



The Digital Finance Era

A Journey Through Fintech and Cryptocurrency

Babak Naysary
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ISBN 978-981-97-3969-1 ISBN 978-981-97-3970-7 (eBook)
<https://doi.org/10.1007/978-981-97-3970-7>

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Introduction and Overview

INTRODUCTION

This chapter outlines a sketch and a brief overview of the topic, including the genesis of FinTech and its development in the past decade along with the subsequent challenges and opportunities that its various segments are posing to the incumbent banking and financial institutions; the main argument in this chapter will be the fact that disruption is a real phenomenon taking place in a fast pace in financial industry and that financial institutions, particularly banks which were immune to severe disruption, under the idea of “Too big to fail” (TBTF) until recently, are now hit with transformations in the form of disintermediation in financial services industry.

THE EMERGENCE OF DIGITAL SHARING ECONOMY

Technology has been one of the major contributors to the economic growth in the past few decades across the globe. Expansion of internet access (Fig. 1.1) coupled with development of online platforms and applications has provided businesses with the abundance of information and an opportunity to produce and market products and services in ways which were not possible before. According to predictions by market research

firm IDC,¹ by 2023, more than 65 percent of global GDP will be digitalized (driven by digitally transformed enterprises) which can be considered as a new tipping point for digital supremacy. This also, in part, plays into a generational culture shift for Millennials and Generation Z (born after 1981), who are tech-savvy and spend a sizeable portion of their waking hours online. These have given rise to new business models which are shaping an emerging phenomenon called sharing economy. Although sharing economy has been studied and referred to as an independent concept, it cannot be denied that it is one of the by-products of digital economy; and considering the fact that sharing has always existed in the economic transactions in various forms and is not a new event, the term digital sharing economy has been used by researchers and practitioners and appears to do more justice to the term in conveying its underlying meaning.

Digital sharing economy can be defined as the application of technology and innovation leveraging digital solutions (such as internet,

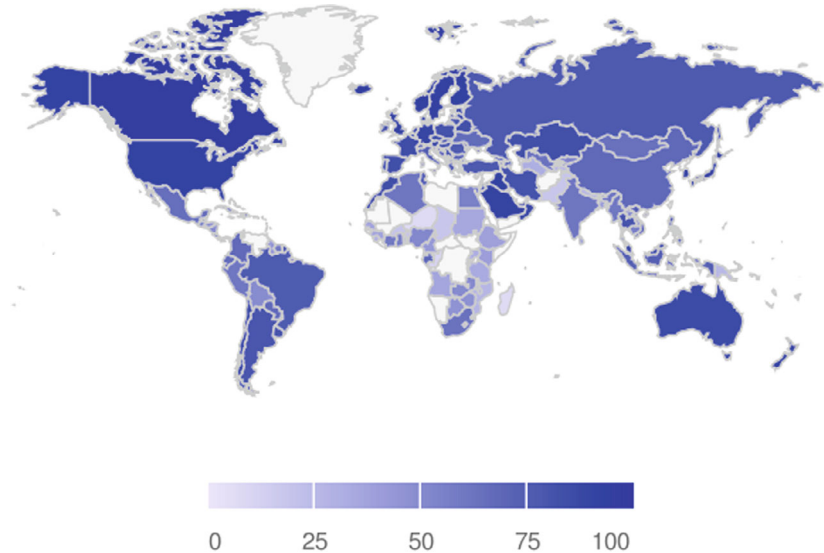


Fig. 1.1 Global internet penetration

¹ <https://www.idc.com/research/viewtoc.jsp?containerId=US46880818>.

mobile devices, and applications) to collaboratively engage communities in numerous transactions such as accommodation, transportation, multimedia exchange, finance, health, and education. It can be viewed as the emergence of software platforms performing the role of intermediaries between the private buyers and private sellers and facilitating the exchange of resources. The significance of digital sharing economy stems from the fact that the traditional forms of sharing and collaboration (which might not necessarily contribute to the economy) are transforming into organized, formal, and larger scale online processes whose direct benefits to the GDP can be observed and measured. The promising prospects of digital sharing economy for socioeconomic development have urged many firms to adopt new business models. Some examples of successful companies emerging from the digital sharing economy ecosystem include Airbnb and Couchsurfing (short-stay accommodation), Uber and BlaBlaCar (ride sharing and transportation), Lime (electric scooter rental), Lending Club and Kickstarter (peer-to-peer lending and crowdfunding), edX and Coursera (educational platforms), Freelancer (on demand professional services), American Well, Doctor On Demand, and Cohealo (healthcare service).

