

# Fintechs, Banks, and Financial Re-Intermediation

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## Abstract

This paper analyses the advances in fintech over the last decade, which have triggered fundamental changes in both banking and the structure of financial intermediation. Competitive pressures on banks in the provision of financial services raise two important questions: can fintech fully replace banks as financial intermediaries; what are the conceptual foundations explaining the development and growth of the fintech sector? In this sense, the study aims at comparing platform fintech re-intermediation versus traditional banking intermediation. Furthermore, fintech companies are placed in the broader context of financial intermediation models and financial system architecture. The analysis carried out shows that: (i) fintech platforms perform re-intermediation but do not eliminate but complement banks in certain market niches; (ii) new high-tech approaches to minimising market frictions (complementing non-financial data with financial data, as well as realising economies of scale in information accumulation and processing) explain, from a theoretical point of view, the growth of the fintech sector; (iii) increased trust as a result of blockchain technology and smart contracts

allows to remove the need for intermediaries in some segments of financial markets.

**Keywords:** fintechs, banks, digital innovations, P2P lending, models of financial intermediation

**JEL:** G20; G21; G24; G28

## Introduction

Fintech is a recently popular abbreviation for „financial technology“. More specifically, it refers to a new type of high-tech financial service providers, part of so-called alternative finance. By their very nature, they are new models of finance that have emerged outside the traditional financial system (including regulated banks and capital markets), where there is a linking of savers (lenders) and borrowers through online platforms or websites.

A fundamental motive for the emergence and development of fintech is the fact that today's „*new economy requires new finance*“, in the words of Marc Carney, former governor of the Bank of England. This means that consumers and businesses increasingly expect transactions between them to be settled in real time, i.e. payments across borders to be identical to those across the street. Moreover, the main drivers of the digital economy - small and medium-sized enterprises (SMEs), including start-ups -

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require new financing models. In recent years, they have faced a serious shortage of credit resources due to two main problems: (i) the assets they want to borrow against are mostly intangible (brand value) rather than physical (buildings or machinery); (ii) SMEs lack the historical data needed to determine their credit rating. In today's data-rich digital world, lenders have access to a wider range of information (both financial and non-financial) on which to base their lending decisions. It is this niche market that fintech companies specialise in.

Viewed from another angle, the development of the fintech industry can be seen as a counterpoint to the consolidation wave in the financial sector, which led to the formation of excessively large financial intermediaries (conglomerates, holding structures or as they are known in the years after the global financial crisis - SIFs (Systemically Important Financial Institutions). Modern innovations in information technology are encouraging the emergence of specialised small players, creating a range of niche markets with high product customisation to meet the preferences of a wide range of customers. This is entirely in line with Fukuyama's view at the turn of the last century that: *"Networks of small virtual organisations, rather than large hierarchical structures or chaotic markets, will become the wave of the future and the endless progress of electronic technologies will drive them forward"* (Fukuyama 1997: 39).

The rise of new digitally based players is a global trend, characteristic of both developed and emerging economies (including Bulgaria). Approximately 26,000 specialised fintech firms (135 in Bulgaria) operate in global financial markets in 2021, posing a potential threat to traditional financial intermediation. The crisis triggered by COVID-19 is

accelerating this technological transformation through increased demand for digital financial services from a wide range of consumers. One unprecedented aspect of this transformation is the extent to which it involves direct transactions carried out without the need for an intermediary, as well as a new type of intermediation called platform intermediation.

All of this creates an environment in which the claim that banks (like dinosaurs) will be fundamentally destroyed and replaced by fintech firms takes on particular relevance. For example, according to Vijayan (2018), *"We are passing through [a] high-tech era of information technology. Things are changing very fast and banking worldwide will soon die natural death due to the emergence of e-wallets. When computers arrived, typewriters died a natural death. With the arrival of mobile phones, most land line phones vanished. Change is inevitable also in [the] banking arena."* The consulting firm Gartner in 2018 articulated the view that *"digitization will make most traditional financial firms irrelevant by 2030."* This brings two significant issues to the fore:

1. Is fintech the new paradigm in the financial services industry, i.e. can fintech completely replace banks or only complement them in certain niche markets?
2. What are the conceptual underpinnings explaining the growth of fintech companies' businesses as platform intermediaries?

The aim of the paper is to formulate some views on these issues, as they are crucial for anticipating future changes in financial systems, measuring their impact on existing institutions and highlighting regulatory policy priorities. What is different about this paper is that it attempts to 'theoretically ground' the rise of the fintech sector. Furthermore, the fintech industry is not analysed in isolation

but as a part (segment) of the financial sector of the economy. The other important competitors of traditional banking institutions, the so-called bigtech or techfin companies, are not included in the study and analysed due to the fact that they do not perform financial intermediation.

The paper is structured in three parts. The first reveals the drivers and segments of the modern fintech industry, as well as its size and growth relative to the traditional financial industry. Part two compares traditional banking intermediation with that carried out by fintech firms. Based on a comparative analysis between them, it attempts to answer the question - is it possible to eliminate banks from fintech? Part three attempts to conceptually redefine financial intermediation - to this end, the fintech sector is placed and analysed within the broader context of financial intermediation models and financial system architecture. The paper ends with a conclusion and a look at possible future research on the topic.

### 1. The modern fintech industry

There is still no universal definition of fintech. In the broadest sense, it is the use of innovative information technology in financial services. According to the Financial Stability Board, fintech firms are defined as: *“Technology-enabled financial innovations that could lead to new business models,*

*applications, processes or products that have a material impact on financial markets and institutions in the provision of financial services”* (FSB 2017). Eickhoff et. al., ‘capture’ the most important aspects of other definitions: *“Fintechs are companies that operate at the intersection of (i) financial products, services, and information technology; (ii) they are typically relatively new companies (often start-ups) with their own innovative product or service offerings”* (Eickhoff et. al., 2017: 2).

The basis of the rapid penetration and development of the fintech sector should undoubtedly be placed on the *process of digital transformation*, which has affected not only the financial industry, but also other sectors of the economy. The specific *drivers of fintech* are usually divided into two groups - demand side and supply side as shown in Table 1. 1.

*Changing consumer preferences* are associated with higher customer demands for price, yield, convenience, speed, etc. During the global financial crisis, and since, huge numbers of customers have made significant losses on investments in financial assets. It is natural to ask why they are paying banks and asset managers ‘salty’ interest rates and fees, yet their financial wealth is shrinking. More importantly, clients are starting to ask more fundamental questions about the role of financial intermediaries in general. In the UK, for example, two businessmen years ago

**Table 1.** Fintech Drivers

Demand side	Supply side
Change in consumer preferences: - higher demands on the financial industry; - different attitudes towards ownership, leading to the development of the sharing economy.	<ul style="list-style-type: none"> <li>• Technology development:                             <ul style="list-style-type: none"> <li>- Internet;</li> <li>- big data, mobile technology and computing power.</li> </ul> </li> <li>• Changes in financial regulation:                             <ul style="list-style-type: none"> <li>- new regulatory and supervisory requirements;</li> <li>- business incentives for incumbent and new players.</li> </ul> </li> </ul>

Sources: FSB (2017), KPMG (2017).

discussed a problem they were increasingly encountering - their banks were lending to them at around 10% interest, while at the same time they were only getting a 1-2% return on their deposits. In their view, there should be a way to deprive the intermediary of the huge slice of the cake it gets and share it more fairly by directly connecting people with savings and those seeking finance. Thanks to the internet, they spotted the solution and created ZOPA - the UK's first peer-to-peer (P2P) platform.

