The Impact of the Fintech Phenomenon – Radical Change Occurs in the Financial Sector?*

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As a result of technological progress, the spread of the Internet and digitalisation, several sectors of the economy have undergone a major transformation. This study focuses on the changes in the financial sector. It presents the new players that emerge, i.e. the increasing prominence of the so-called fintech solutions, which is supported by the demand from consumers and the supply side as well, and it also describes the new solutions and introduce some successful examples of fintech services in payment and lending. Although the new players and solutions have introduced several innovations to the market, often making the use of financial products and services easier, more efficient or providing a more widespread access to them, they entail many potential dangers. We believe that fintech firms are not yet likely to trigger radical changes in financial intermediation.

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1. Introduction

In recent years, substantial changes have occurred in several sectors of the economy, primarily due to the lower barriers to entry thanks to the Internet and digital technologies, the reduction in the costs of starting and operating a business with digital business models and the transformation of consumer habits. From booking accommodation through the advertisement market to the music industry a paradigm shift could be observed, and earlier business models were often replaced by new, digital models. One might ask whether the financial sector is also experiencing such a shift.

One of the most remarkable phenomena in the financial sector is undoubtedly the increasing prominence of the so-called fintech players that emerge in drastic numbers and that marketise technological solutions. The term "fintech" was first

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used in the name of one of Citigroup's projects – a predecessor to today's Citigroup – attempted to improve its image by initiating a technological cooperation with players outside the industry. In 1993, company leaders said that "times have changed, cooperation is necessary for common industry standards".

In the more than 20 years since then, the number of the new fintech players has increased drastically. This is attributable to technological innovations, and on the other hand to the low interest rate environment following the 2008 financial crisis, the tightened banking regulation and the new services that appeared due to the dented confidence in the banking sector. Fintech solutions are a blend of financial products and services (finance) and technology, i.e. they include the various digital services that emerged on the financial market and the business models based on technological development. The increased focus on the fintech sector is a global phenomenon: the mass emergence of new, non-bank players and start-ups can be observed on both developed and developing markets. Services offering fintech solutions have appeared in several banking segments, and especially frequently in payment and lending.

The question inevitably arises as to what changes the new players bring to the market. As Jamie Dimon, the CEO of J.P. Morgan, one of the largest investment banks of the world, wrote in his annual letter to shareholders in 2015, *"Silicon Valley is coming. There are hundreds of startups with a lot of brains and money working on various alternatives to traditional banking"* (*Dimon 2015*). Others are more sceptical about the developments introduced by the new players. *"There has been little financial innovation since grain futures contracts were struck several thousand years ago in the Indus Valley. Most of what passes for innovation is just a new way of doing the very old thing of adding more debt and less down payment, reserve or equity to traditional borrowing or lending contracts,"* claims *Avinash Persaud* (*2015*), a professor at Gresham College and an expert at the Peterson Institute.

This study seeks to ascertain what innovations and fintech solutions resulted from the changes in the different areas of the financial sector and whether these innovations are merely supplementary players in the financial sector at their present state of development or whether they will fundamentally overhaul it. After reviewing the changes in the individual areas of the financial market in the recent period, we argue that although several new solutions and players have appeared, *technological progress does not automatically lead to a decline in banks' significance or loss of market share*. Even though banks keep their branches on the market for financial services, they increasingly adapt to the opportunities offered by digital technology: they strive to provide user experience services, boost their competitiveness and in parallel with that they spend huge amounts on IT developments to provide digital services and mobile banking to their clients and to satisfy other special needs.

2. The increasing prominence of the fintech sector

Only the future will decide whether the spread of fintech aided by the waves of radical technological progress will be successful; however, we should also analyse the past data about this phenomenon. Perhaps one of the main indicators of the spread of the fintech sector[1] is the amount of investments in the segment, in which we can observe a radical jump: while in 2008 a total of USD 1.2 billion was invested in fintech innovations globally, by 2015 this had risen to 22.3 billion (*Table 1*). Another indicator is the number of players. It is difficult to estimate the number of non-bank fintech players, but according to the CrunchBase start-up database, more than 20,000 non-bank start-ups operate in the financial and payment sector globally (*Crunchbase 2016*).