Among the reasons for rapid expansion of digital sharing economy over the past decade and emergence of a new breed of firms and startups are (i) widespread internet availability and access to smartphones, (ii) explosive innovation and technological advancements in online platforms and applications. This has led to emergence of another recent and significant phenomenon called big data analytics which is extensively used by firms and startups to match supply and demand and even set the optimum pricing using advance algorithms, (iii) ease of entry into the market which has increased democratization of entrepreneurship by reducing barriers for new firms and startups to enter into the marketplace through creating apps and online platforms, (iv) facilitated financial transactions between individuals through innovative payment solutions, (v) increased availability of data and subsequent enhancement of transparency regarding the information about buyers, sellers, and products and services offered. This has helped to alleviate some of the security risks issues associated with online services, and finally, (vi) economic turmoil in the past few two decades, which has led many people to relinquish their dependency on the traditional employment channels and seek new sources of income.

The digital sharing economy is an ecosystem where various players and parties interact at three levels. At the core are sharing economy digital

platforms that connect suppliers and consumers at the individual level. The ecosystem is complex, involving organizations that interact with these platforms at the organizational level, leading to new business models. It also includes government agencies at the country level, acting as supervisors and regulators to ensure healthy operations and prevent fraud and market failures.

The idea of sharing idle capacity in digital sharing economy is central for considering it as one of the drivers of sustainability, following Frenken et al. (2015)'s definition of sharing economy as "consumers granting each other temporary access to under-utilized physical assets (idle capacity), possibly for money." One of the apparent benefits of this model, which has been the subject of much research and debate, is the environmental impacts. The fact that ownership of products has become secondary to usage, in light of the possibility to access them with a lower price through borrowing or renting, has theoretically contributed to the decline in the number of new goods produced (the pinnacle of which is car sharing). Apart from environmental impacts, digital sharing economy is believed to have created a platform for sharing peers to experience meaningful contacts and increase the social mixing of individuals with different socio-demographic background. From an economic standpoint, the digital sharing economy platforms are creating a new market that is expanding the volume of transactions and at the same time due to lower associated costs, it is injecting additional purchasing power to the economy and possibly leads to more consumer welfare.

However, critics argue that the advantages of sharing economy are exaggerated and more complex and there are still shortcomings which hinder its development such as lack of trust and security risks issues, unfair competition created by under-regulated marketplace which also facilitates tax avoidance and possible violation of workers' rights in terms of health insurance, pensions, and other benefits. Nevertheless, the digital sharing economy has proven to have disruptive impact on the business sectors. The lack of overhead (such as rental fees) and inventory enabled the share-based business models to operate more efficiently and deliver their value to customers, which calls for traditional firms adapting to this changing landscape. The next section describes the impact of disruptive technologies focusing on the financial services industry.

DISRUPTION AND DISINTERMEDIATION IN FINANCIAL SERVICES INDUSTRY

The original foundation of our modern economic system was created through individuals exchanging goods and services directly to fulfill mutual benefits. The economic system has only become more organized and centralized after the emergence of more sophisticated firms followed by popularization of money and credit. However, the current transformations taking place in the digital world and technological advancements are creating a fertile ground for people to connect, communicate, and trade; this is giving rise to a shift back toward decentralized economic exchanges. The traditional role of market, shaped over the past hundreds of years, can be characterized with two distinct functions and features: first is the mechanism by which sellers can have access to buyers and therefore transactions are facilitated (necessitating the ubiquity of intermediaries) and second is the use of sovereign-issued fiat currencies under the supervision of central banks and market authorities. These roles are now being challenged by the rise of digital sharing economy in which the concept of peer-to-peer (P2P) sharing and also the expansion of cryptocurrencies is posing challenge before traditional trading mechanisms. In many industries, this challenge introduces itself as the risk of disintermediation which simply means discontinuation of providing intermediation services. The concept of intermediation itself can be considered as the process by which agents participate in a commercial relationship to facilitate supply of goods and services for a price. Although disintermediation may not take place as fast or as dramatic as projected by some experts and researchers, it can certainly be viewed as a decreasing role of middlemen and third parties in the supply chain of goods and services. This concept in the financial services industry should be particularly viewed in light of the global financial crisis of 2008/2009 which underlined the inefficiencies of the financial system structure at the heart of which lies banks and other financial institutions. After the financial crisis most of the focus has been targeted to the point whether the existence of intermediaries is necessary for the well-functioning of the markets. Subsequently, the emergence of distributed ledger technologies, such as blockchain which is considered as a decentralized ecosystem to perform transactions, has indeed contributed to the discussions and concerns surrounding disintermediation. One area which has been significantly affected by the disruptions is payment industry where cryptocurrencies are becoming