Different attitudes towards ownership lead to the development of the so-called *sharing (peer) economy*. More and more people are realising that „renting is better than owning“, i.e. ownership leads to a loss of valuable resources, and society will gain more if assets are shared and reused. The sharing economy encompasses three types of interactions: P2P (person-to-person), B2B (business-to-business) and P2B2P (person-to-business-to-person). An essential aspect of the sharing economy is the development of the so-called *crowd economy*, associated with crowdfunding projects and activities (Epping 2021: 211).

*The technological innovations* behind fintech<sup>1</sup> (more precisely, behind fintech 3.0) can be classified into three categories (Nakaso, 2016). *The first one* includes the encryption technology „blockchain“ and the distributed ledger technology (DLT) created in 2008 in close connection with the cryptocurrency „bitcoin“. They provide a new opportunity to exchange money between

individuals (P2P) who do not necessarily know and trust each other. The *second* category includes artificial intelligence and big data analytics, which are evolving in line with the dramatic increase in computing power - cloud computing, machine learning, biometrics, etc. *The third* type of technological innovation involves mobile phones, tablets, smartphones and other devices that have become new means of accessing financial services. The development of the Internet is of particular importance in this area. According to Puschmann (2017: 31), it went through three phases: from the „*Internet of Information*“ (1985-2000) to the „*Internet of Services*“ (2000-2015), and after 2015, steps were taken towards the „*Internet of Value*“. The last phase focuses on standards for blockchains, digital payments, smart contracts and other areas of value exchange.

*Changes in financial regulation* are aimed at lower regulatory and supervisory requirements and the resulting higher incentives for new entrants to financial markets. An example in the European Union (EU) is the Second Payment Service Directive (PSD2), which came into force in 2018. It introduces the requirement for all European banks to provide regulated third parties (payment service providers) with access to customer account information and initiation of payments with the permission and consent of customers. Many national regulators are starting to lower the hurdles for fintech startups and their solutions. Examples include the

<sup>1</sup> Although the term FinTech is relatively new, the relationship between finance and technology has a long history. On the one hand, finance has always been a major driver of technological development, and on the other, the financial industry has experienced several waves of technological innovation. For example, Arner, Barberis, and Buckley (2016) argue that the evolution of FinTech went through three phases: FinTech 1.0 (1866-1967), FinTech 2.0 (1967-2008), and FinTech 3.0 (2008-2016). The authors believe that the laying of the transatlantic cable in 1866 was the first combination between technology and finance. It created the conditions for increased speed in transmitting transaction and payment information via telegraph and laid the foundations for globalization in finance.

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UK, Hong Kong, Singapore and Switzerland. They are all introducing so-called regulatory sandboxes where startups can test innovative solutions in a protected area. In Switzerland, in particular, public funds of up to CHF 1 million are exempt from the permission regime (Puschmann 2017: 30).

According to a publication by the Bank for International Settlements (2018), the main *segments* of the fintech sector include: credit, deposit, and capital-raising services; payments services; investment management services; and insurance. The first two groups of services are alternative to those offered by traditional banking institutions, the third to the asset management industry and the fourth to insurance companies. Table 2 illustrates the main varieties of services in these segments.

*Alternative banking intermediation* is concentrated in the area of consumer and business financing (lending) in the form of *crowdfunding* and peer-to-peer lending (*P2P lending*) platforms. Crowdfunding is an open campaign, essentially via the Internet, to provide financial resources in the form of a donation or in exchange for some form of remuneration and/or voting rights to support initiatives for specific purposes (Belleflamme, Lambert, Schwienbacher 2014). Typically, fundraising aims at creating and offering a new service, product or investment project,

as well as raising funds for some charitable cause. Before the digital age, crowdfunding was carried out on a religious basis: people in churches, mosques or synagogues were asked to make a donation. The shared interests of the believers usually ensured that the money would be spent for the good of the community (Epping 2021: 235). The crowdfunding model involves three types of actors: the initiator or entrepreneur who proposes the idea and/or the project for funding; a group of people or investors supporting the idea; and the team - the owner of the platform who maintains, administers and innovates it.

Depending on the reward offered, the following types of crowdfunding campaigns are found in practice (Cambridge Centre for Alternative Finance 2019: 31):

- *Charitable* (Donations-based) - financial donations without anything in return other than moral satisfaction that the donor has done something good.
- *Rewards-based* - funding in exchange for gifts and prizes, most often the product for which funds are raised.
- *Equity Crowdfunding* - equity crowdfunding, i.e. investors acquire shares (stakes) in the business or project.
- *Debt-based* - financing against interest, i.e. investors receive a percentage of the

**Table 2.** Fintech industry segments

Credit, deposit and capital-raising services	Payment services, clearing and settlement		Investment Management	Insurance
	Retail	Wholesale		
Crowdfunding			High-frequency trading	Link to mobile devices
Lending marketplaces	Mobile wallets	B2B point of sale	Copy trading	Big data
Mobile banks	P2P transfers	FX wholesale	E-trading	Improved risk pricing
Credit scoring	Digital currencies	Digital exchange platforms	Robo-advice	New contracts

**Source:** Bank for International Settlements (2018).

profits of the business or project in the form of interest.

Peer-to-peer (P2P) lending platforms are the most successful crowdfunding model. They provide loans bypassing banks, whereby individuals and companies invest in small businesses. These platforms create an environment to stack the interests of savers and borrowers - some even allow lenders to directly select borrowers. P2P platforms often provide an assessment of business risk derived through algorithms to screen borrowers using big data. They thus reduce the costs associated with bank intermediation, achieving two main objectives: (i) the ability to offer lenders a better return on their investment and (ii) offering loans at lower and flexible interest rates. As summarized by Kaja, Martino, and Paccès (2020: 6), a substitution of „heavy“ bank intermediation by „lighter“ platform intermediation is thus realized.

From a modest base, P2P lending is growing rapidly in the US (with leaders such as Lending Club Corporation, Prosper Marketplace, Upstart, CircleBack Lending), in the UK (Zopa, Funding Circle), and in China (Lufax, WeBank). Leading European countries in P2P lending are Latvia, Germany, France, Lithuania, Estonia (Mintos, TWINO, October. eu Grupeer, Robocash, Lenndy, Bitbond,

Swapper, Peer Berry, Iuvo Group). Up to and including 2019, the world’s largest P2P lending market is that of China, but in 2020 and 2021 the top spot is already occupied by North America - the US and Canada (Cambridge Centre for Alternative Finance 2021: 36).

*Payment systems and transfers* are based on cryptocurrencies and blockchain technology. They can function without using the existing bank payment infrastructure as shown in Figure 1. Banks, as well as Visa and MasterCard, still dominate this segment, but innovations in payments are being created by non-banks such as PayPal, Apple or Google.

