The Digitalization of Financial Markets

The Socioeconomic Impact of Financial Technologies

Edited by
Adam Marszk and Ewa Lechman

First published 2021

ISBN: 978-0-367-55834-5 (hbk)
ISBN: 978-0-367-55840-6 (pbk)
ISBN: 978-1-003-09535-4 (ebk)

Chapter 5

FinTechs, BigTechs and structural changes in capital markets

JANINA HARASIM

Funder:
University of Economics in Katowice

DOI: 10.4324/9781003095354-5

Routledge
Taylor & Francis Group
LONDON AND NEW YORK

5 FinTechs, BigTechs and structural changes in capital markets

Janina Harasim

Introduction

The financial industry has experienced many waves of technological innovation. While these have been shifting the balance in the financial system from banks towards financial markets and specialized players, the overall structure of the financial industry with banks at its core has remained remarkably robust (Philippon, 2015). However, the ongoing changes in the financial industry appear to be more fundamental than previous ones and may have considerable impact on competition and the market structure. There is a growing body of literature confirming that technology can impact not only features of financial services (such as speed, transparency, cost, and security) but also the market structure, especially on the supply side, i.e., the organization of financial service providers (Alt et al., 2018; Boot et al., 2020; He et al., 2017).

The rapid development of technology can affect the market structure in the financial services industry in a multitude of ways. However, when analyzing competition, the entry of technology firms (usually referred as "FinTech") into the provision of financial services cannot be neglected. There is some evidence that their dynamic expansion, supported by certain regulatory initiatives (e.g., PDS2, "regulatory sandboxes") may lead to ground-breaking changes in the market structure, which could have significant implications for competition in the financial industry as well as for the position of incumbent institutions.

The potential impact of FinTech development on competition and market structure is increasingly more often analyzed, but the vast majority of studies focus on its consequences for banks, their market position, and strategy (Alt et al., 2018; Bank for International Settlements, 2018, 2019; European Banking Authority, 2018; Financial Stability Board, 2019; Frost et al., 2019; Navaretti et al., 2018; Petralia et al., 2019; Stulz, 2019) To date, researchers have paid only limited attention to the analysis of the impact of technology companies on competition in financial markets. Therefore, the considerations set out in this chapter fit into the gap existing in the literature.

DOI: 10.4324/9781003095354-5

This chapter aims at exploring some theoretical issues associated with the impact of technology companies on competition and the market structure in the financial industry. To significantly contribute to the present state of knowledge, attention is focused on analyzing structural changes taking place in capital markets. This chapter begins with the explanation, supported by the industrial organization theory (IO), how technology affects the market structure in the financial industry, especially market imperfections and market contestability. The next section shows the impact of FinTechs and BigTechs on competition in the financial industry. Contrary to most previous studies, it has been assumed that their impact should be analyzed separately due to the significant differences between them regarding their size, scale of activity, specific features, and the extent to which the assets and features of both complement or substitute those of incumbents. The next two parts focus on those capital market segments that have most been influenced by digitalization, i.e., the stock market and the asset management and mutual funds industry. In the case of the stock market more attention has been paid to electronic trading and FinTech solutions transforming the organization of securities trading. In the second case, it is shown how digital platforms have been changing the structure of the asset management and mutual funds industry.

General impact of technology on the market structure in the financial industry

In order to explain how technology could affect the market structure in the financial services industry, it is necessary to remind ourselves of traditional theories of intermediation. These are built on the notion that financial intermediaries serve to reduce market imperfections: information asymmetry (which helps minimize problems of moral hazard and adverse selection), communication frictions (by facilitating match-making among interested parties), and decrease in transaction costs (Allen & Santomero, 1997). However, in recent decades, there have been significant changes that are difficult to reconcile with the traditional theories. Scholtens and Van Wensveen (2003) noticed that as developments in information technology, deregulation, deepening of financial markets tend to reduce transaction costs and market imperfections, the financial intermediation theory fails to provide a satisfactory understanding of the existence of traditional financial intermediaries.

Given that, there is a need to explain how technology may affect market structure and financial intermediation using other theoretical basis. Useful guidance on this topic is provided by industrial organization economics (IO), called sometimes "the economics of imperfect competition." According to IO, technology can affect any of the basic determinants of the market structure (see Table 5.1.).

First, technology can undermine the need for intermediaries by altering market imperfections found in the financial system. The proliferation of the

Table 5.1 Technology impact on the market structure in the financial services industry

Determinant	*Impact direction*	*Examples*
Market imperfections		
Information asymmetry	↘	Proliferation of internet (wide and cheap access to information) Automated credit scoring
Communication frictions	↘	Digital platforms – two-sided and multisided (crowdfunding and peer-to-peer platforms, comparison sites for financial products)
Transaction costs	↘	Online and mobile payments Blockchain, robo-advising, smart contracts
Market contestability	↗	The factors mentioned above, back-office automation, the ability to source IT infrastructure through cloud computing services
Integration level of traditional financial intermediaries		
Vertical	↘	Loss of customer interface (e.g., APIs in payment services)
Horizontal	↘	Specialized new entrants (including FinTechs), high cross-selling potential of digital platforms

Source: own study.

internet lowers information asymmetry, making information more available and cheaper since vast amounts of data can be acquired at low cost through web-scraping. This reduces the information gap and increases both market contestability and efficiency of financial markets (Bai et al., 2016; Boot et al., 2020; Gao & Huang, 2020). There is also evidence that automated credit scoring or internal ratings used by platforms, based on non-financial data about customers, performs as well or even better than traditional credit scores in assessing borrower/default risk (Frost et al., 2019; Hau et al., 2019). Most technological innovations have decreased transaction costs, and digital platforms have reduced communication frictions as they more effectively match savers and borrowers (peer-to-peer and crowdfunding platforms) or buyers and sellers (digital marketplaces), consolidate information (comparison sites for financial products), and enable peer-to-peer (P2P) communication (social media).

Second, by enhancing economies of scale and reducing transaction costs and information asymmetry, technological innovations, in general, lower barriers to entry that may increase competition and market contestability. He et al. (2017) provide many examples of the ways that technology can promote market contestability, e.g., they claim that back-office automation allows firms to reduce fixed costs. Boot et al. (2020) highlight another example – according to them the ability to source IT infrastructure through the cloud considerably lowers the barriers to entry, thus increasing market contestability.