more and more the preferable mode of transferring value across the globe. This has removed the necessity to use fiat currencies and refer to the banks and other financial institutions to make payments; instead, the payments can now be made directly from sender to receiver on a P2P basis executed electronically using a shared ledger structure where all transactions are settled and recorded.² Another prominent sector exposed to challenges posed by disintermediation process is the lending industry with P2P lending being introduced as an alternative to bank lending. P2P platforms provide an opportunity for lenders and borrowers to match without an intermediary bank. Contrary to banking institutions, P2P platforms do not invest in loans and do not issue debt and the loans come directly and fully from the investment of lenders. Overall, these transformations have led to diminishing the monopolistic role of the banks through development of FinTech and the shift in customer preferences.

Apart from banking industry, the technologically enabled financial services have the potential to improve the allocation of funds in the capital markets. As one of the major issues between investors and borrowers in the capital market has always been the information asymmetry which provided the intermediaries the chance to exploit investors, FinTech and more particularly in this case crowdfunding platforms offer firms and startups an alternative source of capital by channeling investors' (crowd) money to provide necessary financing. Although an Uber-like situation for capital market is not likely to happen in the near future, however, the impact of gradual transformation in the capital market and the foregoing disintermediation is posing the question of what value do banks capitalistic intermediaries create for their customers. Another highlight in the technological transformation in the financial services industry is the use of artificial intelligence (AI) which allows firms to reduce their risks, expense and enhance their productivity and efficiency. Robo-advisory is one of FinTech sectors which utilizes AI to provide financial services which were previously offered by financial planners and advisors. Although current services provided by robo-advisory platforms are more passive, the current shift taking place in the field of machine learning and particularly deep learning, there are promising prospects of more personalized wealth management services provided by autonomous robo agents.

² <https://internationalbanker.com/finance/is-disintermediation-the-future-of-finance/>.

It is worth mentioning that the foregoing disintermediation and fading role of the human component in the financial transactions have raised concerns over the regulatory perspectives. Whereas traditionally individuals such as bankers, investment managers, and advisors were the subject and focus of intense regulations, the rise of algorithmic processes in the financial industry calls for due diligence from the regulatory bodies to certify the algorithms and create trust and transparency among investors and borrowers in the market.

DECENTRALIZED FINANCE

Decentralized finance (DeFi) refers to a multitude of blockchain-enabled applications challenging current financial ecosystem. These applications normally include smart contracts, which are automated and enforceable contracts which could be accessed and evaluated by anyone with an internet connection with no centralized intermediaries to execute. Before considering the characteristics of DeFi, it is essential to overview the functions of traditional market-based finance. The intermediaries operating as financial institutions, such as banks and insurance companies, or market providers, such as securities exchanges, are the focal point of what is known as the financial system. These institutions centralize the provision of various financial services, whereby participants with extra financial resources who seek earnings are indirectly linked to participants in need of funds and are willing to pay the cost. Over the past century, these financial hubs have developed locally, regionally, and globally. The foundation of the traditional financial system is built upon the element of trust and confidence from the participants' side, which necessitated the establishment and evolution of laws and regulations imposed and monitored by respective states and international bodies. This implied intrinsic instability, which is to be supposedly addressed by regulation (full achievement of which has proven to be unsuccessful in various occasions, particularly during financial crises), is one of the main weaknesses of the traditional mode of finance. This underlies the significance of DeFi, the premise of which is challenging the centralization of finance and eliminates its foregoing inherent flaws (coupled with the shortcomings of state-imposed regulations) through technologically enabled infrastructure underpinning the decentralization of finance.

At the very root of DeFi lie a number of key technologies presented by the acronym "ABCD": A for Artificial intelligence, B for Big data,

C for Cloud, and D for Distributed ledger (including blockchain and smart contracts). These four technologies are the cornerstone of decentralization and are rapidly developing. This constant and exponential development has brought about convenience and efficiency in providing services together with a remarkable reduction in the cost of acquiring, processing, storing, and analyzing data which in turn has given rise to cooperation and financial exchange among a multitude of participants in a decentralized fashion. The positive attitude toward and wide acceptance of DeFi is magnified by the idea of democratization of finance and independence from monopoly and control in the traditional financial system. Increased financial inclusion brought about by use of digital technologies and provision of funds and services to individuals, businesses, and regions which were intentionally or unintentionally excluded from the financial system attests to this optimistic view.

