whole world. Today, despite having lost its crown to the funds managed by JPMorgan and Fidelity, Yu'E Bao is still among the biggest money market mutual funds. The crucial

[70] Source: China no longer runs the world's largest money market fund, , https://qz.com/1791778/ant-financials-yue-bao-is-no-longer-the-worlds-biggest-money-market-fund/ (last visited Jun 15, 2020).
[71] In fintech, China shows the way, The Economist, https://www.economist.com/finance-and-economics/2017/02/25/in-fintech-china-shows-the-way (last visited Jun 16, 2020), p.65.

difference between the two is that the major American mutual funds are mainly used by institutional investors while the Chinese one is directly used mainly by non-institutional investors. The table below (Table 1) lists the 10 biggest funds with their valuations updated to December 2019.

Table 1: Largest funds worldwide (December 2019)

Fund	19-Dec
JPMorgan US Government Money Market Fund	$164 billion
Fidelity Government Cash Reserves	$161 billion
Tianhong YuEBao Money Market Fund	**$157 billion**
Fidelity Government Money Market Fund	$152 billion
Vanguard Federal Money Market Fund	$147 billion
Fidelity Instl Government Portfolio	$134 billion
Vanguard Prime Money Market Fund	$127 billion
Schwab Value Advantage Money Fund	$122 billion
BlackRock Liquidity FedFund	$126 billion
Goldman Sachs FS Government Fund	$129 billion

[72]

[72] Source: China no longer runs the world's largest money market fund, , https://qz.com/1791778/ant-financials-yue-bao-is-no-longer-the-worlds-biggest-money-market-fund/ (last visited Jun 15, 2020).

3.2.3 MyBank: the online banking platform

Traditionally, the banking sector in China has been dominated by state-owns lenders. Those lenders are in most cases not willing to lend to small or medium sized companies[73]. This mainly occurs because those borrowers are generally not able to provide valid proof of their credibility and cannot pass the credit checks preliminary to the issuance of a loan. Thanks to encouragement of Chinese regulators aimed at breaking the monopoly by allowing the creation of privately owned banks, Alibaba could effectively create its own privately funded bank. The result was MyBank, an online-only bank which today represents one of the four main branches of the Ant Financial Service Group. By exploiting the fact that small and medium sized companies are generally ignored by mainstream lending providers, MyBank soon became the service of choice for these agents.

MyBank is able to provide lending services to those small and medium sized companies thanks to the large user base for the other platforms of the group. By analysing big data provided by Alipay and Sesame Credit, financial engineers were able to create an algorithm that takes into account more than 100,000 different indicators. This algorithm is aimed at evaluating the credit history and trustworthiness of a borrower and to approve or deny the loan in a couple of minutes. The technological background of MyBank gives it a clear advantage over traditional banking institutions that do not have access to such a big collection of data.

One of the main advantages of MyBank over traditional banking institutions is its structure. The online banking platform in fact lacks the expensive brick and mortar structure of its physical counterparts. Because of this, MyBank is able to lower its operation costs and can offer better and cheaper services to its customers. An example of this is the default rate asked on loans which is around 1%. Being an online-only bank means that consumers, in order to access the bank's services, have to log in either via a

[73]Private Banks in China: Origin, Challenges and Regulatory ..., , p 585, 586 https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2828184 (last visited Jun 15, 2020).

website or a mobile app. This is a much more convenient and user-friendly way for consumers to access those services.

MyBank has successfully lent money to 16 million small companies for a total value of 2 trillion yuan which approximately corresponds to $290 billion[74].

3.2.4 Sesame credit: the credit rating agency

Sesame Credit is the branch of the Ant Financial Services Group which deals with credit ratings of the millions of consumers by using the big data obtained thanks to the shopping platforms of Taobao and T-mall. Sesame credit is the last of the four main branches of the Ant Financial Services Group and it has a crucial role in the services offered by the group as a whole. Sesame credit works similarly to the FICO and applies a credit score to each of the consumers. The latter uses scores ranging from 300 to 850 while the former can assign scores between 350 and 950. Thanks to the authorisation of users, the company is able to analyse the payment history, shopping data and other factors tracking the behaviours of consumers in order to assign that score. There are many ways in which a good credit score can affect the lives of people in China. A high credit score can for example allow users to borrow from others on P2P lending platforms, an amount of money up to 300,000 yuan which roughly corresponds to $45,000. Other benefits are for example the possibility to access faster airport security checks[75] and the lack of the obligation to leave a deposit when renting a car. Finally, the score provided by Sesame Credit can also be used in order to apply for a visa in China[76]. The credit score is also used by third party companies such as Airbnb in order to verify the identity and a situation of financial stability for those trying to rent a house. People having low scores not only

[74]Jack Ma's Online Bank Is Leading a Quiet Revolution in ..., , https://www.foryoursociety.com/jack-mas-online-bank-is-leading-a-quiet-revolution-in-chinese-lending/ (last visited Jun 15, 2020).
[75] Cheangming, FICO with Chinese characteristics: Nice rewards, but punishing penalties CNBC (2017), https://www.cnbc.com/2017/03/16/china-social-credit-system-ant-financials-sesame-credit-and-others-give-scores-that-go-beyond-fico.html (last visited Jun 16, 2020).
[76] Alibaba unit to start credit-based visa application ..., , http://www.chinadailyasia.com/business/2015-07/16/content_15291120.html (last visited Jun 15, 2020).

have no access to those benefits but also incur in some negative effects. An example of those penalties could be travel restrictions: people who have a low credit score might be prohibited access to trains or plane tickets.