*Investment Management Services.* Fintech is significantly changing the mechanisms by which financial markets are traded, i.e. the ways in which savings are invested and managed, including the provision of financial advice. A specific area of investment advice is also evolving – the so-called robo-advice. This includes algorithm-based online services related to financial advice in the banking, securities and portfolio management, insurance and pensions industries. „Robo-advisors“ are computer programs that generate investment advice according to the information they have about clients. Moreover, if programmed properly, robo-advisors can avoid some of the common *conflicts of*

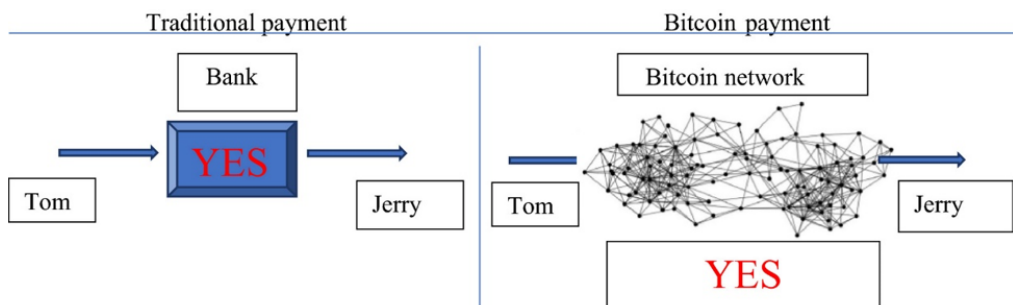


Figure 1. Traditional versus bitcoin payment

Source: Cai (2018: 6).



**Table 3.** Fintech assets versus global banking assets

Years	Fintech assets - FA (USD billion)	Global banking assets - GBA (USD trillion)	FA/GBA (%)
2013	11	142	0,008
2016	284	138	0,205
2019	447	155	0.288
2020	585	180	0,325

Sources: FSB (2021), Statista (2021).

*interest* that arise in the industry. Robo-advice is still in its infancy and small compared to overall financial advice, especially in Europe where assets under management amount to less than 6% of those in the US (Frost 2020).

*InsurTech.* The main driver of fintech in insurance is the vast amounts of information that connected devices (computers, phones, smart watches, etc.) deployed in homes, cars and carried as personal belongings accumulate for the individuals who own them. This leads to 'big data' that insurance companies can use to calculate risk more accurately and more dynamically than they currently do. Consumers can choose to use sensors and trackers generating data that insurers can use not only in pricing the initial policy, but also in designing adjustments that reward certain low-risk behaviors. Automobile and health insurance are two important segments for insurtechs (Thakor, 2019).

Exactly how big is the fintech sector? In Table 3 attempts to answer the question - for this purpose, the assets (loans, etc.) created by fintech companies are compared with global banking assets.

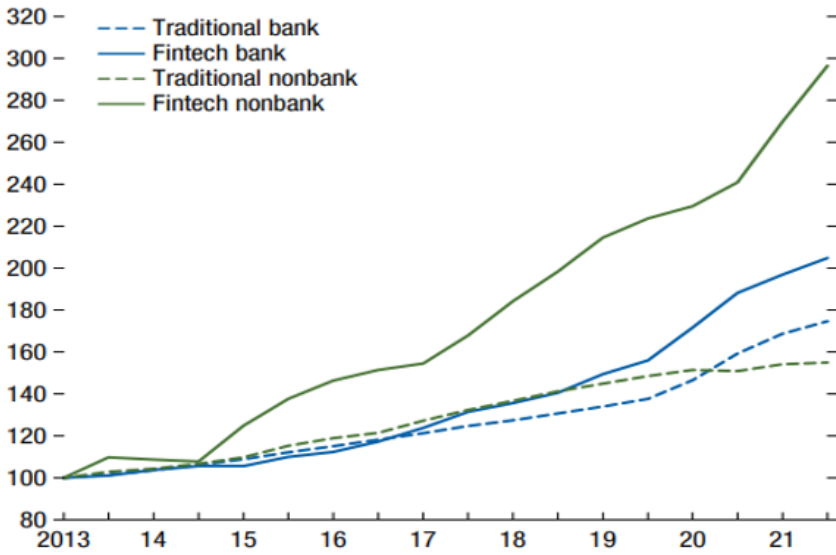
The data in Table 3 undeniably prove that the fintech sector is still too small compared to the traditional banking system. One reason for this can be sought in their 'age'. Banks are the oldest and most important financial intermediaries with a history of several centuries. On the other hand, fintech

companies are the youngest financial service providers, whose rise started in the years following the global financial crisis, which is why they are referred to as the 'young madmen'.

At the same time, however, the growth in the number and assets of fintech firms is impressive. For example, at the end of 2016, there were 8,800 fintech companies operating globally; by the end of 2018, the number was already 12,000, and by the end of 2021, 26,000 (World Bank Group 2022: 30). Over the period 2013-2021, the assets of non-bank fintech companies grew 3-fold or 300% (see Figure 2). Fintech banks (also known as neobanks) rank second with an asset growth of 200%, followed by traditional banks at 180% and traditional non-banks at 155%.

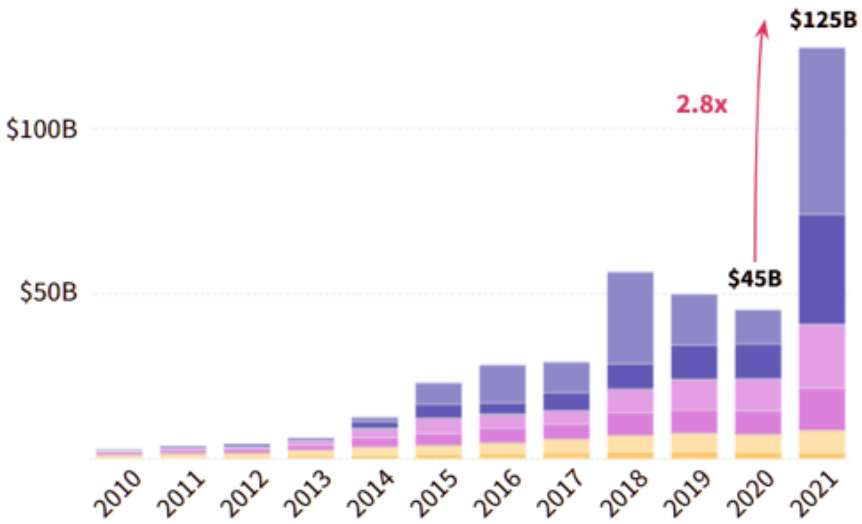
An important measure of the size and growth of the sector is venture capital investment in fintech startups (see Figure 3).

The total value of the investments in question increased from less than USD 10 billion per year before 2014 to around USD 55 billion in 2018, before falling to USD 45 billion in 2020. The main reasons for this decline are twofold: the introduced regulatory restrictions on China's fintech industry in 2018, as well as the COVID-19 pandemic. At the end of 2021, however, investments in fintech are already USD 125 billion or an increase of 2.8 times compared to 2020.



**Figure 2.** Fintech asset growth relative to peer lenders (2013:H1=100)

Source: International Monetary Fund (2022: 66).



**Figure 3.** Global investments in FinTech startups (USD billion)

Source: ZIGURAT (2022).



**Table 4.** Traditional financial intermediaries vs. fintechs

Criteria	Traditional financial intermediaries (banks)	Fintechs
Structure	Centralized hierarchical	Decentralised network
Objective	Maximising banks' equity value and shareholder wealth	Maximizing the value of fintech platform owners
Functions as financial intermediaries	<ul style="list-style-type: none"> <li>• Accumulation of savings</li> <li>• Customer screening</li> <li>• Ensuring liquidity</li> <li>• Transforming maturities</li> <li>• Monitoring of borrowers' behaviour</li> <li>• Sharing the risk</li> </ul>	<ul style="list-style-type: none"> <li>• Customer screening</li> <li>• Providing liquidity (P2P platforms)</li> </ul>
Business model	Balance sheet business - quality asset transformation (QAT), high level of leverage	Off-balance business model, do not use leverage
Return for owners	Higher returns for bank shareholders	Lower returns for fintech platform owners
Operating costs, prices and charges for products and services	High operating costs, prices and charges for products and services to customers	Lower operating costs, prices and fees for products and services to customers
Innovation flexibility	Lower	High innovation receptivity and flexibility
Customer spectrum	Serve the entire possible customer spectrum	They specialize in serving individuals, startups and SMEs
Regulation and supervision	Most tightly regulated, but with high costs to society	They are much less regulated and at less cost to society

## 2. Fintech vs banks

Table 4 presents a comparison between banks and new digital firms according to important criteria such as: structure; purpose; functions as financial intermediaries; business model; return to owners (investors); operating costs; innovation flexibility; customer spectrum; regulatory and supervisory system.