Despite the wide adoption and excitement over the promising prospects of DeFi, it comes with a number of challenges. As the underlying concept of DeFi is ruling of “codes” as the ultimate law, it is posing a systemic threat to the regulatory bodies and government authorities who seek control over the market. On the other hand, due to its boundless nature, users across the globe can transact with each other, which makes the determination of jurisdictions in charge and relevant laws increasingly difficult. Generation and storage of data on clouds throughout multiple servers are also rendering the data protection controls inefficient and, in some cases, impossible. However, these challenges can be the ultimate opportunity for the regulatory bodies and RegTech to build a better functioning financial market by embracing these new technologies, which ironically implies that the full manifestation of decentralized financial system can only be achieved through centralized government cooperation.

SOCIETAL IMPLICATIONS OF FINTECH

In previous sections, we discussed how FinTech has influenced the traditional financial ecosystem. One of the major effects of FinTech is perpetuating new ways of collaboration among participants in the market, new business models and its customer centric approach. These impacts have reached far beyond the financial industry to influence the social norms and financial culture of individuals and businesses in society. This is particularly evident in mobile payment as the biggest FinTech segment.

Due to ever-increasing usage of mobile devices, the payment systems have evolved from cash or credit card transactions to various ways by which customers can process the payments for their transactions. This has, in turn, changed the business climate and consumer spending behavior. The modes of mobile payment have evolved to include near field communication (NFC) and quick response (QR) codes, which facilitate the payments made in person at the store or at any terminal by simply approaching the terminal. Among the various advantages of mobile payment are facilitating payments of bills, loans, lending and borrowing, and even international payments in a secure and convenient manner. Consequently, the access to financial system has been facilitated to a great extent, which contributed toward financial inclusion with the ultimate impact of increasing overall financial well-being of unserved and underserved individuals and businesses. By resolving some of the issues related to the traditional financial system such as information asymmetry, credit scoring mechanisms, risk assessment, and high cost of lending, FinTech has improved the chances of the poor accessing their required funds. Increasing evidence also indicates the implication FinTech on economic development which indirectly contributes to alleviate poverty.

It has been argued that FinTech can serve as a tool to reduce gender inequality. As reported in the Global Findex Database, in general the number of women with bank accounts is significantly lower than men. This is even more pronounced in the case of developing countries and rural areas. Among the barriers hindering women from having proper access to financial services are lack of identity cards, insufficient initial financial resources, limited means of mobility, and lower financial literacy. FinTech startups are providing low literates with user-friendly applications and reducing the complexity of performing financial transactions. The promotion of micro-entrepreneurship programs using FinTech across the world has also included women in the business ecosystem and helped service financially deprived women and generate employment opportunities in a more gender-neutral way.

Finally, the advent of FinTech has nurtured a more environmentally conscious attitude among consumers. Overall, the financial industry plays a big role in the battle against the climate change and environmental problems which are one of the biggest global issues now. Various attempts have been made by the financial sector to advance sustainability and develop strategies more in line with responsible investment decisions. The link between FinTech and sustainability has become more

pronounced during the Covid-19 pandemic. Inclusion of “sustainable digital finance” as one of the key priorities of the G-20 work stream attests to the impact of FinTech on sustainability. This impact can be enforced though enhancing the usage and allocation of existing financial resources, and also provision of necessary funds for the establishment of environmentally sustainable firms in a faster, cheaper, and more affordable way. Additionally, artificial intelligence and big data facilitate processing information on the environment behavior of companies which helps investors to incorporate ESG considerations into their financial decisions. Overall, FinTech contributes to sustainability by making the financial services more resilient, efficient, and less energy intensive.

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CHAPTER 2

Fiat Money: History and Features

INTRODUCTION

A brief history of the emergence of fiat money will be brought forth in this chapter in an attempt to illustrate its significance as a large part of human life since several thousand years ago. The importance of this chapter stems from the fact that, in order to understand the concepts of new digital transaction systems, it is essential to familiarize the reader with the role of money as one of the most important achievements in the history of humankind.

To this end, evolution of currencies as a means for transactions, from barter, use of gold and other precious metals, to the current international system of government fiat monies managed by discretionary central banks is expounded. The ultimate aim of this chapter is to explain the status quo and at the same time explore the fundamental and controversial ideas that are revolutionizing the monetary systems and are caused by the increasing demand for the elasticity of money supply to cater to the need of current business environments.

BARTER AND COMMODITY MONEY

As human civilization progressed, a need was created for the exchange of goods and services among people. This need was due to the fact that the goods that one individual or family was producing were not necessarily