3.3 The threat to traditional financial institutions

Technology has changed the way in which people interact with financial institutions multiple times in the past. The ATMs represented the end for paper-based transactions involving human tellers. They largely simplified the deposit and withdrawal of money from bank accounts and granted people the accessibility to their funds even in those places where their own local bank was not present. Card based services also represented a shift in the way people interact with financial institutions: people did not need any more to physically withdraw money to complete a payment but could just use their cards near points of sale (POS) devices. Today, as the China example cited above shows, even cards are being replaced by more convenient tools: mobile virtual apps. While the payment system developed in China seems so revolutionary with respect to the traditional banking industry, it should be considered only as an improvement of the already existing system. While surely being impressive, the China case cannot be regarded as revolutionary for the financial sector as a whole since it just involves a transaction in a conventional way: the transfer of money from a bank account to the other[77].

Modern technological improvements have made cashless payments fast, easy, convenient and cheap for both consumers and banks. They are still however rooted in the core business of the banking industry: the use of a bank account to define the two parties in the transaction. Third party platforms and apps will execute payments and access the bank accounts for consumers and therefore challenge the dominance of the banking industry over payment transactions. Despite that, the bank account centric model is intact[78].

A disruptive innovation for the financial system would be one which allows payments without the need to use bank accounts as a base. An example of this disruptive innovation is given by digital currencies issued by private or public entities. The threat coming from private parties is especially high if the private entity is an influential company such as an e-commerce or social media giant. It is not so impossible to imagine an E-commerce

[77] The Changing Concept of Money: A Threat to the Monetary ..., , pp 37-68 https://link.springer.com/article/10.1007/s40804-020-00182-z (last visited Jun 15, 2020).

[78] Ibid.

platform that sells a wide variety of products and services and with a large customer base to create its own currency. That currency that would be used by a big portion of the society for daily transactions would represent a de facto parallel currency outside the control of the central bank[79]. The amount of transactions based on this new privately issued currency could also become similar in size or even higher than the traditional central bank fiat currencies. This e-commerce giant would therefore become a de facto new central bank by deciding the amount of the currency available and a non-officially recognised commercial bank by creating deposits in the new currency. The new setup currency would meet all the characteristics to be defined as money and would therefore be recognised as such.

As described in the China case, e-commerce giants like Alibaba possess an enormous amount of data on their consumers and the use they will be able to make of them rises as artificial intelligences develop. Until now, as examined above, e-commerce giants still only use models with conventional e-money. They therefore still participate and encourage a bank account centric model by limiting themselves to facilitate transactions. The real question now is how long will it take for those giants to take over the traditional banking business and disrupt the bank account centric model.

Central banks have the power of creating fiat currencies. They do not only have the power to print and minting coins, they also have the power to create virtual money. When they do so, they will create liabilities on their balance sheets. Central banks credit commercial banks' reserve accounts by using loans to banks or assets acquisition from banks[80]. Those liabilities are balanced on the asset side of the balance sheet with claims for repayment against banks in case of loans or the financial instruments acquired from banks. Commercial banks also have the power of creating money. In this case it will be called "commercial money" when contrasted with central bank money. This money creation power is given to banks thanks to the combination of deposit taking and lending activities. This power that banks can use is balanced with the high regulation existing on the

[79] Ibid.
[80] Thomas F. Cargill, *The Financial System, Financial Regulation and Central Bank Policy*, pp 259-267 (2017).

activities they can conduct[81]. The money creation power of both the central banks and commercial banks is today uncontested. The establishment of a private entity creating a parallel monetary system not relying on bank accounts can reduce the power of traditional financial institutions.

[81] Armour J, Awrey D, Davies P, Enriques L, Gordon JN, Mayer C, Payne J Principles of financial regulation. Oxford University Press, Oxfordpp 290-293 (2016).

4. LIBRA

This chapter is focused on Libra, the digital currency that Facebook plans to launch in 2020. The chapter starts with a description of Libra and why it has the potential of being different from e-money and other digital currencies. Subsequently, the Libra Association is analysed. The Libra Association is an independent body that will be in charge of the stability of the currency. It does so thanks to the creation and management of the Libra reserve. The chapter will also analyse what assets are included in the reserve and why and general rules regarding how it will be managed. Subsequently the chapter describes how Libra works and, in doing so, it will often be compared to the most known virtual currency: Bitcoin. The chapter is concluded with an analysis of the potential impact of Libra on the financial sector.

4.1 What is Libra?

One of the most threatening new players for the traditional financial system is represented by Libra, the digital currency that Facebook is planning to establish. The philosophy behind the creation of Libra is different than the one behind Bitcoin. Libra is intended to become a globally used digital coin used for a similar amount of transactions as one of the major fiat currencies. Libra can be considered, according to the discussion presented above, a disruptive innovation for the financial sector. This is because it will not require an infrastructure based on bank accounts to work but it will be based, similarly to other cryptocurrencies, on blockchain technology.

Libra is described as a solution of the problem of lack of access to cheap and reliable financial services for many people. The objective of Libra has officially been stated as being the following: "*The mission for Libra is a simple global currency and financial infrastructure that empowers billions of people*"[82]. Libra is therefore trying to tackle directly the problem of financial inclusion as described in the first chapter. Libra has the

[82] Libra White Paper: Blockchain, Association, Reserve, LIBRA.ORG, https://libra.org/en-US/white-paper/ (last visited Jun 16, 2020).

potential of doing so since in order to be used by consumers only requires a smartphone and an internet connection. The presence and the requirements of other financial institutions is therefore not required.