Third, technology can affect the level of horizontal and vertical integration of incumbents, especially banks, which are typically vertically and horizontally integrated financial intermediaries. The vertical integration arises from the strategic advantage of relying on core competencies to compete in upstream segments or control upstream activity. This means that banks directly interact with customers in their core maturity transformation business (i.e., when raising deposits and making loans). However, the rise of digital platforms fundamentally changes the way goods and services are distributed and poses a severe threat to banks. Platforms can capture most existing rents and lots of customer data by intercepting the customer interface from banks. As a consequence, banks can lose their position of "first point of contact" for financial services and face the risk of vertical disintegration (Boot et al., 2020).

Horizontal integration comes from economies of scope which means that banks (e.g., through cross-selling) can provide multiple services that do not directly rely on a balance sheet (e.g., payments, advisory services, asset/wealth management, or insurance), using information on savers and borrowers and their behavior. However, such financial services can also be provided by non-bank specialized providers (especially FinTech firms), which can outperform banks in terms of speed, convenience and price. The degree of banks' horizontal integration could also be damaged by the high cross-selling potential of digital platforms, which can offer financial services (complementary to their offer) based on their deep knowledge of user's behavior.

Thus, according to IO, the impact of modern technologies on competition and the structure of the financial industry should be generally positive. However, is it in fact the case? Does the ongoing digitalization also bring about threats to competition? Does it only change products and processes or does it also affect the market structure? Crémer et al. (2019) argue that traditionally understood competition – with a large number of firms competing – is often not feasible in the digital economy, which seems to be confirmed by IO theory. This is probably due to the increasing opportunities created by modern technologies and emergence of entities that utterly transform the way in which products and services, including financial ones, are structured, provisioned, and consumed. The technologies with the greatest impact on the financial industry include application programming interfaces (APIs), artificial intelligence (AI) and machine learning (ML), data analytics, distributed ledger technology (DLT)/blockchain, cloud services and mobile technology, and those entities who can best exploit their potential are technology companies, called FinTechs.

Entry of FinTechs and BigTechs into finance and their impact on competition

Even though FinTech is a buzzword in the financial industry in recent years, it has not been clearly defined yet. On the basis of the current ways of understanding the term "FinTech," Harasim and Mitręga-Niestrój (2018)

distinguished two approaches to apprehend it: objective (functional) and subjective (institutional).

In the first of them, FinTech is broadly understood as the use of innovative technologies in order to provide financial services more effectively (Arner et al., 2015; Financial Stability Board, 2017; Lee & Kim, 2015). In the second approach, FinTech is understood more narrowly as the sector created by non-traditional providers of financial services, using innovative technologies to more effectively provide existing services or/and create new ones, which enables the delivery of new value to customers (Harasim & Mitręga-Niestrój, 2018, p. 173). However, only the latter approach allows to measure the development of the FinTech sector and to assess how it affects competition in the financial industry.

In most studies to date, all technology companies operating in the financial sector were included in the FinTech sector. However, this is not a homogeneous group of entities as it encompasses both small innovative technology companies, often start-ups which will be called FinTechs, and the technology giants, known as BigTechs. While the activity of FinTechs is closely related to the provision of financial services, BigTechs provide primarily non-financial services. The dominant areas of BigTechs' activity are social media, search engines, and e-commerce, but their main revenues streams come from targeted advertising. They are large companies, highly capitalized, with the cutting-edge technologies, usually operating on a global or international scale. They are present in all regions of the world, but the largest BigTechs come from the United States and China. In the first case, they are Google, Apple, Facebook, and Amazon, collectively referred to as GAFA, and in the second, Baidu, Alibaba, and Tencent referred to as BAT.

Taking into account the differences between various technology companies, it is reasonable to distinguish between two main types of tech firms:

- FinTechs, which are usually small technology firms focused on the development of products and/or process innovations in the financial services industry, with special emphasis on improving user's experience.
- BigTechs, i.e., large technology companies with an established market position that mainly offer non-financial goods and services (both tangible and digital) via digital platforms, which enter into finance to complement their own offer and gather additional customer data.

Assessing the impact of FinTechs and BigTechs on the shape of financial industry is not easy due to the lack of precise identification criteria (for both),[1] and the relatively short time elapsed since the first financial services were offered by them (for BigTechs). Nevertheless, it is possible to identify the main opportunities and threats related to their expansion into finance (see Figure 5.1.), as most of them have a significant impact on competition and the market structure.

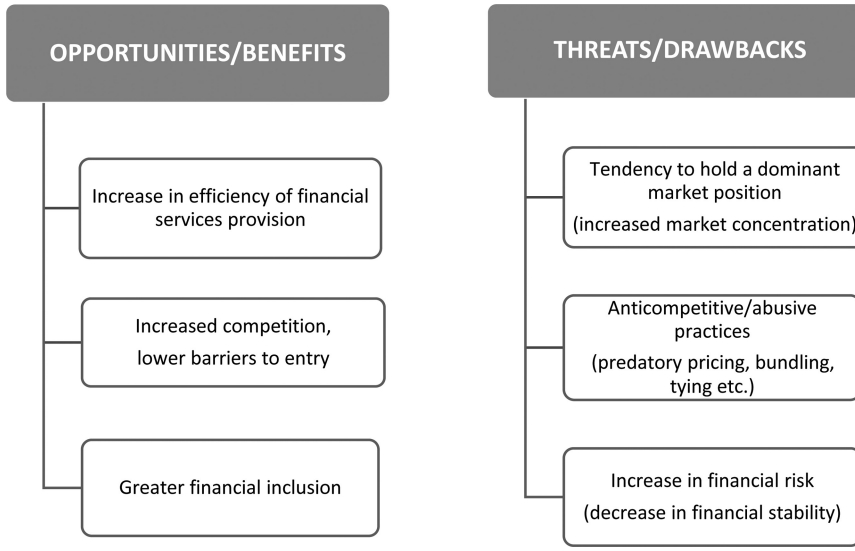

Figure 5.1 Opportunities and threats connected with the entry of FinTechs and BigTechs into finance.

Source: own study.

The opportunities shown in Figure 5.1. are interrelated. The main sources of the competitive advantage of technology companies over incumbents are low transaction costs and low costs of collecting, processing, and analyzing customer data. As a result, they are able to provide financial services in a more effective way, and also offer them to people for whom they were previously unavailable, thus increasing the level of financial inclusion. The undisputed advantages of their expansion into finance are also higher quality of financial services and efficiency of their provision, faster innovation development, increased market competition, and lower barriers to entry.