*Structure.* At the macro level, digitalization is changing the industrial structure of the financial system from a centralized and hierarchical structure to a decentralized network structure (Pushmann, 2017). At the micro level, fintech platforms embody a „system network architecture“ where a

number of applications are integrated into a single technical infrastructure that is available to end users. Hence, P2P lending is characterized by network effects. The more investors a platform can attract, the more borrowers it has the potential to serve (Metcalfé's Law)<sup>2</sup>. This means that P2P platforms can benefit from creating a passive effect among investors.

*Objective.* Some authors argue that a P2P platform is nothing more than a computer program that provides an algorithm to match the interests of investors and borrowers, i.e., it is not actually a profit-maximizing firm and therefore cannot be compared to a bank.

<sup>2</sup> Robert Metcalfe is the founder of 3Com Corporation and the creator of Ethernet. According to his law (Metcalfé's law), the value of a network is proportional to the number of users, i.e. the network value =  $n*(n - 1)/2$ , where: n - number of participants in the network.

This view is flawed - P2P platforms are profit-maximising entities that make subjective decisions that are often opaque and require the trust of users (see Merton 2018). The profits of fintech platforms are based on origination fees etc. plus a portion of loan repayments. At the same time, a fraction of banks, as well as of fintech platforms, do not aim to make a profit. These are, for example, cooperative credit institutions, rewards-based and donations-based crowdfunding campaigns.

*Functions as financial intermediaries.* Although fintechs also reduce frictions (defects) in the credit market through new high-tech means, they do not perform *accumulation of savings (in the form of deposits), transformation of assets and maturities, monitoring of customer behaviour, risk sharing.*

*Business model.* Banks operate a balance sheet business, where the assets they create (mainly loans) are financed by the savings they attract in the form of deposits. At the same time, loans and deposits differ significantly in terms of size, maturity, liquidity and risk. It is therefore generally accepted in the specialist literature that banks carry out what is known as Qualitative Asset Transformation (QAT), taking the risks upon themselves. The business model of fintech firms is fundamentally different from that of banks. Digital channels allow fintechs to ‚side-step‘ the established distribution networks of banks and offer financial services that *do not require* balance sheet reporting, such as payments and savings management to investors (Boot et. al 2020: 5). This means that the loans provided through fintech platforms are assets of the savers (lenders) themselves, who also bear the credit risk. The business model of

fintech companies therefore brings them closer to that of brokerage firms.

In addition, unlike fintech companies, banks operate at a high level of *leverage*, increasing the risk to the system when asset prices fall. In the specialized literature, it is widely accepted that the high level of bank leverage is among the main contributors to the global financial crisis (Demertzis et al. 2017). For example, a significant shortcoming of the Basel II agreement is that the required equity capital is insufficient for banks to withstand financial meltdowns. It is for this reason that the new Basel III agreement includes a specific requirement for a minimum leverage level of 3%.

*Returns for owners.* The data shows that these platforms do not deliver the Return on Equity (ROE) typical of banks. For example, in the last quarter of 2018, JP Morgan Chase achieved an ROE of 14.07%, while Lending Club’s ROE was 6.2%. A broader comparison shows qualitatively similar results. This, as Thakor (2019: 12) notes, may tempt P2P platforms to start using „leverage“ in the future.

*Prices of products and services.* Fintech platforms offer *more competitive prices* on products and services. This is a consequence of the difference in costs between the business model of banks and that of P2P platforms. In general, banks have higher operating costs than P2P platforms, as they have to pay for their branch network, for deposit accumulation, for ATMs as well as costs for stricter regulation. According to Welltrado (2018), operating costs as a percentage of outstanding loans are 2.70% in Lending Club versus almost 7% in banks.

Fintechs can work with *innovative flexibility* that traditional banks are unable to provide. Fintech firms have the advantage of starting

without legacy IT systems and product range, i.e. they can choose the most appropriate IT system for the products they want to create. Furthermore, unlike banks, fintech firms (start-ups) can take greater risks because they have nothing to lose. This enables them to not fear mistakes, allow customers to steer them towards better products, and focus on interfaces that maximize *user experience*.

The Achilles' heel of banks (especially the big ones) is that their IT systems are built piecemeal (through add-ons), sometimes with older programming languages. Integrating fintech innovation into such an IT platform can be problematic or downright unfeasible (Stulz 2019: 3). Moreover, unlike the young, it is much more difficult for older firms (such as banks) to innovate. This is because large banks are complex diversified corporations in which innovation can be hindered due to conflicts between different structural units as well as due to bureaucracy. Finally, the very nature of business constrains banks to provide services related to *value preservation*, i.e. to take on less risk. In this context, one could point to a well-known principle that has guided generations of bankers: "*Never be first*".

*Customer spectrum.* Banks are the most complex financial intermediaries, generally offering products and services across the entire customer spectrum. Fintechs, on the other hand, provide services that are more attractive to young and less lucrative small customers as well as to small and medium-sized enterprises (including start-ups), but not to large corporations. It is also important to stress that Fintech reaches market segments and customers that have been ignored by traditional financial intermediaries. For example, fintechs top the list of factors that have driven the advancement of so-called

financial inclusion - mainly in developing countries (de Cos, 2019). In these countries, financial services are not yet widespread, but the rapid penetration of mobile phones and smartphones provides the opportunity to offer basic financial services virtually to poorer segments of the population. A case in point is M-Pesa in Kenya, which specializes in opening accounts and providing loans through mobile devices.

*Regulation and supervision.* Strict regulation (and, according to many experts, over-regulation) of banks is associated with: capital adequacy, liquidity and leverage requirements; a bank deposit protection system; macro- and micro-prudential supervision; a bank resolution fund. On the other hand, fintech firms have flourished in recent years thanks (in part) to their weak regulation. For example, according to Stulz (2019: 3), banks are subject to regulations that force them to take steps and limit the ability of customers to use their services for money laundering. Fintech firms do not have to comply with the same regulations. In addition, banks are required to hold a minimum amount of capital, while FinTech firms are not subject to capital requirements, so they can conduct banking activities at a lower cost.

Since banks are highly regulated and slow to make changes, this may explain why „small outsiders“ survive and grow rapidly (Crouhy, Galai, Wiener 2021: 47). At the same time, the lower regulatory burden in fintech is to some extent due to innovations in financial regulation - on the one hand, the growing presence of specialized providers of regulatory expertise - *RegTech* (Regulatory Technology - RegTech), and also the development and testing of high-tech solutions for the needs of financial supervision - *SupTech* (Supervisory Technology - SupTech) within

so-called Regulatory Sandboxes (Vachkov, Valkanov 2021: 266-267). As highlighted by Suprin, Petrishina, and Vasylichuk (2020: 3), blockchain could reduce regtech costs by USD 4.6 billion per year.