The three characteristics to be considered as money will be respected by Libra thanks to its design focused on easy accessibility and low volatility. The accessibility characteristic will be given by the fact that it will be based and managed thanks to mobile applications. This makes it easily available also in those parts of the world that do not possess highly developed banking infrastructures. Libra has therefore the potential to reach a larger customer base than traditional e-money. Potentially, Libra can also reach a larger customer base than the one of the Ant Financial Service group that still adopts a bank account centric model. The stability feature is one of the main aspects that could determine the level of trust people have on the currency. This feature will be given by the fact that Libra coins will be backed by the Libra reserve in the aim of giving the coins an intrinsic value. This intrinsic value and the assets guarantying it will not be managed directly by Facebook but by the Libra association in order to make it more independent from the social media giant.

4.2 The Libra Association and the Libra reserve

The Libra association is described as being an independent non-profit association based in Geneva, Switzerland. The scope of the association is to build a better payment network[83]. It was initially was created by Calibra, a subsidiary of Facebook that was setup exactly for this purpose. Today, the Libra association is composed by geographically distributed businesses and non-profit organizations. Among the members of the association there are also large multinational companies. Those companies are diverse also in their business sector. They range from BigTechs firms to telecommunication companies. Today the members in the Libra association are 27[84] but

[83] Libra: A New Global Payment System, LIBRA.ORG, https://libra.org/en-US/ (last visited Jun 16, 2020).
[84] Ibid.

Facebook hopes to get to 100 members of the association before the currency is officially launched.

In order for a company to become a member of the association, it has to fulfil some criteria that are set out in the white paper published by the Libra association itself. Those criteria are focused on the size of the company, its stability and reputation. In particular, businesses must hit two of three thresholds of a $1 billion USD market value or $500 million in customer balances, interact with 20 million people a year and/or be recognized as a top 100 industry leader by a group like Interbrand Global or the S&P[85]. There is also an additional economic requirement. A company willing to enter the Libra Association will have to invest a minimum of US$10m in order to get an investment token. Those tokens are used in order to determine in which proportion the company will receive the eventual dividends generated by the management of the Libra reserve. The tokens also grant the member company the right to vote in the council of the association[86]. Research organizations like universities, and non-profits can also become part of the Libra Association. In order to do so, they have to fulfil three of four qualities, including working on financial inclusion for more than five years, multi-national reach to lots of users, a top 100 designation by Charity Navigator or an agent like it and/or $50 million in budget[87].

The council of the association will represent the managing organ of the Libra Association. The council will have the responsibility of electing the association's managing director. The appointed managing director will create and "executive team and elect a board made up of 5 to 19 representatives. While voting in the council, each member of the association will get one vote or 1% of the total votes (whichever is larger). This is done in order to decentralise the control of the Libra Association and with the objective of avoiding any of the members taking control of Libra for its own gain.

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[85] Josh Constine, FACEBOOK ANNOUNCES LIBRA CRYPTOCURRENCY: ALL YOU NEED TO KNOW TECHCRUNCH (2019), https://techcrunch.com/2019/06/18/facebook-libra/?guccounter=1 (last visited Jun 16, 2020).

[86] Libra: A New Global Payment System, LIBRA.ORG, https://libra.org/en-US/ supra note 83.

[87] Josh Constine, FACEBOOK ANNOUNCES LIBRA CRYPTOCURRENCY: ALL YOU NEED TO KNOW TECHCRUNCH (2019) supra note 85.

In order to fulfil the function as store of value and in order to guarantee the fast and easy redemption of Libra coins, the assets invested in the Libra reserve must be highly liquid ones having low volatility. The financial instruments that fit this purpose the most are short-term government securities issued by those countries with low default probability and having stable currencies experiencing low inflation. Furthermore, the reserve will include historically stable international fiat currencies, including the dollar, pound, euro, Swiss franc and yen. The Libra reserve therefore can be compared to an investment fund investing in money market assets. Any change to the composition of the reserve requires an approval from a majority of the member in the council of the association. Finally, the only case in which such an adjustment can be proposed is in the case of a significant change in market conditions[88].

The focus on the project is not on the active management of the reserve and its goal is not to generate a surplus or profits out of it. While, as said, the members of the association will receive dividends from eventual profits of the reserve, users will not enjoy a share of those profits. Dividends are paid out to the members of the Libra association only after operating expenses, investments in the ecosystem, engineering research have been fully covered. This interest that members enjoy is part of what convinced companies to become members of the association. If Libra becomes popular, the reserve will reach a significant amount and it will have the potential of paying high interests.

4.3 How does Libra work?

Every Libra payment is permanently registered into the Libra Blockchain. The Blockchain represents a cryptographically authenticated database that acts as a public online ledger. The Libra Block chain is designed to handle 1,000 transactions per second. That would be much faster than Bitcoin's 7 transactions per second or Ethereum's 15.

[88] Facebook's Libra: A case for capital markets supervision?, https://www.henrystewartpublications.com/sites/default/files/Facebooks%20Libra%20A%20case%20for%20capital%20markets%20supervision.pdf (last visited Jun 15, 2020).