Although most of the opportunities and threats listed in Figure 5.1. are connected with the expansion of both BigTechs and FinTechs, it should be emphasized that the impact of BigTechs on competition in the financial sector is much greater than that of Fintechs. This difference arises from a much larger scale of BigTechs' activity, their distinctive platform-based business model, and the fact that their features and resources rather substitute those of incumbents. For this reason, when assessing the impact of technology companies on competition and market structure, FinTechs and BigTechs should be treated separately.

The general impact of FinTechs on competition should be more positive than that of BigTechs. Taking into account that FinTechs are generally small young start-ups, and that their resources and features largely complement those of incumbents, the likelihood that they would choose collaboration

with traditional market players is greater than that they would compete with them. The fundamental advantage of FinTechs over incumbents is that they are operated as leaner and more agile businesses. Their high-tech capabilities enable them to respond to changing customer expectations in a quicker and more flexible manner, and moreover, they can do it at a low cost, using transparent pricing. They also have the ability to attract talented young people and create innovative solutions which improve user's experience. For these reasons, FinTechs can become a valuable intermediary between incumbents and customers by providing advanced technology solutions that allow financial services and the way they are delivered to be improved, making them more convenient and better suited to satisfying customer preferences.

Positive impact of BigTechs on competition is most evident only in the short term. In the long term, negative effects may prevail, which is mainly related to the BigTech's business model and the features of the platforms they use.

The platform-based business model exploits the most important characteristics of the digital economy: the key role of data, network effects, rapidly growing economies of scale, and economies of scope. BigTechs collect vast amounts of non-financial data through multi-sided platforms which enable direct interactions among a large number of users (buyers and sellers). The large stock of user data enables the use of bigdata analytic tools, such as AI/ML, to enhance existing services that exploit natural network effects and to foster further user activity. Offering financial services can complement and reinforce BigTechs' ecosystem, as payment or lending services generate additional customer data. Having access to new sources of information about customers, in particular data on their financial situation and spending habits, BigTechs can better target advertising and boost the sales of their own products/services. Combining their cutting-edge technology with rich financial and consumer habit information and a stronger customer focus, BigTechs have the communication and informational capacity to compete, and possibly even outperform incumbents in financial services provision.

However, over time, digital platforms may strive to create and maintain dominant market power by maximizing network effects and economies of scale and scope, which subsequently may lead to an increase in market concentration (Evans & Schmalensee, 2007; Fraile Carmona et al., 2018; Rochet & Tirole, 2003; Tucker, 2019). This is because the same features that bring benefits in the short term can generate new risks associated with their market power in the long run. Digital platforms tend to establish captive ecosystems[2] which negatively affect competition. Once such a system is established, potential competitors have little room to build and develop rival platforms. Moreover, by consolidating their dominant position, leading platforms may raise entry barriers excluding competitors from the market (lock-out effect).[3] On the other hand, they can exert their market power to increase user switching costs (lock-in effect), i.e., making it more difficult to change the provider.

Apart from the risks associated with the abuse of market power, BigTechs may use many anti-competitive practices, such as: tying and bundling products,[4] cross-subsidization,[5] and misuse of customer data (Bank for International Settlements, 2019). The first one reduces the price transparency of the offer and of the provider's cost structure and can be perceived as a particular form of price discrimination. The last one is associated with the informational advantage of BigTechs which can be used not only to reduce costs and increase market efficiency but also to apply price discrimination (Bar-Gill, 2019). In extreme cases, this can lead to the exclusion of some customers from accessing particular services. The activity of BigTechs may also generate many risks, including the threat to financial stability (systemic risk), however, this problem goes beyond the scope of this study.

Which of the described effects of BigTechs' expansion will prevail: positive or negative, depends essentially on what is the main driver of their expansion into finance. If the competitive advantage of BigTechs over incumbents, e.g., lower transaction costs, access to better information, and superior technology is a key driver of their entry, this can bring greater efficiency to the provision of financial services and greater financial inclusion. On the other hand, if such an entry is driven primarily by a desire to create and maintain market power (due to network and synergy effects) as well as regulatory arbitrage and additional risk-taking, the consequences of their expansion may be mainly negative and less desirable in welfare terms.

Due to the fact that BigTechs address their services primarily to individuals, and the core financial products they offer, so far, are payments and loans, they pose the greatest threat to banks. However, taking into account the rapid pace of their expansion, the question arises whether they may also threaten the position of traditional financial intermediaries operating on financial markets? There is also a question about the role of FinTechs in financial markets – do the solutions they provide only improve products and processes as well as increase the efficiency of markets or do they significantly change their structure?

An in-depth analysis of the existing literature allowed to identify those financial market segments that changed the most due to digitalization. The first segment is the stock market, and the second is the asset management and mutual fund industry.

FinTech and structural changes on the stock market

Traditionally, the key intermediaries in the primary markets were merchant banks and underwriters and in the secondary markets – stock exchanges and stockbrokers who above all provided liquidity. As the services they offered were relatively costly, their provision was rather limited for both individuals investing and smaller companies raising capital. With the development of technology, capital markets have moved from a traditional specialist model to a technology-driven model where liquidity is primarily provisioned by the buy-side.

Modern technologies have changed the entire securities value chain, but not all of its components have been digitized to the same extent. They heavily influenced trading (price discovery and order execution) and post-trade processes (clearing and settlement, servicing, and administration), and had only limited impact on the front end (client coverage and sales) – see Table 5.2.

Technological changes in the capital market considerably accelerated after the financial crisis. The resulting increased regulatory and capital requirements weakened the position of incumbents and challenged their business models, facilitating the entry of FinTechs into the market. FinTechs have the flexibility, customer proximity, and technology understanding necessary to address business challenges across the entire value chain of capital markets. They provide solutions that (Deutsche Börse & Celent, 2016):

Table 5.2 Digitalization in the stock market

	Trading		
Time period	*Organization of trading venues*	*Price discovery and order execution*	*Settlement*
1971		First fully automated stock trading in National Association of Securities Dealers Automated Quotations (NASDAQ)	-
The 80's	Regional stock exchanges	Open outcry trading floors Designated Order Turnaround (SuperDOT trading system launched by NASDAQ (1984) Electronic trading introduced in London Stock Exchange (1986)	No fixed settlement period
The 90's	Consolidation of the regional stock exchanges	Electronic trading introduced in Borsa Italiana (1994), Toronto Stock Exchange (1997), and Tokyo Stock Exchange (1999)	T+5 settlements Electronic stock registers and dematerialization
From 2000	Fragmentation of trading venues	Internet-based stock trading Algorithmic trading High Frequency Trading (HFT)	Competition between clearing houses
From 2010	-	Electronic trading introduced in New York Stock Exchange (2014) Smart contracts	Clearing house inter-operability T+2 settlements DLT technology (blockchain)

Source: own study.