Table 1
Venture capital invested in fintech companies in 2008–2015
(USD billion)

	2008	2009	2010	2011	2012	2013	2014	2015
Investment (USD billion)	1.2	1.7	1.8	2.5	3.2	4.6	12.7	22.3

Source: Based on data from KPMG (2016).

What caused the spread of fintech companies and solutions, and the substantial growth of the sector in the recent period? The emergence of new, non-bank players and ideas and the increasing interest of investors were influenced by several factors from both the demand and the supply side. Such factors include the changing consumer habits, revolutionary innovations, the continuous technological progress and the macroeconomic and regulatory environment. This list could be expanded; however, below we will briefly explain why we considered precisely these important.

2.1. Changing consumer habits

With the development of information technology and the increasing penetration of the Internet and mobile phones, the consumer habits of the population and companies have been substantially transformed, not only in everyday life but also in how banking is conducted. Generations with a different socialisation have emerged as consumers of financial services. They are often referred to as the mobile-only or digitally literate generation or Generation Y. Today this age group is the largest consumer segment in the US economy. According to a survey, 88 per cent of

[1] The study does not cover the geographical distribution of fintechs. The analysis of the initiatives and practices of certain megapolises (New York, London, Tel Aviv) and city states (Singapore) in this field calls for a separate essay. Unfortunately, the presentation of the Hungarian fintech culture is also beyond the scope of this work, despite the fact that interesting developments could and can be observed in Hungary, too. For those interested in Hungarian fintechs, the articles by Ádám Turzó on the portfolio.hu specialised website, "HunFintech25" published by T-System Magyarország Zrt. in 2016 and the analyses by Corvinus Fintech Center may prove useful reading.

Generation Y use the Internet for banking, and almost three-quarters of them (73 per cent) are more interested in the new financial services of technology companies than the financial services of their own banks (*Scratch 2014*).[2]

In parallel with this, confidence in financial institutions was seriously undermined all over the world in the wake of the 2008 financial crisis. Several studies have pointed out that in parallel with the loss of confidence in financial institutions on the part of European and American consumers, confidence in the financial services of technological institutions has increased substantially (*Crabtree 2013*; *Fujitsu 2016*). Discontent with traditional service providers bolsters the acceptance of fintech innovations. This attitude is especially strong among the young.

2.2. Technological progress

Moore's law describes the increasing pace of technological progress with an exponential growth path. The dynamic nature of the changes is clearly shown by the development of computing capacities. If we compare the first mainframe computer[3] with a modern smartphone, as János Kornai did, we can see a huge difference. The "ancient" machine filled a whole room, while the smartphone fits in our pocket. The old computer had an exorbitant price tag, at USD 11 million at 2003 prices, while today's smartphones sell for around USD 400 at 2003 prices, i.e. at less than 0.004 per cent of the old price. Meanwhile performance has soared remarkably: processor speed has increased 73,000-fold, while memory capacity has grown 120,000-fold (*Kornai 2015*; *Kornai 2016*).

According to the managing director of the Monetary Authority of Singapore, "the smartphone is becoming our bank. People can consume financial services on the go" (*Menon 2016*). According to the data from the International Telecommunication Union, a specialised agency of the United Nations, over 7 billion mobile subscriptions and more than 3 billion private Internet users were recorded globally in 2015. In the ten years between 2005 and 2015, the number of mobile subscriptions per 100 people increased almost 3-fold, while the number of Internet users grew more than 2.5-fold (*ITU 2016*).

Banking on the mobile phone is much more widespread among the young, which may also be interesting from a demand perspective. Based on a survey conducted annually, more than two-thirds of 18–29-year-olds used their mobile phone for managing their finances in 2015, while this proportion was only 45 per cent in 2011. The relevant detailed data from the survey can be found in *Table 2*.