Unlike Bitcoin, Libra coins are not finite in number but they can be infinitely created in exchange for fiat currencies and destroyed when redeemed. What this means is that the size of the reserves is directly dependent on the amount of Libra coins in the hands of the public. Furthermore, Bitcoin uses a decentralised, permission less[89], purely peer-to-peer electronic cash system. No additional trusted third party is present in the system. Libra instead claims to be decentralised in its structure but, at least in its initial phase[90], will be a permissioned[91] centralised network relying on the governance of a trusted third party: the Libra association[92].

When a Libra coin is purchased, the price paid for it (denominated in fiat currency) will be transferred to the reserve and invested in order to keep as stable as possible the value of the coin over time. In the case in which the coins are redeemed, central bank fiat currency is transferred back to the consumer and the redeemed Libra coin is destroyed. That means that, at any time, 100% of the value of Libra coins in circulation will be collateralized with real-world assets in the Libra Reserve. However, because of the fluctuation in the value of the assets in the reserve, there will not be a fixed exchange rate between Libra coins and fiat currencies. The value of Libra coins is therefore only indirectly related to the value of fiat currencies[93]. While liquidity shortages are not probable, they are still possible since the reserve is composed by assets that are less liquid than pure cash. The only virtual money that can be directly exchanged for a fixed amount of fiat currency is traditional e-money as explained in the first chapter of this paper. One advantage of Libra over e-money is given by the fact that the former could be used in

[89] The term "permissionless" refers to the fact that anybody by conducting the process of mining can obtain his new currency and that currency is verified by another agent, a validator who can be any other agent in the participating in the blockchain.
[90] Libra is planned to transition into being a permissioneless blockchain after just five years of its release.
[91] The term "permissioned" refers to the fact that in order to validate a new acquisition of new digital coins the validation of a specific agent is required.
[92] John Taskinsoy, *This Time Is Different: Facebook's Libra Can Improve Both Financial Inclusion and Global Financial Stability As a Viable Alternative Currency to the U.S. Dollar*, SSRN ELECTRONIC JOURNAL (2019).
[93] Christian Hofmann, *The Changing Concept of Money: A Threat to the Monetary System or an Opportunity for the Financial Sector?*, 21 EUROPEAN BUSINESS ORGANIZATION LAW REVIEW 37–68 (2020).

global transactions while the latter are available often inside the boundaries of a jurisdiction[94].

Transactions using Libra are not entirely free. Users incur a fee of a tiny fraction of a cent used to pay for "gas". This fee is aimed at covering the cost of processing the transfer of funds similar to what happens with Ethereum. Despite that the fee will be negligible to most consumers, when they add up, the gas fees will deter bad actors from creating millions of transactions to power spam and denial-of-service attacks.

The Libra Blockchain will be open source. This means that any developer will be able to build apps by using the Move coding language on which the digital infrastructure is based. This will make it possible for developers to create smart contracts[95] to be executed in the Blockchain. The fact that the Libra ecosystem and the Move language will be open both for it to be built and used, represents a risk. The risk incurred when designing such a system is that developers with bad faith could design a fraudulent scheme in order to subtract Libra deposits from users.

Bitcoin and Libra also differ on the blockchain protocol they implement to validate transactions. The Bitcoin protocol uses a set of public and private keys. To receive bitcoin, it is enough for the sender to know your address. The system makes it easy to receive money but requires verification of identity to send it. The public key is used in order to ensure you are the owner of an address that can receive funds. The public key is also mathematically derived from your private key. The sender of a Bitcoin in a transaction signs with his private key a hash of the previous transaction and the public key given to the next owner of the bitcoins. The transaction is then propagated and validated by the network nodes. The transaction is then concluded and the Bitcoins are successfully transferred[96]. The Libra blockchain protocol instead bases transactions on the following steps:

[94] Ibid.
[95] A smart contract is defined as being a self-executing contract with the terms of the agreement between buyer and seller being which are written into lines of code.
[96] Bitcoin: A Peer-to-Peer Electronic Cash System, , https://bitcoin.org/bitcoin.pdf (last visited Jun 16, 2020).