- Improve the market infrastructure (efficient and intelligent platforms for trading and clearing, new assets classes, API, and cloud services used to seamlessly manage market infrastructure).
- Enable post-trade digitization (automation of compliance, regulatory, collateral management, and securities lending processes, innovative solutions to manage risk attribution and reporting processes).
- Facilitate investment decision-making (robo-advisors, software, online and mobile tools enabling the creation of individual investment strategies).
- Create alternative funding opportunities (lending and other funding platforms).

Electronic trading systems, which have already been introduced on many exchanges (not only stock but also derivatives and commodity exchanges) and other trading venues, facilitate algorithmic and high-frequency trading. In 2015, HFT was reported to account for approximately 55% of trading volume in the US equity markets, and between 23% and 43% of value traded, or 58% and 76% of orders, in the European equity markets (Balp & Strampelli, 2018, p. 3). These technologies created capabilities that no human trader could ever offer, such as assimilating and integrating vast quantities of data and executing thousands of trades at a nanosecond speed with no human intervention (Chaboud et al., 2014; Johnson et al., 2013). As a result, automated high-frequency traders have largely replaced human ones, i.e., the market-making activities traditionally performed by broker-dealers.

HFT impacted not only organization of trading on the stock markets, but also market efficiency and the level of centralization of stock trading. However, this impact is assessed in an ambiguous way. Jain (2005), as well as Hendershott and Moulton (2011), are of the opinion that HFT enhances market efficiency, making stock markets more efficient. On the other hand, Garvey and Wu (2010) or Balp and Strampelli (2018) deem that permissible by regulations two-tiered access to information creates an unfair advantage for HFT and in consequence, can threaten stock markets' long-term efficiency. There is also more and more evidence that algorithmic trading has accelerated the speculative behavior of the market participants (Hasbrouck & Saar, 2013; Riordan & Storkenmaier, 2012). The development of algorithmic trading, including HFT, increased the centralization of trading on exchanges, as the central servers turned out to be more powerful and sophisticated to cope with massive data flows (Geranio, 2016). Thus, centralization of trading resulting from the technological advances, combined with multilayered market infrastructure, neither facilitated access to investment for individuals nor the ability of smaller firms to raise and access capital, but rather additionally hindered them.

The technology which can decentralize trading on the capital market is DLT more commonly known as the blockchain (the latter is in fact a type of DLT). DLT allows for transactions and data to be recorded, shared, and

synchronized across a distributed network of different network participants and offers unique benefits in terms of consensus, efficiency, and security (Casey et al., 2018; World Bank, 2017). DLT has great potential to change the way the capital market works. Not only could it facilitate access to the market for smaller investors/firms, but also reduces transaction costs (by streamlining processing and eliminating intermediate steps) and capital costs (by shortening settlement time and more efficient use of collateral), level of risk (credit risk, settlement risk, operational risk, cyber risk, and even systematic risk) (HSBC Securities Services, 2019), and increases market transparency by potentially eliminating the burdens of regulatory reporting and discouraging market abuse (Innovate Finance, 2016).

DLT has many potential applications, as it can be applied to the entire securities value chain, beginning with listing (issuing), through trading, clearing, and settlement up to reporting for OTC securities and derivatives markets. Many large financial institutions, but also FinTechs, are experimenting with DLT and blockchain. The most well-known example is the R3 consortium formed mainly by banks in 2016, which created an open-source distributed ledger platform Corda and helps develop blockchain technology. Blockchain is also used by institutions related to capital markets in many countries, e.g., The Directorate of Defense Trade Controls (DTCC) in the United States is rebuilding its credit default swaps processing platform with blockchain, the Australian and Toronto Stock Exchanges are using blockchain to replace legacy settlement systems, and the Tel Aviv Stock Exchange is working on putting collateral management on a ledger (Accenture, 2018).

However, after the initial enthusiasm with which blockchain was approached by the financial industry, there is more and more skepticism about the possibility of achieving the expected benefits of using DLT (Lee, 2018).[6] The widespread deployment of this technology is hampered by existing regulations which are not adapted to the use of DLT in the financial sector (including competition law), the lack of common standards and interoperability, insufficient skills and knowledge for firms to develop, operate, and monitor DLT effectively (HSBC Securities Services, 2019; Innovate Finance, 2016). Furthermore, Ellul et al. (2020) note that the limited ability for software and data errors to be rectified which result from decentralized nature of DLT pose regulatory challenges to providing protection for the various users and stakeholders of this technology.

While FinTechs provide many technological solutions implemented on capital markets, BigTechs have not been very active in this market segment so far. This does not mean, however, that their expansion has no impact on the capital market. It is indirect in nature and results mainly from their rapidly growing market value and noticeable activity in the area of mergers and acquisitions. The market capitalization of American BigTechs is greater than that of the largest global financial institutions, such as JP Morgan or Bank of America (Frost et al., 2019). In mid-2020, the total market capitalization of five American BigTechs – Apple, Amazon, Microsoft, Alphabet

(Google), and Facebook – amounted to almost USD 6.9 trillion, and their weighted share in the S&P 500 index exceeded 25%. COVID pandemic further strengthens their market power and impact on the stock market – in the first half of 2020, their revenues and year-to-date price returns were growing steadily compared to the first half of 2019 (Ali, 2020). Additionally, BigTechs have taken over many small innovative companies in recent years. As a result, regulators in the United States and China, at the end of 2020, launched antitrust probes into tech giants (GAFA and Alibaba respectively) complaining that they restrict competition and hinder the development of innovation by buying startups in order to keep them from becoming competitors (Zhu et al., 2020).

The rise of digital platforms in the asset management and mutual funds industry

The asset management and mutual funds industry is the second segment that has considerably changed with the digitalization.