The above comparisons show that fintechs outperform traditional intermediaries (banks) in providing financial services to customers in the following areas:

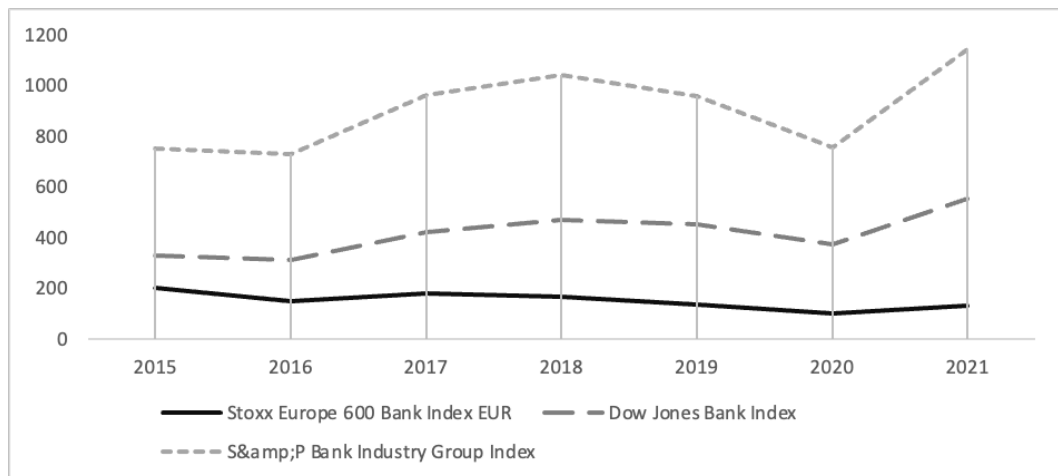
- They are less regulated, not part of large inflexible organisations and not burdened with legacy IT systems. This allows them to operate with an *innovative flexibility* that is atypical of traditional banks.
- Develop *better applications* of modern information technology in finance based on big data, social media, cloud computing, artificial intelligence.
- Offer *more competitive prices* on products and services.
- They are able to focus very narrowly on solutions related to specific customer needs - offering a better *customer experience*.

At the same time, online lending firms do not eliminate the need for intermediation,

but rather complement traditional banks by functioning as a new type of intermediary. For some clients and forms of lending, where the risks and associated regulatory costs are high, the migration for lending from banks to fintech will continue. However, the growth of fintech platforms is unlikely to pose a significant competitive threat to banks. For example, if the banking business is threatened with failure, a fall in banks' share prices on stock markets can be expected. As shown in Figure 4, in years of a major fintech boom, the annual average values of the bank stocks broad indices have risen (in the case of the S&P Bank Industry Group Index from 753.30 to 1143.44; in the case of the Dow Jones Bank Index from 328.34 to 554.11), while the Stoxx Europe 600 Bank Index has declined, but not substantially and not in a way portending bust.

Therefore, the answer to the question - will banks be gradually eliminated from fintech - is most likely „no“, due to the following additional arguments:

- Banks are able to replicate much of the business of fintech firms. However, the



**Figure 4.** Annual averages of broad bank indices

Sources: Marketwatch; Sgglobal.

## Articles

opposite is not true. Less regulation enables fintech firms to put competitive pressure on banks for specific products, but they cannot replace them in general.

- A large number of banks still have a „high reputation“, an important intangible asset, and are trusted by many loyal customers. Banks, moreover, have the resources to protect their customers' savings from all kinds of cyber risks (Dzhaparov, 2020).
- Fintech start-ups lack the capital, information and other resources to compete successfully with banks. It is common practice for banks to provide loans to fintech platforms through which the latter finance certain investments before they have raised funds from the market. Where collateral in certain lending transactions is too important because of the private information held, banks can better minimise moral hazard. This, according to Thakor (2019: 9), is a serious advantage over fintech platforms.
- Banks operate under a regulatory umbrella and enjoy central bank and government support. This was evident during the global financial crisis of 2008, when the US Federal Reserve, other central banks and governments stepped in to help banks through the crisis. Deposit insurance and the demand for safe assets will continue to provide banks with funding costs and credibility over other forms of intermediation.

*History* gives us illustrative examples of the above conclusion: this is not the first time that specialists of various ranks have defended the thesis that technological innovation will put an end to banks and the existing financial system as we know it. This is also the opinion of Prof. Jean Dermine (Dermine 2017: 64):

*“The cataclysmic predictions of the slow death of banking remind me of similar gloomy forecasts made over the past 35 years. When telephone banking was introduced in the 1980s, there were fears that telephone companies would enter the banking industry and displace incumbent players. But that did not happen - the banks themselves started to offer telephone based services.”*

In the years of the extraordinary boom in the development of capital markets and investment banking (1990-2000), it was believed that direct financing would replace the costly and inefficient indirect financing provided by financial intermediaries (mainly banks). Increasingly, the question is being asked - is there a future for traditional banking? It has even been hypothesised that traditional bank lending will disappear from the list of financial services offered in the foreseeable future (Cecchetti 1999: 1-2). This is because technology together with securitisation will turn lending into a brokerage activity. But the prediction turned out to be wrong: bank asset-to-GDP ratios rose in both developed and emerging economies; a fraction of large broker-dealer firms (investment banks) transformed into commercial banks (Goldman Sachs and Morgan Stanley). In an iconic 1994 article entitled „Are banks dead? Or are the reports greatly exaggerated?“, authors Boyd and Gertler helpfully refute the notion that commercial banking is an industry in serious decline.

The widespread penetration of the internet in the last quarter of the last century has led to the emergence of dedicated online banks. However, these banks have not driven traditional banks out of the market. Instead, the latter have made internet (online) banking accessible to their customers (Stulz 2019: 1). At the turn of the millennium, as the dot.com

bubble inflated, many bankers were terrified that Microsoft would enter their industry and enable customers to navigate online from one bank to another-such transparency of pricing and product offerings was likely to undermine bank revenues and profits. As of 2017, Microsoft does not offer banking services (Dermine 2017: 64).

The future role of fintech, as practice shows, will be shaped by several alternatives:

- *To compete with banks in segments such as equity financing or lending.* To this end, some fintech firms are likely to undertake horizontal mergers and acquisitions to increase the range of services offered and their competitiveness. According to Crouhy, Galai and Wiener (2021: 48), 51 fintech mergers and acquisitions took place in 2019 - for example, the acquisition of Quovo by Plaid for approximately \$200 million and the merger of FirstData with Fiserv.
- *Develop partnerships with banks.* For example, Lending Club and Prosper partnered with Utah-based WebBank, and OnDeck partnered with JP Morgan Chase to provide small business loans (Thakor 2019: 9). Over the past three years, globally, 65% of banks have entered into at least one partnership with a fintech company and 35% have invested in fintech startups. In 2019, banks have implemented an average of 1.3 partnerships, while in 2021 the number increases to 2.5 (Shevlin 2022: 1).

- *To be acquired from an operating bank*<sup>3</sup>. This gives banks access to a more modern form of lending.
- *To be transformed (converted) into a bank.* US fintech company SoFi has evolved from a specialist student lending company to a multi-product online financial institution. It applied for a banking license that allows it to provide services nationwide (Crouhy, Galai and Wiener 2021: 47). In United Kingdom - in 2020, ZOPA (the first P2P platform) was granted a full banking license, and in January 2022 the fintech company Revolut also transformed into a bank. This trend is expected to expand in the future.

### 3. Fintech in the context of financial intermediation theory

Financial intermediation, as is well known from theory, is related to overcoming frictions in financial markets - transaction costs and information asymmetry (Georgiev, Valkanov 2014: 26-36). These, in turn, have two dimensions, respectively before (ex ante) and after a transaction (ex post), as shown in Table 5. Considering the fact that the main component of transaction costs is information costs, it can be argued that the information problem is the main one facing financial intermediaries.