[2] Another interesting result of the survey is that 71 per cent of the respondents would turn to their dentist, rather than their bank, for financial advice (*Scratch 2014*).
[3] IBM 7094, used in 1967.

Table 2
Share of those using mobile banking and the number of respondents for the given year within the indicated age group
(%, 2011–2015)

Age group	2011	2012	2013	2014	2015
18–29	45	54	63	60	67
30–44	29	37	43	54	58
45–59	12	21	25	32	34
60+	5	10	9	13	18
Total	22	29	33	39	43
Number of respondents	1,859	2,180	2,187	2,437	2,151

Source: Fed (2016:8).

According to the *IMF* (*2016*), there are substantial differences between the countries that recently joined the European Union: in the Czech Republic, those aged over 15 used their mobile phone for paying bills 9 times in a year. This number was below 1 in Bulgaria, while the members of this age group in Hungary and Poland paid bills through their mobile devices 2 times on average, and those in Slovakia paid 3.5 times on average.

The spread of digital payments is promoted by the technological development of digital identification (biometric sensors). Perhaps we should briefly mention the technological progress in machine learning, artificial intelligence and big data, which all open up new horizons for the development of fintechs. Technological progress may not only be software-based, it is also determined by hardware and the devices. Due to its economies of scale and simplicity, cloud-based technology has accelerated the spread of new solutions.

2.3. Revolutionary innovation

Revolutionary (radical) innovation differs from technological progress in that it is able to disrupt market conditions to the core and to an unprecedented extent. In the case of financial technology, something that is called distributed ledger technology (DLT) can lead to an explosion of fintechs. The distributed ledger technology enables real-time transactions and control without involving a central ledger or an authority. The distributed ledger technology is able to execute a large number of transactions rapidly, therefore it has become an obvious area of use for payment clearing and settlement. This technology has a vast potential, offering opportunities through the reduction of the transaction and operating costs of payments and especially cross-border money transfers. According to the estimate published by the European Parliament, it may potentially reduce aggregate transaction costs globally by as much as EUR 20 billion (*EP 2016*).

The blockchain is a distributed, decentralised database, which may be conceived as a huge global spreadsheet that is shared on millions of computers at the same time. It is open-source, i.e. anyone can change the background codes, and anyone can see the exact processes that take place. This is completely interpersonal, and there is no need for intermediaries who would authorise and execute the transactions (*Tapscott – Tapscott 2016*). In essence, all users store and access the continuously growing database of transactions, while there is no need for a central unit or records. However, interbank transactions – whether concerning money, securities or syndicated loans – are typically executed by a third party, i.e. for example clearing houses, central authorities, transfer systems or depositories.

The blockchain technology was first used for recording transactions in the so-called bitcoin virtual currency.[4] Although the blockchain can be considered the main technological innovation of bitcoin, since it is intended for the verification of financial transactions in the network, it can be used for other purposes as well. This model represents a radical shift from the currently functioning technology, in which participants send the transaction data to clearing houses and companies that then compare them. These clearing centres have several disadvantages: first, they charge money for their work and second, they are slow compared to the distributed ledger technology. Furthermore, the new method is safer, as it is not enough to take action in the system at one special target for modifying the ledger, all ledgers have to be changed at the same time. This is because due to its decentralised nature, this accounting technology enables the creation of payment systems that are reliable from a systemic risk perspective and resilient to the potential problems and defaults in the network.

One analyst of the European Central Bank (*Löber 2016*) describes three possible scenarios: (1) clusters will form among the current players, (2) the structure stays the same; however, the place of some players will be uncertain or (3) the role of several intermediaries (e.g. clearing houses) becomes superfluous. The so-called "smart contracts" are also based on blockchain and they enter into force when the conditions of the contract are satisfied, for example a purchase transaction happens immediately if the buyer transfers the money to the seller.