Traditional wealth/asset managers (i.e., private banks, bank brokers, registered investment advisors) serve all customer segments with investible capital, i.e., ultra-high net worth, high net worth, and mass affluent customers. The latter segment is the largest, but for a long time, it did not have access to individual advice and a personalized offer. The development of technology has enabled this group of underserved customers to use more sophisticated investment opportunities, taking advantage of social trading tools and platforms and retail algorithmic trading (World Economic Forum, 2015). The first one offers less-experienced investors the opportunity to gain experience and understanding, e.g., by participating in copy trading which allows them to simply replicate the portfolios of top-performing traders (e.g., eToro, Estimize, Stocktwits). The second solution enables investors with limited technical knowledge to create, backtest, and deploy trading algorithms and share them with others (Streak, Quantopian & Zipline, Numerai). These solutions delivered mainly by FinTechs are the easiest and quickest ways to maximize returns. They are also cost-effective – unlike traditional investment management, most social trading platforms do not require a minimum investment threshold to get started.

However, the real breakthrough that changed the structure of the asset management and mutual funds industry was the rise of digital platforms. Evans and Gawer (2016) in their in-depth study divided digital platforms into four types: transaction, innovation, integrated, and investment platforms. The largest number of platforms identified by them, as many as 160 out of 176, belonged to the first type. Transaction platforms enable highly efficient matching between different types of users, and/or the platform provider itself. By maximizing network effects as well as increasing economies of scale, they may significantly impact the structure of the financial markets. Transaction platforms operate in various segments of the financial markets

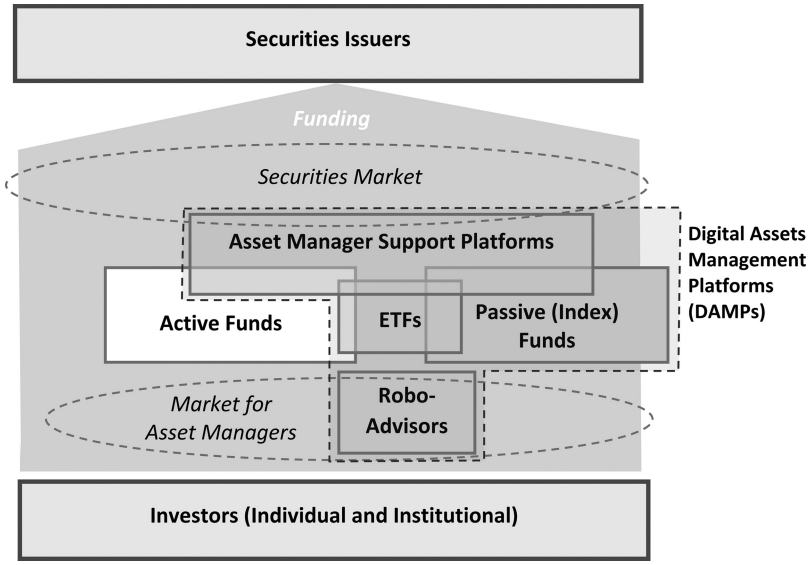

Figure 5.2 Digital platforms in asset management[7].

Source: Haberly et al. (2019, p. 171).

(e.g., the foreign exchange market - Forex or FX), however, their impact on the market structure has been particularly visible in the asset management and mutual funds industry in recent years. The platforms operating in those market segments were called DAMPs (digital asset management platforms) by Haberly et al. (2019). They distinguished four of their types: index funds, EFTs, asset manager support platforms, and robo-advisors (see Figure 5.2.).

Index funds and Exchange Traded Fund (ETFs) both are passively managed investment vehicles designed to mimic the performance of other assets (Marszk & Lechman, 2019). Investing in those funds through the platforms is more accessible and cheaper than in mutual funds due to the low entry thresholds, lower taxation, and relatively low management fees. Index funds and ETF platforms have dramatically enhanced the market functional efficiency. The rise of ETF platforms has also changed the market structure as ETFs can be bought and sold just like regular stocks throughout the trading day, with prices fluctuating constantly as opposed to mutual funds, which are only priced at the end of the day.

Both described types of platforms can be defined as product-driven transaction platforms as opposed to asset manager support platforms, which are rather process-driven as they provide services to both active and passive managers, including portfolio risk management, trading optimization and execution, and regulatory compliance support. By using sophisticated data-driven analytics, they increase both the fundamental valuation efficiency and functional efficiency of the securities market. The robo-advisors'

platforms can, in turn, be referred to as customer-driven transaction platforms as they generally operate in the retail market, where they offer high-value advisory services on portfolio allocation based on automated analysis (D'Acunto et al., 2019). Due to the fact that they boost all aspects of market efficiency in a complementary way, they are most similar to platforms operating outside the financial sector.

As demonstrated by Haberly et al. (2019), the entry of platforms significantly increased the level of concentration of the global asset management industry – the three largest passive management companies, i.e., BlackRock, Vanguard, and State Street, controlled in 2016 53% of the global index fund market and as much as 82% of the ETF market in terms of assets under management (AUM) while the actively-managed funds segment remains fragmented with the 10 largest managers worldwide having 27% of market share (and 3 largest companies having only 10% of market share). This concentration was also high in the robo-advising segment, where Vanguard Personal Advisor has half the size of the market share of the next nine companies representing mainly FinTech sector (such as Betterment, Wealthfront, Personal Capital, or Acorns)

Haberly et al. (2019) also note that, like other digital platforms, DAMPs do not deploy so much leverage technology to enhance their competitiveness within markets, as to radically restructure the market itself. However, unlike them, DAMPs were not introduced from the outside, but they have mostly been developed endogenously by leading financial asset management firms. As a result, instead of weakening the position of incumbents, DAMPs reinforced it.

So far, most BigTech companies do not offer asset management services which are complex financial products. Providing them requires risk management skills, as well as knowledge and experience in dealing with regulations, which are not strong points of tech giants. Only Chinese BigTechs offer investment services – in 2011, Alibaba Group launched the Yu'e Bao platform, and six years later, Tencent launched the LiCaitong platform. However, they mainly create opportunities for short-term investments in money market funds – offering such an opportunity allows BigTechs to manage surplus cash in online and mobile payment accounts of platform users. The Yu'e Bao fund offered to AliPay users became in 2018 the largest money market fund in the world in terms of AUM, however, recently its assets have decreased substantially (by almost 40%) because of tighter regulation in China and growing competition from higher-yielding (but risky) wealth management products.