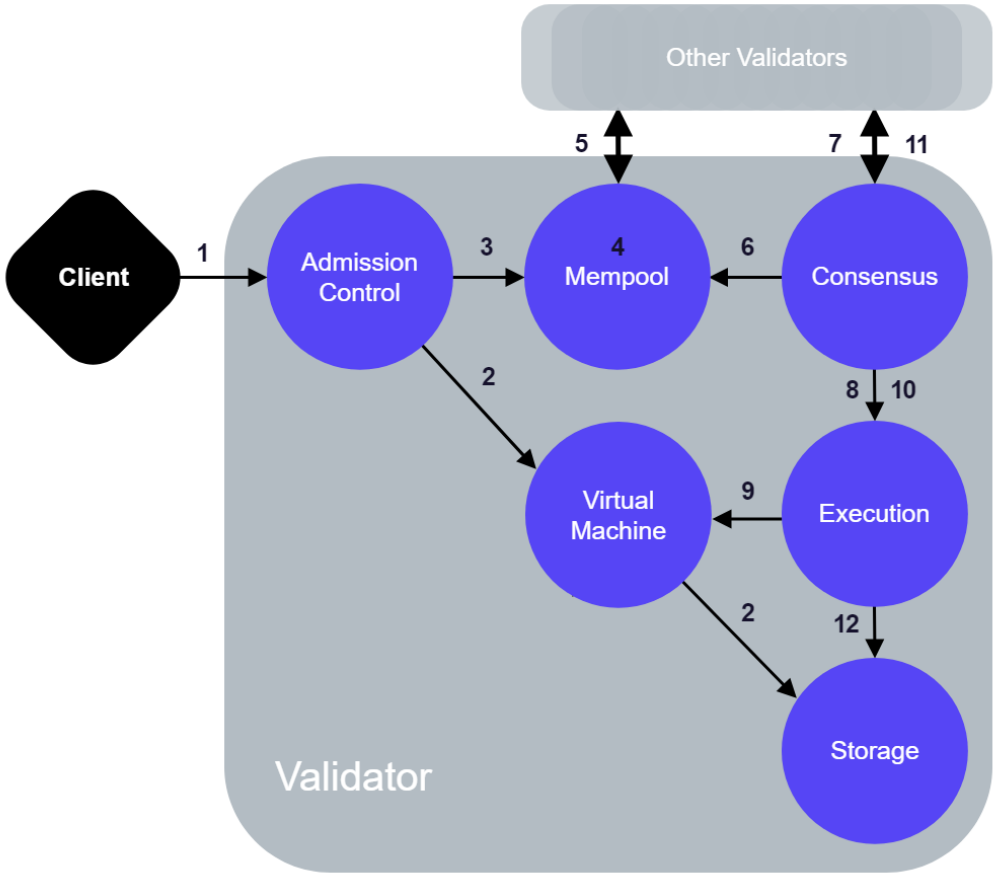
1) The sender submits the transaction to the validator whose admission control (AC) component receives the transaction.;
2) AC will use the virtual machine (VM) component to perform validation checks, such as signature verification, checking that the sender's account has sufficient balance, checking that transaction T5 is not being replayed;
3) When T5 passes the validation checks, AC sends the transaction to the variator's mempool[97];
4) The mempool will hold the data about the transaction in an in-memory buffer.
5) The validator will share the transactions in its mempool with other validators and place transactions received from the other validators into its own mempool.
6) The first validator is a proposer/leader and it will pull a block of transactions from its mempool and replicate this block as a proposal to other validators via its consensus component.
7) The consensus component of the validator is responsible for coordinating agreement among all validators on the order of transactions in the proposed block.
8) As part of reaching agreement, the block of transactions is passed to the execution component.
9) The execution component manages the execution of transactions in the virtual machine (VM).
10) After executing the transactions in the block, the execution component includes the transactions in the block to the Merkle accumulator (of the ledger history). This is an in-memory/temporary version of the Merkle accumulator. The (proposed/speculative) result of executing these transactions is returned to the consensus component.
11) The consensus leader attempts to reach consensus on the block's execution result with other validators participating in the consensus.
12) If the block's execution result is agreed upon and signed by a set of validators that have the super-majority of votes, the initial validator's execution component reads

[97] The mempool is the holding area storing all the pending transactions.

the result of the block execution from the speculative execution cache and commits all the transactions in the block to persistent storage[98].

The picture below (Figure 8) summarises the process described above.

Figure 8: Steps behind a Libra transaction



[99]

[98] Libra: A New Global Payment System, LIBRA.ORG, https://libra.org/en-US/ supra note 83.
[99] Ibid.

4.4 Libra and the financial sector

Libra has the potential to create a more secure environment than the one guaranteed by ordinary commercial banks. This is because, since each coin issued is fully backed, bank runs do not represent a threat. The rationale behind bank runs is the one that each holder of a bank deposit will rush in order to withdraw his funds before the bank ends its reserves and becomes unable to do so. With a fully backed currency, each coin will be convertible back into fiat currency independently of how many people already redeemed their coins[100].

A privately issued and privately managed payment system is unlikely to be a guarantor of a more stable currency than the fiat currencies issued by central banks. Despite this, Libra has the potential to challenge the current financial system because of the large customer base of the Facebook group which does not only include the homonymous social media platform but also Instagram and WhatsApp. Libra will probably will be highly optimised to work in conjunction with those existing social media platforms and would therefore easily obtain the attention of technological literate users and younger generations. Furthermore, Libra will be a high appealing tool for all those agents who do not have access to a bank account. Even in countries having an established financial system Libra might be preferred over traditional means because of its ability to seamlessly and efficiently complete cross borders transfers of money.

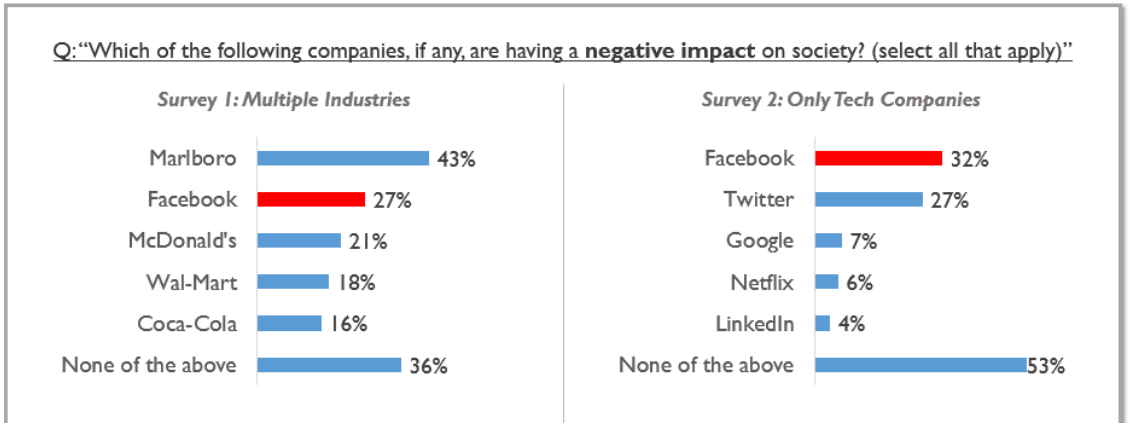
By launching on a global scale, and becomes the payment system of choice of a considerable amount of the population, the redemption feature offered in order to reconvert Libra coins into traditional fiat currencies will lose of any practical use. By becoming a widely used currency, Libra will become a true substitute of bank accounts not only in terms of means of payment but also as a store of value. The possibility of redemption offered will be useful, in the case of a global success for Libra, only in the initial phase. If Libra will become a globally spread currency of choice, it will turn into a