2.4. Macroeconomic and regulatory environment

In addition to keeping an eye on their inflation targets, central banks support the growth and employment of national economies and maintain financial stability. As a result of the international financial crisis, monetary policy has become increasingly active, as interest rates were cut and quantitative easing measures were introduced. It is worth briefly touching upon the extent of the changes in European regulations on lending. The question arises whether non-bank players will be more

[4] For more details on the role of virtual currencies in the circulation of money, see *Chapter 3.1*.

reliable lenders than banks, merely due to the better application of the big data phenomenon. Do banks' special position (their regulated and supervised nature) provide protection against their challengers from outside the sector (i.e. does it actually inhibit entry to the market) or is it merely a disadvantage entailing costs?

Banks are asset-transforming institutions: they perform denomination, maturity, currency and interest rate transformation, all while being the debtors to all depositors and the lenders to all debtors. However, this "central counterparty" position entails fairly considerable risk costs and it is highly capital intensive. Banks need to comply with strict quantitative and qualitative liquidity and prudential (Basel III), consumer protection and solvency (Solvency II in the case of insurers) requirements. The aim of these rules is to protect the financial intermediary system from systemic meltdowns and to shield consumers from potential idiosyncratic defaults and consumer protection risks. Although the strict and risk-averse regulation has resulted in a more stable financial system, in several countries, especially in the European financial sector, it has become difficult to finance and support (often risky) innovations and initiatives (*Zilgalvis 2014*). This has contributed to the fact that the innovations influencing the sector increasingly come from market participants not subject to the regulation, i.e. from start-ups and large enterprises engaged in other industries. However, this does not only pose a challenge to banks but also to the people creating the rules, who need to keep up with new technologies and continuously expand the rules to cover the new players.

We also have to mention that these developments are typical not only in the banking sector but also in the insurance sector: some fintech solutions have appeared there that can be monitored and referred to as insurtech.

3. The radical nature of the innovations brought about by the fintech sector

The emergence of digital solutions and fintech players had different effects on the financial intermediary sector. Most new players first appeared in the areas of less knowledge-intensive and standardised services with lower barriers to entry. Among these, the field of payment and lending deserves a special mention. In this area, non-bank players have appeared in large numbers in both developed and developing countries. In this chapter, we will present the changes in these two fields. Our analysis is not constrained to individual geographical locations, since that is a less and less fundamental factor owing to the digital nature of the services.

3.1. Fintechs in the payment sector

The factors described in the previous chapter have contributed enormously to the emergence and spread of fintech companies in many fields of finance. This is especially true of the payment sector, where we have seen the emergence of several

new players and solutions with respect to the means of payment, retail payment solutions and payment systems in recent years.

The most prominent innovations in the field of the means of payment in recent years are the virtual currencies (e.g. the bitcoin virtual currency based on the blockchain technology presented in *Subchapter 2.3*), the common characteristic of which is that they handle payments without the intervention of any intermediaries. Opinions on the significance of virtual currencies have varied, both the market and regulation regard it as a double-edged sword. Yet one recent Bank of England study points out the positive impact of the digital means of payment. According to the analysis by the central bank, a virtual currency issued by the central bank[5] would not only have a beneficial effect on the country's GDP by reducing monetary transaction costs and the distorting impact of taxes, the currency could also serve as an important monetary policy instrument due to its countercyclical nature (*Barrdear – Kumhof 2016*). Nevertheless, we should not forget that the virtual currency outlined by the Bank of England and issued by the central bank is currently not available in practice. Until now, only private virtual currencies have come into circulation such as the above-mentioned bitcoin. Several regulatory bodies, including the Magyar Nemzeti Bank, have warned (*MNB 2015*) that bitcoin and the similar virtual instruments usable for payment entail many risks, since they do not have an official issuer and they are not subject to the supervision of the authorities or central bank of any country. Hence there are no appropriate responsibility, guarantee and liability rules, which would protect consumers' interests for example in the case of an abuse or account theft. "*We have to be aware of the fact that in the case of any dispute or the suspicion of abuse, consumers have nowhere to turn to have their complaints investigated or the potential damages determined. For example in the case of a bank card payment, the parties do not have to trust each other, only their own banks. If a problem arises, the two banks get in contact with each other through the card company, investigate the case, and pay damages to the client if the complaint is justified. With respect to bitcoin, central banks primarily have consumer protection tasks: they have to raise the attention of consumers to the area and extent of the risks that may affect bitcoin users*" (*Kajdi et al. 2017:6*).