Because they control the flow of information between lenders and borrowers, intermediaries realize significant economic benefits. For example, Philippon (2015) shows that financial industry revenues as a percentage of U.S. GDP increased from about 1 percent in 1880 to about 8 percent

<sup>3</sup> A similar practice has existed in the recent past with other types of financial intermediaries. For example, the development of alternative trading systems - Electronic Communications Networks (ECNs) in the US and Multilateral Trading Facilities (MTFs) in Europe - has not led to the disappearance of stock exchanges from the market space. Quite the opposite is happening, with major exchanges acquiring the leading ECNs and MTFs (see Georgiev 2019).



**Table 5.** Dimensions of frictions in financial markets

	<b>Transactional costs</b>	<b>Information asymmetry</b>
<b>Before the transaction (ex ante)</b>	<ul style="list-style-type: none"> <li>• counterparty search costs</li> <li>• verification costs (assessment) of the quality of financial instruments</li> </ul>	<ul style="list-style-type: none"> <li>• adverse selection</li> </ul>
<b>After a transaction (ex post)</b>	<ul style="list-style-type: none"> <li>• contract enforcement costs</li> <li>• monitoring costs</li> </ul>	<ul style="list-style-type: none"> <li>• moral hazard</li> </ul>

of GDP in 2015. Despite the huge increase in revenues, however, financial intermediaries have not become more efficient. In the same paper, Philippon demonstrates that the cost of financial intermediation has remained relatively constant over the past 130 years at about 2%. Part of the reason is that over the past century, information gathering and processing have not typically been subject to economies of scale.

However, over the past decade, as the previous paragraphs have made clear, there has been a wave of technological innovation that has the potential to increase economies of scale and reduce the costs associated with the accumulation and processing of information. These innovations are shrinking the traditional financial industry, shifting the layers within it and leading to the formation of new models of intermediation. As a result, transactions in financial markets are in practice implemented through:

- *banking model*, also known as traditional banking intermediation and *originate-and-hold business model*;
- *a market model* based on non-bank intermediaries - broker-dealer firms and the asset management industry;
- *a re-intermediated model* where fintechs compete with traditional financial intermediaries;
- *a completely disrupted model supported by blockchain and smart contracts.*

Table 6 summarises the approaches used in different models of financial intermediation to minimise market frictions.

Historically, the level of transaction costs and information asymmetries is highest in the banking model, which explains the low trust between savers and borrowers. A number of theoretical concepts have been developed in the specialized literature to clarify how banks minimize market frictions to tolerable levels and, as a result, make it possible for financial markets to function. The most important of these are the theories of: *economies of scale and specialization* (Gurley and Shaw, 1960), *market signaling* (Leland and Pyle, 1977), *credit rationing* (Stiglitz and Weiss, 1981) *delegated monitoring* (Diamond, 1984), and *corporate-customer tying* (Davis and Mayer, 1991). They also explain the higher trust in banks by customers, which armed them with a great deal of power.

New technologies from the FinTech 2.0 phase are enabling a new approach to minimizing market frictions - through the development of financial infrastructure

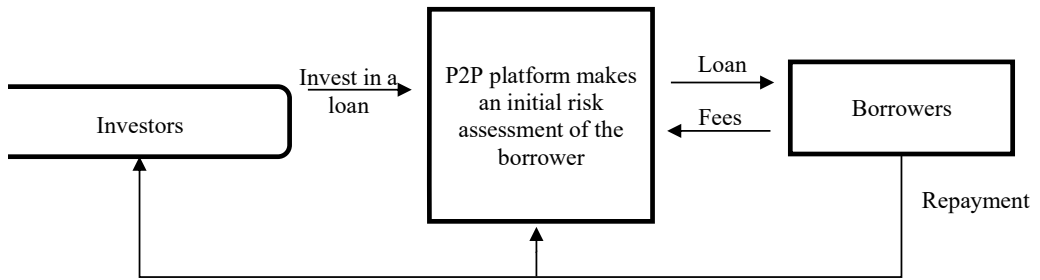
**Table 6.** Financial intermediation models

Models of financial intermediation	Approaches to minimize market frictions	Information	Trust
1. Banking model	Economies of scale and specialisation; Signalling; Credit rationing; Delegated monitoring; Bundling.	Private by nature	Low (between savers and borrowers); higher to the banks - they make the investment decisions.
2. Market model	Development of transactional and information financial infrastructure. Greater transparency of borrowers (corporate issuers).	The role of private information is decreasing and the importance of public information is increasing	Medium - investment decisions are made by savers (often with the advice of trusted brokers) or by institutional investors.
3. Reintermediation model (Fintechs)	Through new IT developments - big data (financial and non-financial), social media, cloud computing, artificial intelligence.	Non-financial information (more public) is added to financial information	Higher - investment decisions are made by savers.
4. Discontinuous model - no financial intermediaries	Blockchain, Smart contracts	Public information	Highest (among savers and borrowers) - technological confidence.

components<sup>4</sup>. They lead to a reduction in the importance of private information and an increase in the transparency of financial markets. On the one hand, this reduces the power and credibility of banks and, on the other, stimulates the development of securitisation and increases the role of broker-dealer firms and the asset management industry. It is important to underline that a number of banks (mainly large ones) are transforming their business model from *originate-and-hold* to *originate-and-distribute*. In doing so, they are starting to look more like broker-dealers and portfolio managers, moving significantly away from the traditional banking business.

The new reality formed after the global financial crisis by fintech 3.0 favours the development of the reintermediation model of intermediation. As shown in Table 6, fintech companies are at the core of this model. Fintech companies are re-intermediating, i.e. shrinking traditional intermediation by creating and maintaining platforms (such as P2P) to connect savers and borrowers (see Figure 5). They are making very clever use of modern technology, forming a new business model of intermediation based on big data (financial and non-financial), cloud computing, machine learning and artificial intelligence.

<sup>4</sup> The role of financial infrastructure should be associated with reducing market frictions - transaction costs and information asymmetries. Hence, the components of financial infrastructure can be divided into two groups: transaction infrastructure and information infrastructure. Accordingly, the institutions comprising the information infrastructure include: accounting systems and standards, credit registers and rating agencies, whose main objective is to increase the level of financial transparency. On the other hand, the institutional components of the transactional infrastructure are represented by trading, payment and clearing systems, a legal system providing protection for creditors and shareholders, and a regulatory system and mechanisms. See: Georgiev, Valkanov (2014: 75-84).



**Figure 5.** Reintermediation model

Source: Thakor (2019:4)

How can the rising market shares of fintech companies in the years following the global financial crisis be explained from a theoretical perspective? The spread of the internet and advances in computing technology have led to a huge increase in the availability and access to data, often at negligible cost. At issue is the emergence of vast *non-financial data* related to consumer choices and preferences, such as browsing history and online shopping behaviour of individuals or customer ratings from online providers. The scale of this new data enables the use of analytical tools such as cloud computing, machine learning and artificial intelligence to assess counterparty quality and make financial decisions. Using these innovations alongside other technological advances results in: lower costs of searching for matching parties to transactions; achieving economies of scale in collecting and processing large data sets; achieving cheaper and more secure transmission of information; and reducing verification costs (Thakor 2019: 2). Fintechs thus minimize market frictions and offer financial services at lower prices and to a larger mass of consumers.