[100] Catalini C, Gratry O, Hou J, Parasumaran S, Wernerfelt N (2019) The Libra reserve.

de facto fiat currency but issued by a private entity. Facebook and the Libra association will therefore behave as a central bank[101].

Despite all of the measures adopted by Facebook to make the Libra association completely independent, there is still a choice society has to make. This choice is about whether or not people feel comfortable about granting private companies access information on their private transactions. This is especially true given the opinion people have about Facebook itself. The picture below (Figure 9) represents results obtained thanks to a survey conducted in 2018. In the survey, people are asked which company in the respondent's opinion has had a negative impact on society. As it can be seen, Facebook ranks second when multiple industries are taken into consideration and first when only tech companies are considered.

Figure 9: Results of a poll asking about companies having a negative impact on society



[102]

[101] Christian Hofmann, *The Changing Concept of Money: A Threat to the Monetary System or an Opportunity for the Financial Sector?*, 21 EUROPEAN BUSINESS ORGANIZATION LAW REVIEW 37–68 (2020).
[102] Source: Honest data.

Furthermore, given some episodes like the Facebook - Cambridge Analytica data scandal in 2018, it is reasonable for consumers to be worried about the protection of their privacy regarding the data that the Libra association would collect. While Facebook has stated thar Calibra will not share any information with Facebook, the statement is not bilateral. What this means is that Facebook has not guaranteed that data about consumers collected on the social network platform will not be shared with Calibra. This is especially important since Facebook plans to use Calibra to sell in the future financial products. If Calibra would be able to access data on its consumers it could offer specific financial products to them thus having an advantage that commercial banks and other financial intermediaries do not enjoy[103].

5. How can central banks prevent losing their monopoly? Central Bank Digital Currencies

In order to prevent the loss of their dominant spot in the financial sector, central banks should modernise the services they offer in order to make the shift to currencies issued by private counterparts harder for consumers. In this context legislation plays a crucial role. The PSD II enacted by the EU is one of the examples of directives aimed at modernising and improving the current financial system. PSD II requires for example the players in the financial industry to introduce more modern and secure transaction verification processes in order to increase payment security. Furthermore, PSD II addresses for example other important concerns such as the ones relating to the loss of money because of scams, hacking and other means of unfair extraction of funds from consumers' deposits[104]. The problem of cross-country payments is solved in the EU by the creations of the Euro zone's Single Euro Payments Area (SEPA) which avoids also the problem of the exchange currencies in those transactions[105]. The establishment of the

[103] Mondato, IS LIBRA A GLOBAL ANSWER TO FINANCIAL INCLUSION? MONDATO INSIGHT (2019), https://blog.mondato.com/libra-facebook-financial-inclusion/ (last visited Jun 16, 2020).
[104] Directive (EU) 2015/2366 on payment services in the internal market [2015] OJ L 337/35.
[105] Regulation (EC) No. 924/2009 on cross-border payments in the Community [2009] OJ L 266/11 Art.3 (1).

SEPA also allows consumers to use their cards and e-wallets to pay in any country in the EU area without any additional charge of commissions than the one that would be asked in a national transaction[106]. Thanks to these measures aimed at making the financial sector more consumer friendly, people will not feel the same need to switch to a privately issued digital currency. The willingness to approach privately issued digital currencies will be for example higher in Asian countries. This is because in Asian countries those measures that improve the financial system by making it more easily usable are not so developed.

Today central banks create the physical (banknotes and coins) and reserve money (the money in the account of commercial banks deposited at central banks). Central banks could prevent their loss of their monopoly over a private agent by offering the same product as the competitor: they could decide to issue their own digital currency.

The new digital currency would be working most efficiently implemented if central banks would be able to sell them directly to the public. In this way every agent in society would be able to buy those coins in exchange for book money or cash. This direct connection between the central bank and the public would cause a paradigm shift. If the central banks would distribute their own digital currency directly to the public, consumers would be able to open deposits directly with the central bank. Commercial banks would not be anymore the only agents able to do open accounts with their central bank.

In this scenario in which the central bank becomes the provider of both means of payment and store of value functions, the presence of commercial banks in the financial system would become redundant. In this scenario, commercial banks would directly compete with their central bank in order to obtain the deposits of consumers. Banks would still be able to offer their depository services to consumers and lend money to them. However, especially if banks would lose their money creation powers, their business would become unsustainable. This is especially true because consumers would require an incentive in the form of higher interests in order to deposit their money in the commercial banks and

[106] Regulation (EU) 2015/751 on interchange fees for card-based payment transactions [2015] OJ L123/1, Art. 4 read with Regulation (EC) No. 924/2009 on cross-border payments in the Community[2009] OJ L 266/11, Art. 3(1).

not in the central bank[107]. The central bank would therefore monopolise the full financial sector. The balance sheet of commercial banks would be dramatically affected[108] and consumers would probably rush to convert their deposits in an account with the central bank[109].