Even if the virtual currency is not expected to be widespread, the underlying technology, i.e. the blockchain, has huge untapped potential for the payment system. Although the testing of the use of the blockchain in traditional payment fields is only in its early stages (*Buitenhek 2016*), today several fintech players offer services based on this technology, circumventing the intermediary system of banks. Among these, we should mention Ripple, which executes foreign transactions for

[5] In the scenario outlined based on the article, the central bank issues virtual currency to the tune of 30 per cent of GDP, against government securities. The 30 per cent assumption equals the extent of the quantitative easing measures performed by central banks in the past year (*Barrdear – Kumhof 2016*).

companies and the custody operations of corporate clients through a blockchain-based clearing system instead of the SWIFT network used by banks.

The emergence of the technology and the new, non-bank players brought about substantial changes in the field of alternative retail payment solutions as well. The hotbed of alternative payment solutions is emerging markets. In these countries, the spread of mobile usage and the large number of those without access to financial services were great catalysts in the spread of the various mobile-based payments and online remittances. One of the most successful examples is the M-Pesa mobile payment system launched in Kenya in 2007 (see the Box). M-Pesa is used by 17.6 million people, almost 40 per cent of the population, and the service executed transactions to the tune of USD 31 billion in 2016, which approximately equals half of Kenya's GDP (*Safaricom 2016*). In China, AliPay, the payment system of the Alibaba Holding, conducts 75 per cent of the total transaction volume of Chinese retail trade with 270 million active monthly users (*AGHL 2015*). The rapid technological adaptation of emerging markets provides a tremendous opportunity for fintech companies, since these countries transfer from using cash directly to mobile payment, leapfrogging payments by debit and credit cards. These solutions not only provide an opportunity to those forced out of the financial system for accessing basic financial services, but also mean a cheaper and swifter alternative alongside existing banking services. For example according to a World Bank estimate, the average cost of international payments executed by banks is 11.2 per cent of the amount sent, whereas online players offer this service to clients at an average cost of 5.57 per cent (*World Bank 2015*). Although alternative payment solutions produce several benefits to the population, this is, of course, not without risks. As the European Central Bank warned as early as in 2007, the greatest concern regarding players offering non-bank payment solutions is linked to information security and the protection of consumer data (*Weiner et al. 2007).* These cross-border payment innovations pose a challenge to authorities from a regulatory perspective as well, since it is not always obvious who is responsible for the prudential supervision of the fintechs providing non-bank payment solutions, and for enforcing clients' right to security and the obligations of the service provider (e.g. rules on indemnification and the provision of information to clients).

M-Pesa – A successful example in mobile payment

The M-Pesa mobile payment system was launched by Safaricom, Kenya's largest telephone company, in 2007. The payment system was originally set up for the repayment of microloans, but later, due to the success of the system, it was transformed into a general mobile payment system: today it can be used for, inter alia, depositing and withdrawing cash, transferring money to private individuals and companies, and paying utility bills, taxi fares or tuition fees. No interest is paid for the accounts held by M-Pesa. One of the keys to the service's success is the simple, cheap and user-friendly registration and usage. The use of the mobile payment system is subject to having a SIM card, therefore there is no need for the rigorous client identification required by banking regulation.

The most frequent regulatory concern in connection with mobile payment systems is the lack of consumer and deposit protection. Many solutions have been devised to address this. For example in the M-Pesa system, the accounts are not managed by Safaricom but a trust operated by Vodafone. The trust is completely independent from Safaricom, which cannot make any claim for the client accounts if it goes bankrupt. The funds on the client accounts managed by the trust are deposited on bank accounts; therefore, the accounts enjoy the protection of deposit insurance. The interest earned on the bank accounts is transferred to a charity fund, which is used to support local education, healthcare and environmental protection initiatives.