While some money market funds are offered by Chinese BigTechs, mutual funds, in general, are increasingly distributed in China, as in the United States and many other countries, via digital stand-alone platforms. According to Cerulli Associates, in mid-2020, online platforms accounted for 24.7% of the total AUM of mutual funds in China (Acosta, 2020). Nonetheless, recently the Chinese BigTechs have created the possibility for their users to purchase mutual funds directly from asset management firms

which can open accounts on platforms operated by them. An example of such a solution is the Caifuhao platform launched by the Alibaba Group in 2017, which is an open marketplace for third-party financial institutions not only Chinese, but also the largest foreign asset managers, such as Vanguard, Schroders, Alliance Bernstein, and Fidelity.

In China, mutual funds are available not only via online platforms but also via mobile applications. As shown by Hong et al. (2020), this impacts the structure of the mutual fund industry as well as the behavior of investors and fund managers. They proved, *inter alia*, that organizational cohesiveness of large fund families, after joining the top platforms, weakens as platforms level the playing fields for all funds. The ability to purchase funds directly via mobile apps results in strong amplification of performance chasing and significant increase in performance sensitivity for both equity and mixed funds. Not having access to professional advice, individual investors often rely on simple performance rank lists displayed in their mobile apps. As a result, their investment decisions are based on similar information mainly regarding past performance, which makes their reactions synchronized. This synchronized performance chasing gives the rise of the amplified performance chasing, which in turn, creates incentives for fund managers to increase risk-taking in order to enhance the probability of getting into the top rank of funds.

To conclude, digitalization and the entry of technology companies have been constantly changing the market structure and competition in the financial industry. This can be observed not only in banking industry but also in capital markets. The stock market has been moving from a traditional specialist model to a technology-driven model. Technology solutions provided mainly by FinTechs have allowed electronic trading as well as automation of clearing and settlement. Electronic trading systems have facilitated the development of algorithmic trading, including HFT, which has increased the level of centralization of trade. This in turn, instead of the expected lowering of entry barriers for smaller investors and smaller firms seeking capital, increased them even more. Although the technology made it possible to reduce transaction costs, but did not eliminate the information asymmetry, as HFT traders using collocation services have an information advantage over other traders. In asset management and mutual funds industry, the main catalyst for structural changes was the rise of digital platforms. They are gaining importance in distribution of index funds and ETFs increasing the concentration of the global market of passively managed funds, while those of actively managed funds remain fragmented. Interestingly, the digital asset management platforms were created by the leading incumbent institutions, which allowed them to reinforce their market position thus increasing market contestability. On the other hand, the development of platforms, especially robo-advisors ones, facilitated access to passive investment for individual investors by reducing transaction costs and communication frictions. However, the issue of reducing information asymmetry remains debatable. It might seem that due to the increasing

access to information, this asymmetry has decreased, but in fact, it is rather the opposite. As most investment products are complex, analyzing and using abundant information concerning them to optimize investment decisions lies beyond the capabilities of an average investor. As a result, in the case of online robo-advisors' platforms, it is the algorithms that steer customer choices within a limited, profiled offer. By contrast, investors, who have mobile access to funds, are mainly guided by rankings which makes their decisions more speculative.

Digitalization in capital markets is driven primarily by FinTech solutions that change not only products and processes but also the structure of the market. FinTechs collaborate with incumbents and strengthen their position in the specific market niches, such as robo-advising. This may be somewhat surprising that BigTechs have a very limited interest in entering this market segment. This can be explained by relatively weak complementarity between their core activities and investment services. In addition, providing them requires risk management skills, as well as knowledge and experience in dealing with regulations, which are not strong points of BigTechs. Although Chinese BigTechs enter the asset management segment, they are not in a position to threaten incumbents. However, it should be stressed that the expansion of BigTechs on the capital market is often hampered by regulators, not only in the United States, but also in China.

The changes taking place in capital markets confirm that the greatest challenge for competition is the platform-based business model based on network effects and economies of scale and scope. In capital markets, this business model is not introduced from the outside, as in banking, but come from inside as it is applied by incumbents to reinforce their market position. Although stand-alone platforms developed in the asset management and mutual funds industry entail a lesser risk of distorting competition than those contained in captives' ecosystems built by BigTechs, they also represent a significant challenge for competition policy. Running them in digital economy requires not only other tools but also a different scale as most platforms operate on a transnational or even global scale. As a consequence, there is a need for better coordination of regulatory framework and other measures taken as part of competition policy, on the one hand, to ensure a level playing field for all market players, and on the other, to effectively respond to attempts to exercise the dominant market power. Additionally, the tools used must not contradict the main objective of competition policy in the digital economy which should be the promotion of innovations.

Notes

1. It is particularly difficult to identify companies that belong to the FinTech sector. Many institutions and consulting companies, such as the EBA, FSB, IMF, European Commission, EY, Deloitte, Capgemini and Efma, Accenture, Roland Berger, try to estimate the size of this sector, however, using very different data collection methodology and different identification criteria.

2. This means that the products they offer are most often compatible with other products sold on the same platform, but not compatible with products/services sold on other platforms.
3. According to Shapiro and Varian (1999), in the markets with network effects, pioneer companies can count on a first-mover advantage consisting of quickly acquiring a large number of customers, which will make the entry of later competitors onto the market significantly more difficult.
4. *Bundling* occurs when two products are only sold jointly, making it impossible to acquire the products individually. *Tying* refers to a situation where some of the products in the package may be bought individually, whereas others can be purchased in a package only; however, the price of the package is lower than when buying individual products separately.
5. *Cross-subsidization* occurs when the profits from one activity are used to pay for another activity that is less efficient or even unprofitable, in order to eliminate competition. Cross-subsidization may be combined with the use of price discrimination.
6. Despite this fact, Lee (2018) thinks that DLT in their current form can be utilized to correct some market imperfections by improving trade transparency and making the system more secure, and, at the same time, more cost-efficient for the participants.
7. Reprinted from *Geoforum*, 106 (2019), Haberly, D., MacDonald-Korth, D., Urban, M., & Wójcik, D., Asset Management as a Digital Platform Industry: A Global Financial Network Perspective, pp. 167–181, Copyright (2019), with permission from Elsevier.