5.1 Central bank digital currencies and privately issued ones

The creation of new central bank digital coins will be of little use to contrast the privately issued counterparts in the case in which society distrusts the dominant position of central banks and the current big players in the financial system. If this is the case, issuing those coins would not only be a waste of resources but would also have the possible effect of sending the message to the public that even central banks acknowledge those problems that those digital currencies try to solve. Furthermore, a privately issued digital coin would have the ability to execute cross border payments while central bank digital currencies would only be used for payments remaining at the national level. Transactions outside the jurisdiction of the central bank would in fact still require a conversion into the foreign currency.

In order to keep the benefits of both systems while minimising the disadvantages, a possible scenario would be the one of a cooperation between the private entities and central banks. This approach would be cantered around coins issued by private entities like banks but backed by a central bank. In this scenario, the private entity would require a licence to issue the digital currency. Those private parties would have access to central bank reserve accounts where the fiat currency exchanged for the digital coins is deposited. The transactions would be settled directly by the central banks. The benefits of such a system would be the possibility of executing cross border payments, stability of the currency, the lack of a radical shift in the financial sector. The ability to execute cross border payments is granted by the fact that the currency is issued by a private entity and

[107] The Case for Central Bank Electronic Money and the Non ..., , pp 101-102 https://research.stlouisfed.org/publications/review/2018/02/13/the-case-for-central-bank-electronic-money-and-the-non-case-for-central-bank-cryptocurrencies (last visited Jun 16, 2020).
[108] Javier Guzmán Calafell: Some considerations on central ..., , p 4 https://www.bis.org/review/r190711i.pdf (last visited Jun 16, 2020).
[109] Ibid.

not the central bank. The stability features are given by the fact that the currency is backed by the central bank fiat currency. In this case also liquidity risks can be minimised. A radical shift in the financial sector will not be required because consumers will still interact with banks. Furthermore, there will be no competition between central banks and commercial banks since the central bank would not grant deposits to the general public[110].

5.2 The Chinese national digital currency

China has been experimenting since 2014 the idea of its own Central Banks Digital Currency (CBCD) and in the beginning of 2020, six years later, has launched a pilot version for it. Furthermore, the Digital Currency Electronic Payment platform (DCEP) is expected to launch before the end of 2021[111]. The new digital currency will most likely be based on a blockchain technology and it will present on a two-tier structure. The structure is called like this because it will have two layers: the central bank as representing the first and commercial banks and other financial institutions representing the second. The two tiers will have different functions. The central bank will be in charge of issuing the currency to the agents in the second tier and they will have the role to distribute the currency to the public. One of the reasons for which a two-tier structure is implemented is because the People's Bank of China does not want to directly face consumers. This is because banks can leverage can leverage their existing infrastructures and technological expertise in dealing with customers. Another reason for which the PBOC leaves to ordinary banks the consumer facing role is that, if the central bank would be facing directly consumers, the scale of the infrastructure to be developed would be too large.

[110] Tobias Adrian ; Tommaso Mancini Griffoli - IMF, , p 12-15 https://www.imf.org/en/Publications/fintech-notes/Issues/2019/07/12/The-Rise-of-Digital-Money-47097 (last visited Jun 16, 2020).

[111] Zennon Kapron, CHINA'S CENTRAL BANK DIGITAL CURRENCY WILL STRENGTHEN ALIPAY AND WECHAT PAY, NOT REPLACE THEM FORBES (2020), https://www.forbes.com/sites/zennonkapron/2020/05/24/chinas-central-bank-digital-currency-will-strengthen-alipay-and-wechat-pay-not-replace-them/#3f300b5f6b69 (last visited Jun 16, 2020).

Finally, the two ties structure would keep unaffected the power of the PBOC monetary policy[112].

Mu Changchun, the head of the central bank's digital currency research institute wanted to differentiate the new Chinese currency from other digital coins. Specifically, the Chinese currency would have to be more efficient than Libra, Bitcoin and Ethereum when considering the amount of simultaneous transactions that can be executed. The currency aims at becoming the payment instrument of choice for the full Chinese market. In China the amount of online transactions has in the past reached peaks of 92,771 per second. Bitcoin and Ethereum are currently only able to process 20 transactions per second and Facebook's Libra is predicted to be able to handle only up to 1,000 transactions per second.

Unlike Facebook's Libra, the new Chinese digital currency will not support smart contract. This is because the PBOC is concerned that smart contracts would add too much functionality to the currency. This would cause in its opinion confusion on the currency's monetary role. The scope of the currency is to act as a unit of account, means of payment, and store of value. Over-sophisticating the system would not only reduce immediate usability but also make it more vulnerable as discussed in the Libra analysis. Similarly, to Libra, this CBDC will be fully backed by other assets. In this case, however, the currency will be backed by central bank deposits from commercial banks and institutions[113].