It is undeniable that the use of non-financial data has a significant effect on the provision of financial services. Traditionally, banks have relied on financial information

about customers from monitoring their cash flows and analysing their financial statements. On the other hand, fintech firms collect vast amounts of non-financial data through e-commerce platforms, social networks and online search. We can assume that such non-financial data is valuable in financial decision making. Information in the form of a so-called ‘digital footprint’ (from an ISP, mobile operator, operating system, etc.) can be used to assess risk for a wide range of borrowers. Fintechs are thus influencing the tendency for banks to lose their comparative advantage as they have less access to unique information about subjects seeking credit.

Moreover, the complementarity between financial and non-financial data (combining traditional credit scores and digital footprint) increases the potential for improving the accuracy of credit default forecasts. As highlighted by Boot et. al. al. (2020), incorporating non-financial data leads to a significant increase in the efficiency of financial intermediation. This is because fintech firms are able to focus very narrowly on solutions related to specific customer needs, i.e., they facilitate the ‘customization’ of financial services. Mobile phones and smartphones have characteristics of ‘personalisation’ tools and FinTech makes it possible to analyse individual customers

using big data. By combining such new tools with analytics methodology, FinTechs can make it easier for the industry to deliver more personalised services and ultimately offer a better *customer experience*.

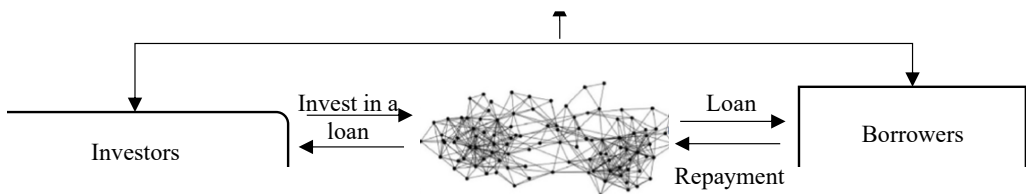
Another possible explanation is provided by Merton and Bodie's *functional theory*, through which the authors propose an analysis of financial intermediation in functional terms (Merton and Bodie, 1995). An argument in favour of focusing on the functional rather than the institutional aspect is the fact that over long periods of time functions are much more stable than institutions. The thesis of the authors cited is that institutions come and go, evolve and change, but functional needs persist, although they are combined and delivered in different ways.

Furthermore, the performance of each function changes over time as, improvements in technology, competition and product innovation enable efficiency gains. Thus, as functions are performed more efficiently, institutions adapt to change. In short, *institutional form follows functional efficiency*. Historically, this is why money market mutual funds (MMMFs) successfully competed with banks in the 1980s and 1990s and alternative trading systems (ECNs in the US and MTFs in the EU) with traditional stock exchanges. In the same way, fintechs are more efficient than traditional financial intermediaries. As is

well known from practice, they are cheaper for investors, bring them higher returns and, moreover, transactions are concluded and implemented with greater speed. An important factor in this, according to Stulz (2019: 12), is the fact that digital technologies have huge built-in economies of scale. With digital technology, the marginal cost of one more customer is usually trivial.

At the same time, it should be noted that blockchain-based fintech solutions are at the heart of the *completely* disintermediated *model*. Blockchain technology enables the emergence of 'smart contracts'. These are based on decentralised consensus as well as tamper-proof algorithmic executions. Smart contracts can allow entities that do not trust each other to collaborate without having to go through a neutral intermediary institution. In other words, the smart contract replaces the need for a trusted intermediary such as a bank to bring the contracting parties together. It is thus fundamentally a 'technological solution' for creating *trust* (Thakor 2019: 11). Arguably, this minimises *moral hazard* to the greatest extent and explains precisely why it eliminates the need for intermediaries as shown in Figure 6.

The potential of smart contracts to improve efficiency and reduce contracting and verification costs is significant. The OECD describes this phenomenon as follows:



**Figure 6: Fully discontinuous model**

Source: adapted from Cai (2018)

*„Trustless transfer technology is very interesting, and it is quite possible (or even likely) that it will become a disruptive technology for many FIs in the future. The idea of eliminating the trusted third party in finance is revolutionary - the world of finance has never encountered such a technological innovation that calls into question the need for intermediaries and the huge share of profits in the economy that are suited to them in this role.“*

This, perhaps, brings the world closer to the so-called *ideal markets* described by Nobel laureates K. Arrow and G. Debreu, where on the one hand no intermediaries are needed and on the other hand regulation and supervision.

### Conclusion

The study shows that the fintech industry has the potential to significantly change the structure of financial intermediation. The use of new technologies (big data, artificial intelligence, cloud computing, blockchain, smart contracts) is putting significant pressure on traditional financial intermediaries (banks) to change their business models and/or seek collaboration with innovative firms. Furthermore, fintech companies:

- Increase competition and improve the efficiency of financial services offered.
- Increase the sources of finance for the real economy.
- They contribute to the democratisation of finance by providing access to financial services to customers who are shunned by traditional financial institutions (banks).
- They have the potential to improve the stability of the financial system by (i) better diversifying risks away from systemically important financial institutions (SIFIs); (ii) reducing leverage.

But fintech companies are not competitors to banks in the full sense of the word because they are too small - their share of the global financial market is still insignificant, despite their significant growth in recent years. Moreover, they are not able to fully replicate the banking business (as opposed to the other way around). In general, traditional financial institutions (banks) and new fintech companies are doomed not so much to compete as to cooperate. In particular, banks need new technology and fintech companies need investment. Such a practice has long existed in the Japanese economy, characterised by the phrase *„kyoryoki shi nagara kyosa“*, meaning *„to cooperate while competing“*.

From a conceptual point of view, the development and growth of the fintech sector can be explained by new high-tech approaches to minimize frictions in financial markets. Analysis of practice shows that transaction costs are substantially reduced by realising economies of scale in the accumulation and processing of information. Moreover, adding non-financial to financial data and analysing it through artificial intelligence, machine learning and cloud computing leads to lower information asymmetry and more accurate valuation of market counterparties.

The ongoing transition to a technology-based financial system is changing the structure and role not only of intermediaries but also of regulatory and supervisory agencies. Today, they face a number of challenges that can be highlighted as issues (problems) for future research:

- How should the framework of financial regulation (in particular in the EU and Bulgaria) be changed to provide more support to the fintech industry and hence,

to a more diversified structure of financial intermediation?

- New technologies are making financial services more accessible to the general public. But on the other hand, the number of financial instruments and their complexity are increasing. New risks are created, including new forms of financial fraud. All this requires a correspondingly high-tech approach to the regulation and supervision of the fintech industry.
- Regulators and supervisors obtain information from the balance sheets of financial institutions. Many regulatory frameworks such as capital and liquidity requirements, leverage ratios, etc. impose limits on balance sheet exposures in order to achieve and maintain financial stability. For non-bank fintech (P2P) firms, it is difficult to obtain sufficient information on financial intermediation from their balance sheets. This means that financial authorities have to consider how they can obtain the necessary information in order to maintain financial stability, i.e. this is a major challenge as it is very difficult (if not impossible) to regulate something that is invisible.

## References

Arner, D, Barberis, J. and Buckley, R. (2015). The evolution of fintech: a new post-crisis paradigm? University of Hong Kong Faculty of Law Research Papers, 2015/047, October.

Arner, D, Barberis, J. (2016). 150 Years of FinTech: An Evolutionary Analysis. *JASSA The Finsia Journal of Applied Finance*, Issue 3.

Arrow, K., and Debreu, G. (1954). Existence of Equilibrium for a Competitive Economy. *Econometrica* 22, pp. 265-290.