References

Accenture (2018). *Capital Markets Vision 2022. Relevance*, Value and Growth in the Digital Era. https://capitalmarketsblog.accenture.com/capital-markets-2022-overview

Acosta, F. N. (2020). *China's online fund platforms a key distribution channel*. Fund Selector Asia. https://fundselectorasia.com/chinas-online-fund-platforms-a-key-distribution-channel/

Ali, A. (2020). *The stocks to rule them all: Big Tech's might in five charts*. Visual Capitalist. https://www.visualcapitalist.com/the-stocks-to-rule-them-all-big-techs-might-in-five-charts/

Allen, F., & Santomero, A. (1997). The theory of financial intermediation. *Journal of Banking and Finance*, *21*(11–12), 1461–1485. doi: https://doi.org/10.1016/s0378-4266(97)00032-0.

Alt, R., Beck, R., & Smits, M. (2018). FinTech and the transformation of the financial industry. *Electronic Markets*, *28*(3), 235–243. doi: https://doi.org/10.1007/s12525-018-0310-9.

Arner, D. W., Barberis, J., & Buckley, R. P. (2015). The evolution of fintech: A new post-crisis paradigm? *SSRN Electronic Journal*. doi: https://doi.org/10.2139/ssrn.2676553.

Bai, J., Philippon, T., & Savov, A. (2016). Have financial markets become more informative? *Journal of Financial Economics*, *122*(3), 625–654. doi: https://doi.org/10.1016/j.jfineco.2016.08.005.

Balp, G., & Strampelli, G. (2018). Preserving capital markets efficiency in the high-frequency trading era. *SSRN Electronic Journal*. doi: https://doi.org/10.2139/ssrn.3097723.

Bar-Gill, O. (2019). Algorithmic price discrimination when demand is a function of both preferences and (mis)perceptions. *University of Chicago Law Review*, *86*(2). https://www.jstor.org/stable/26590554.

Bank for International Settlements (2018). *Sound practices: Implications of fintech developments for banks and bank supervisors*. Basel Committee on Banking Supervision (BCBS), February. https://www.bis.org/bcbs/publ/d431.htm.

Bank for International Settlements (2019). *Big tech in finance: Opportunities and risks*. In: Annual Economic Report, 55–79. https://www.bis.org/publ/arpdf/ar2019e3.htm.

Boot, A., Hoffmann, P., Laeven, L., & Ratnovski, L. (2020). Financial intermediation and technology: What's Old, What's New?, *IMF Working Papers*, *20*(161). doi: https://doi.org/10.5089/9781513552491.001.

Casey, M., Crane, J., Gensler, G., Johnson, S., & Narula, N. (2018). The impact of blockchain technology on finance: A catalyst for change. *Geneva Reports on the World Economy 21*, International Center for Monetary and Banking Studies (ICMB). https://voxeu.org/content/impact-blockchain-technology-finance-catalyst-change.

Chaboud, A. P., Chiquoine, B., Hjalmarsson, E. & Vega, C. (2014). Rise of the machines: Algorithmic trading in the foreign exchange market, *The Journal of Finance*, *69*(5), 2045–2084. doi: https://doi.org/10.1111/jofi.12186.

Crémer, J., De Montjoye, Y. A., & Schweitzer, H. (2019). *Competition policy for the digital era: Final report*. Luxembourg: European Commission, Publications Office of the European Union. doi: https://doi.org/10.2763/407537.

D'Acunto, F., Prabhala, N., & Rossi, A. G. (2019). The promises and pitfalls of robo-advising. *The Review of Financial Studies*, *32*(5), 1983–2020. doi: https://doi.org/10.1093/rfs/hhz014.

Deutsche Börse & Celent. (2016). *Future of Fintech in Capital Markets*. June 20. https://www.deutsche-boerse.com/resource/blob/37024/ed055219caeb553f43950609d29e1bb3/data/future-of-fintech-in-capital-markets_en.pdf

Ellul, J., Galea, J., Ganado, M., Mccarthy, S., & Pace, G. J. (2020). Regulating blockchain, DLT and smart contracts: A technology regulator's perspective. *ERA Forum*, *21*, 209–220. doi: https://doi.org/10.1007/s12027-020-00617-7.

European Banking Authority (2018). *Report on the impact of FinTech on the incumbents credit institutions business models,* July. https://www.eba.europa.eu/file/28458

Evans, D. S., & Schmalensee, R. (2007). The industrial organization of markets with two-sided platforms. *Competition Policy International*, *3*(1), 151–179. https://econpapers.repec.org/article/cpicpijrn/3.1.2007_3ai=4907.htm.

Evans, P. C., & Gawer, A. (2016). *The Rise of the Platform Enterprise: A Global Survey,* The Emerging Platform Economy Series No. 1, The Center for Global Enterprise. https://www.thecge.net/archived-papers/the-rise-of-the-platform-enterprise-a-global-survey/

Financial Stability Board (2017). *Financial Stability Implications from FinTech, Supervisory and Regulatory Issues that Merit Authorities' Attention*. June. https://www.fsb.org/wp-content/uploads/R270617.pdf.

Financial Stability Board (2019). *FinTech and market structure in financial services: Market developments and potential financial stability implications*, February. https://www.fsb.org/wp-content/uploads/P140219.pdf.

Fraile Carmona, A., González-Quel Lombardo, A., Rivera Pastor, R., Tarín Quirós, C., Villar García, J. P., Ramos Muñoz, D., & Castejón Martín, L. (2018). *Competition issues in the area of financial technology (FinTech)*, Directorate-General for

Internal Policies, July. https://www.europarl.europa.eu/RegData/etudes/STUD/2018/619027/IPOL_STU(2018)619027_EN.pdf.

Frost, J., Gambacorta, L., Huang, Y., Song Shin, H., & Zbinden, P. (2019). BigTech and the changing structure of financial intermediation, *Economic Policy*, *34*(100), 761–799. doi: https://doi.org/10.1093/epolic/eiaa003.

Gao, M., & Huang, J. (2020). Informing the market: The effect of modern information technologies on information production. *Review of Financial Studies*, *33*(4), 1367–1411. doi: https://doi.org/10.1093/rfs/hhz100.

Garvey, R., & Wu, F. (2010). Speed, distance, and electronic trading: New evidence on why location matters. *Journal of Financial Markets*, *13*(4), 367–396. doi: https://doi.org/10.1016/j.finmar.2010.07.001.