It could be thought that Beijing is launching the DCEP to take out control from the digital incumbents: Alipay and WeChat Pay. Those two firms alone control about 90% of China's digital payments market, between 20-25% of retail spend across China and all the financial products and services like wealth management they offer as mentioned in the China case chapter. Taking out those firms now would mean revolutionising the Chinese financial system. The PBOC however is not trying to compete with Alipay and WeChat

[112] Ibid.
[113] Ledger Insights, CHINA IS READY FOR CENTRAL BANK DIGITAL CURRENCY ISSUANCE. HERE'S THE PLAN LEDGER INSIGHTS - ENTERPRISE BLOCKCHAIN (2019), https://www.ledgerinsights.com/china-ready-central-bank-digital-currency-cbdc/ (last visited Jun 16, 2020).

Pay. Conversely to what it might be thought, the DCEP is planned to be perfectly integrated with the two platforms. This is because, as already analysed, despite being often depicted as disruptors in the financial sector, Ant Financial and Tencent still kept a bank account centric model. Furthermore, as seen while talking about the history of the Ant Financial Service Group, the development and expansion of the group was paired with new regulation that in some cases also helped the expansion of the group. It is unclear yet if the PBOC will distribute DCEP through Alipay or WeChat Pay directly, but both platforms will support a DCEP wallet[114].

[114] Zennon Kapron, CHINA'S CENTRAL BANK DIGITAL CURRENCY WILL STRENGTHEN ALIPAY AND WECHAT PAY, NOT REPLACE THEM FORBES (2020) supra note 111.

6. Conclusion

The bond between the financial sector and technology has always been present but now it is surely stronger than ever. Technologies such as BigData, Artificial Intelligence and especially Blockchain are changing the way in which people manage their funds. Fintech innovation is today not only making the financial sector more efficient but is also contributing to reach socially responsible goals. In particular, in the paper it has been analysed how Fintech can promote the United Nations Sustainable Development Goals. The ease of use of new money management platform combined with the lower barriers to entry they set for consumers and the lack of the requirement of established financial institutions is promoting financial inclusion. As technology develops, more and more people gain access to financial services. In the years from 2010 and 2017, 1.2 billion people accessed for the first time financial or mobile accounts for the first time. The majority of these new participants in the financial markets are located in developing countries.

The four pillar model for a fully digitally optimised society that was proposed by Arner, Buckley and Zetzsche describes which are the aspects on which a society should focus in order to achieve that objective. In particular those aspects are: Digital ID and eKYC, electronic payment systems, electronic provision of government services, design of financial market infrastructures that improve access, usage and stability.

China which is now considered among the most advanced countries in the field of digital payments. This is the case thanks to the presence of two major players: the Ant Financial Service Group and Tencent's WeChat Pay. Together those two companies control almost 90% of the digital transactions in China. Both the history and the influence of the Ant Financial Service group is impressive. The group is divided in various branches each one having a specific function and offering certain services. Those branches are the following: Alipay, Ant Fortune, MyBank and Sesame credit. Thanks to its various branches, the group offers functions and services such as payment instrument, store of value, brokerage and credit rating agency. The Ant Financial Service group has undoubtfully had an influence on the Chinese financial system, it has changed the way in which people interact

with money and has increased both financial inclusion and the level of digitalization of the country. The Ant Financial Service Group and Tencent's WeChat pay have left no space for traditional banks to operate. The high influence BigTech firms and social media giants can represent a threat to the financial system because of their potential to substitute themselves to both ordinary and commercial banks. Despite that, both the Ant Financial Service group and Tencent's WeChat Pay still keep the bank account centric model intact. What happens in China, despite being surely impressive, still does not represent a true revolution for the financial sector.

Libra on the other hand has the potential of being revolutionary. The currency Facebook plans to launch in 2020 on a global scale, has the potential not only to become a parallel currency to the fiat ones issued by central banks but also the main currency used globally. Libra is different from all the other digital currency issued in the past. What makes Bitcoin not scalable and not usable for the masses is not only the fact that they are finite in quantity but especially the fact that they experience high volatility. Libra plans to solve the latter problem by backing up every coin using the Libra reserve which is composed by the main fiat currencies and short-term government securities. The reserve will be managed by the Libra association composed by various members including various big firms, non-profit organization and academic partners. While the purpose of Libra is officially the one of achieving higher financial inclusion, letting a group of private companies the possibility of behaving as a global central bank is not optimal. This is especially true because of reasons related to possible conflicts of interest given by the fact that the members of the Libra association enjoy parts of the profits the Libra reserve makes on its assets. This could undermine the objectiveness of the Libra association thus leading to instability of the currency. Furthermore, there is a high risk that Calibra, Facebook's subsidiary setup in order to participate in the Libra association, will receive and use information from Facebook about its users in order to promote financial products in the future.

Central banks can adopt measures in order to avoid losing their control over the financial sector. First, central banks might reduce the incentives people would have to use another privately issued currency. For example, in Europe the PSD II is aimed at addressing some of the shortcoming of the traditional financial sector that would be solved by a privately

issued currency. Measures such as elimination of commission fees when transferring money abroad or increased security and anti-fraud measures are perfect examples of such options available to central banks.

Most importantly, central banks could issue their own digital currencies. In doing so, central banks can adopt a wide variety of schemes. They could for example issue their currency directly to consumers thus eliminating the need for commercial banks. China is among the first moving in that direction and it plans to issue its own digital currency by the end of 2021. The approach chosen by China is based on avoiding a direct contact between the central bank and the public by creating a two-tier structure. The implementation of such a system would keep intact the powers of the central bank while providing more convenient means of payment for society. This hybrid approach relying on the cooperation rather than competition of private and public bodies is the one reaches multiple objectives at the same time: stability of the currency, more convenient means of payment, higher financial inclusion and independence of the body controlling the currency.

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