Bank for International Settlements (2018). Sound Practices: Implications of Fintech Developments for Banks and Bank Supervisors. Basel Committee on Banking Supervision, February 2018.

Belleflamme, P., Lambert, T., Schwienbacher, A. (2014). Crowdfunding: Tapping the Right Crowd. *Journal of Business Venturing*, 29(5), pp. 585-609.

Boot, A., Hoffmann, P., Laeven, L., Ratnovski, L. (2020). Financial intermediation and technology: What's old, what's new? *ECB Working Paper Series* No. 2438.

Boyd J., Gertler, M. (1994). Are banks dead? Or are the reports greatly exaggerated? *Quarterly Review*, Federal Reserve Bank of Minneapolis, vol. 18, pp. 2-23.

Cai, C. W. (2018). Disruption of financial intermediation by FinTech: a review on crowdfunding and blockchain. *Accounting & Finance*, Accounting and Finance Association of Australia and New Zealand.

Cambridge Centre for Alternative Finance (2019). *Shifting Paradigms. The 4th European Alternative Finance Benchmarking Report*. University of Cambridge.

Cambridge Centre for Alternative Finance (2021). *The 2<sup>nd</sup> Global Alternative Finance Market Benchmarking Report*. University of Cambridge.

Cambridge Centre for Alternative Finance, World Bank and World Economic Forum (2022). *The Global Covid-19 Fintech Market Impact and Industry Resilience Report*. University of Cambridge, World Bank Group and the World Economic Forum.

Cecchetti, St. (1999). The Future of Financial Intermediation and Regulation: An Overview. Federal Reserve Bank of New York, Current



## Articles

- Issues in Economics and Finance, Vol. 5, No. 8.
- Cornelli, G., Frost, J., Gambacorta, L., Rau, R., Wardrop, R., and Ziegler, T. (2021). Fintech and bigtech credit: a new database. BIS Working Papers No 887.
- Crouhy, M., Galai, D., and Wiener, Z. (2021). The Impact of Fintech on Financial Intermediation: A Functional Approach. *The Journal of FinTech*, Vol. 1, No. 1.
- Davis, E., and Mayer, C. (1991). Corporate Finance in the Euromarkets and the Economics of Intermediation. *Bank of England Discussion Paper*, Technical Series, No. 45.
- de Cos, P. H. (2019). Financial technology: the 150-year revolution. Keynote speech at the 22<sup>nd</sup> Euro Finance Week, Frankfurt.
- Demertzis, M., Merler, S., and Wolff, G. (2017). Capital Markets Union and the fintech opportunity. *Policy Contribution Issue No. 22*, Bruegel.
- Dermine, J. (2017). Digital Disruption and Bank Lending. *European Economy*, No. 2, pp. 63-76.
- Diamond, D. (1984). Financial intermediation and delegated monitoring. *Review of Economic Studies* 51, pp. 393-414.
- Dzhaparov, P. (2020). Application of blockchain and artificial intelligence in bank risk management. *Economics and Management*, Vol. XVII, Issue 1, pp. 43-57.
- Eickhoff, M., Muntermann, J., Weinrich, T. (2017). What do FinTechs actually do? A Taxonomy of FinTech Business Models. International Conference on Information Systems.
- Epping, R. (2021). *THE NEW WORLD ECONOMY: A Beginner's Guide*. Sofia: Knigomania. (in Bulgarian)
- Financial Stability Board (2017). Financial Stability Implications from FinTech: Supervisory and Regulatory Issues that Merit Authorities Attention.
- Financial Stability Board (2019). FinTech and market structure in financial services: Market developments and potential financial stability implications.
- Financial Stability Board (2021). Global Monitoring Report on Non-Bank Financial Intermediation.
- Frost, J. (2020). The economic forces driving fintech adoption across countries. *BIS Working Papers*, No. 838.
- Fukuyama, Fr. (1997). *Trust*. Sofia: RIVA. (in Bulgarian)
- Georgiev, L., Valkanov, N. (2014). *Financial intermediation*. Varna: Steno. (in Bulgarian)
- Georgiev, L. (2019). Alternative Trading Systems, Stock Exchanges and Modern Capital Market Structure. Twelfth scientific and applied conference with international participation „Investments in the future“, Varna, pp. 55-63. (in Bulgarian)
- Gurley, J., and Shaw, E. (1960). *Money in the Theory of Finance*. Washington: Brookings Institution.
- International Monetary Fund (2022). Global Financial Stability Report - Shockwaves from the War in Ukraine: Testing the Financial System's Resilience. Washington, DC, April.
- Kaja, F., Martino, E., and Paccès, A. (2020). FinTech and The Law & Economics of Disintermediation. Working Paper No. 540, ECGI Working Paper Series in Law.
- KPMG (2017). Value of Fintech. ([www.kpmg.co.uk/ValueOfFintech](http://www.kpmg.co.uk/ValueOfFintech))
- Leland, H., and Pyle, D. (1977). Informational asymmetries, financial structure and financial

- intermediation. *the Journal of Finance* 32, pp. 371-387.
- Merton, R. (2018). Solving Global Challenges Using Finance Science: Past and Future. The *China International Conference in Finance*, Tianjin, China, July 11.
- Merton, R. C., Bodie, Z. (1995). A conceptual framework for analyzing the financial environment. In: "*The Global financial System - A Functional Perspective*", Harvard Business School Press.
- Nakaso, H. (2016). FinTech - Its Impacts on Finance, Economies and Central Banking. Bank of Japan.
- Philippon, T. (2015). Has the US finance industry become less efficient? On the theory and measurement of financial intermediation. *American Economic Review* 105, 1408-1438.
- Philippon, T. (2017). The FinTech Opportunity. *BIS Working Papers*, No. 655.
- Puschmann, T. (2017). Banking without banks: will technology transform financial intermediation? Oesterreichische Nationalbank, Economics Conference.
- Statista (2021). Total assets of banks worldwide from 2002 to 2020. <https://www.statista.com/statistics/421215/banks-assets-globally/>.
- Shevlin, R. (2022). Bank-Fintech Partnerships Are Under Performing: What's Going Wrong? *Forbes*, Jan19, 2022.
- Stiglitz, J., and Weiss, A. (1981). Credit rationing in markets with imperfect information. *American Economic Review* 71, pp. 393-410.
- Stulz, R. (2019). Fintech, Bigtech, and the Future of Banks. NBER Working Paper Series, WP 26312.
- Suprin, A., Petrishina, T., and Vasylychuk, I. (2020). Competition and cooperation between fintech companies and traditional financial institutions. E3S Web of Conferences 166, 13028, <https://doi.org/10.1051/e3sconf/202016613028> ICSF 2020
- Thakor, A. V. (2019). Fintech and banking. *Journal of Financial Intermediation* (August 2019).
- Vachkov, S., Valkanov, N. (2021). Regulation, Competition and Partnership in the Financial Sector. *Izvestiya Journal of Varna University of Economics*, 65 (3), pp. 259-276.
- Vijayan, G. (2018). Death of the banking industry worldwide. *Medium*, 13 August.
- Vives, X. (2017). The Impact of Fintech on Banking. *European Economy* No 2, pp. 97-105.
- Welltrado (2018). Global Blockchain-Backed Loans Marketplace ICO. White Paper.
- World Bank Group (2022). Fintech and the Future of Finance Overview Paper. World Bank Publications, Washington DC.
- ZIGURAT: Innovation & Technology Business School (2022). Evolution of Fintech: The 5 Key Eras. (<https://www.e-zigurat.com/innovation-school/blog/evolution-of-fintech/>).