Geranio, M. (2016). *Evolution of the exchange industry: From dealers' clubs to multinational companies*. Springer International Publishing.

Haberly, D., MacDonald-Korth, D., Urban, M., & Wójcik, D. (2019). Asset management as a digital platform industry: A global financial network perspective, *Geoforum*, *106*, 176–181. doi: https://doi.org/10.1016/j.geoforum.2019.08.009.

Harasim, J., & Mitręga-Niestrój, K. (2018). FinTech – Dylematy definicyjne i determinanty rozwoju. *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, *531*, 169–179. doi: https://doi.org/10.15611/pn.2018.531.15.

Hasbrouck, J., & Saar, G. (2013). Low-latency trading. *Journal of Financial Markets, 16*(4), 646–679. doi: https://doi.org/10.1016/j.finmar.2013.05.003.

Hau, H., Huang, Y., Shan, H., & Sheng, Z. (2019). How fintech enters China's credit market, *AEA Papers and Proceedings*, *109*, 60–64. doi: https://doi.org/10.1257/pandp.20191012.

He, D., Leckov, R. B., Haksar, V., Mancini Griffoli, T., Jenkinson, N., Kashima, M., Khiaonarong, T., Rochon, C., & Tourpe, H. (2017). Fintech and financial services: Initial considerations. *IMF Staff Discussion Notes*. June. https://www.imf.org/en/Publications/Staff-Discussion-Notes/Issues/2017/06/16/Fintech-and-Financial-Services-Initial-Considerations-44985

Hendershott, T., & Moulton, P. C. (2011). Automation, speed, and stock market quality: The NYSE's hybrid, *Journal of Financial Markets*, *14*(4), 568–604. doi: https://doi.org/10.1016/j.finmar.2011.02.003.

Hong, C. Y., Lu, X. & Pan, J. (2020). FinTech platforms and mutual fund distribution, *NBER Working Papers* 26576, National Bureau of Economic Research, Inc. doi: https://doi.org/10.3386/W26576.

HSBC Securities Services (2019). *Distributed Ledger Technology in the capital Markets. Game changers - Future Trends in Securities Services*, March. https://www.gbm.hsbc.com/game-changers-future-trends-in-securities-services/distributed-ledger-technology.

Innovate Finance (2016). *Blockchain*, *DLT and the Capital Markets Journey Navigating the Regulatory and Legal Landscape,* October. https://www.innovatefinance.com/reports/blockchain-dlt-and-the-capital-markets-journey-navigating-the-regulatory-and-legal-landscape/.

Jain, P. (2005). Financial market design and equity premium: Electronic versus floor trading, *The Journal of Finance*, *60*(6),2955–2985. doi: https://doi.org/10.1111/j.1540-6261.2005.00822.x.

Johnson, N., Zhao, G., Hunsader, E., Qi, H., Johnson, N., Meng, J., & Tivnan, B. (2013). Abrupt rise of new machine ecology beyond human response time, *Scientific Reports 3*(1), 2627,1–7. doi: https://doi.org/10.1038/srep02627.

Lee, J. (2018). Distributed ledger technologies (Blockchain) in capital markets: Risk and governance, *SSRN Electronic Journal*. doi: https://doi.org/10.2139/ssrn.3180553.

Lee, T., & Kim, H. W. (2015). An exploratory study on Fintech industry in Korea: Crowdfunding case. *2nd International conference on Innovative Engineering Technologies (ICIET'2015) August 7–8, 2015 Bangkok (Thailand)*. doi: https://doi.org/10.15242/iie.e0815045.

Marszk, A., & Lechman, E., (2019). *Exchange traded funds in Europe*. Elsevier: Academic Press.

Navaretti, G. B., Calzolari, G., Mansilla-Fernandez, J. M. & Pozzolo, A. F. (2018). Fintech and banking. Friends or foes? *SSRN Electronic Journal*. doi: https://doi.org/10.2139/ssrn.3099337.

Petralia, K., Philippon, T., Rice, T., & Veron, N. (2019). Banking disrupted. Financial intermediation in an era of transformational technology, *Geneva Report on the World Economy, 22*. https://voxeu.org/content/banking-disrupted-financial-intermediation-era-transformational-technology.

Philippon, T. (2015). Has the US finance industry become less efficient? On the theory and measurement of financial intermediation. *American Economic Review*, *105*(4), 1408–38. doi: https://doi.org/10.1257/aer.20120578.

Riordan, R., & Storkenmaier, A. (2012). Latency, liquidity and price discovery. *Journal of Financial Markets*, *15*(4), 416–437. doi: https://doi.org/10.1016/j.finmar.2012.05.003.

Rochet, J. C., & Tirole, J. (2003). Platform competition in two-sided markets. *Journal of the European Economic Association*, *1*(4), 990–1029. doi: https://doi.org/10.1162/154247603322493212.

Scholtens, B., & Van Wensveen, D. (2003). The theory of financial intermediation: An essay on what it does (not) explain. *SUERF Studies, SUERF - The European Money and Finance Forum,* No 1. August. https://ideas.repec.org/b/erf/erfstu/23.html.

Shapiro C. & Varian H. R. (1999). *Information Rules: A Strategic Guide to the Network Economy*, Boston, Massachusetts: Harvard Business School Press. https://doi.org/10.1080/00220489909595956

Stulz, R. M. (2019). Fintech, Bigtech, and the future of banks. *Journal of Applied Corporate Finance*, *31*(4), 86–97. doi: https://doi.org/10.1111/jacf.12378.

Tucker, C. (2019). Digital data, platforms and the usual [Antitrust] suspects: Network effects, switching costs, essential facility. *Review of Industrial Organization 54*(4), 683–694. doi: https://doi.org/10.1007/s11151-019-09693-7.

World Bank (2017). Distributed Ledger Technology (DLT) and Blockchain. FinTech Note, No 1. https://openknowledge.worldbank.org/handle/10986/29053.

World Economic Forum (2015). *The Future of Financial Services. How disruptive innovations are reshaping the way financial services are structured, provisioned and consumed*, An Industry Project of the Financial Services Community prepared in collaboration with Deloitte. Final Report, June. http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf.

Zhu, J., Wu, K., Leng, Ch. (2020). China launches antitrust probe into tech giant Alibaba. Reuters. https://www.reuters.com/article/us-china-antgroup/china-launches-antitrust-probe-into-tech-giant-alibaba-idUSKBN28Y05T.