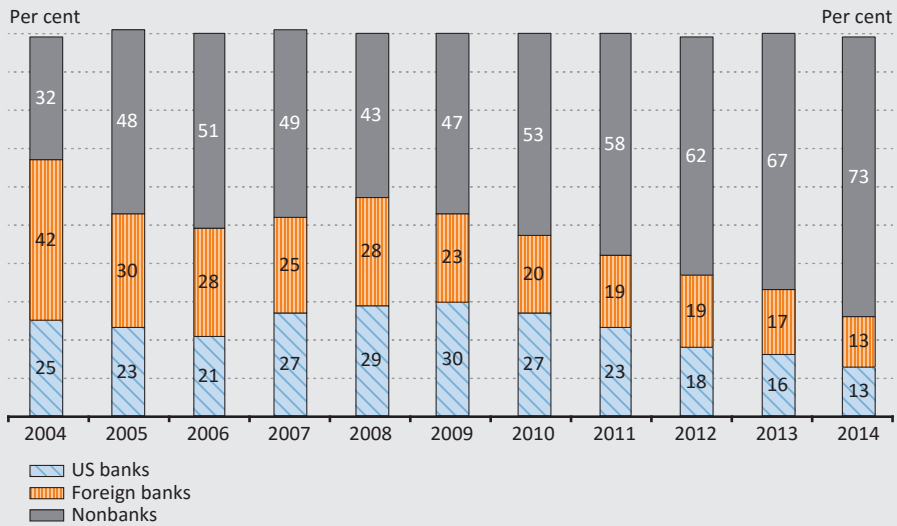
Owing to its cheap and user-friendly operation, the M-Pesa mobile payment system spreads fast in the world. In March 2014, it was introduced in Romania as well; therefore, now it can be used in Europe, as well.

3.2. Fintechs in lending

The technological advancements presented in *Subchapter 2.2* played a central role in the development of credit institution models. The reduction of costs due to digital operation and the use of online marketing provide an opportunity to alternative credit institutions for acquiring a growing market share in the lending business. Since the 2008 financial crisis, banks have had to substantially increase their Tier 1 capital adequacy ratio on account of the tightened rules,[6] so that the market can avoid the systemic meltdowns like the previous one.[7] As a result of the tightened rules, credit supply constraints have emerged on several markets and sectors (*Mills–McCarthy 2014*, *Spinassou 2013*). Taking advantage of the credit crunch, the alternative credit providers entered the market for riskier loans, extending personal, small business and student loans to clients who did not obtain funds from banks. *Figure 1* shows the share of non-banks in one market segment of the United States between 2004 and 2014.

[6] The Basel Committee issued the Basel III Accord in September 2010, which strengthened the system of banks' capital requirements with setting strict quantitative and qualitative requirements.
[7] According to European Central Bank data, European banks increased their Tier 1 capital adequacy ratios from 8.3 per cent to 14.6 per cent between 2008 and 2015 (*ECB 2016*).

Figure 1
Share of various market participants in risky loan instruments in the United States
(loans with a substandard, doubtful or at-loss rating)



Source: Nash-Beardsley (2015:40).

New entrants entered the competition with several new business models. Among these, online marketplace platform lending and crowdfunding have become the most widespread. Online marketplace lenders act as intermediaries between the party providing the loan and the one obtaining it. The segment has grown from peer-to-peer lending, where lenders provided an opportunity to private investors for extending funding to private borrowers and companies in exchange for a predetermined interest. With the development of the market and owing to the low interest rate environment, institutional investors also increasingly turned towards this market (*Kirby–Worner 2014*). With the appearance of institutional investors, the market has gradually lost its peer-to-peer character. Today most online marketplace lenders "slice up" the funding provided by investors, lending to borrowers with various risk ratings.

Lending Club, a marketplace lender

Nowadays, the largest online marketplace lender is Lending Club operating in the United States, which has granted loans of over USD 22 billion since its launch in 2011. Online marketplace lenders operate using various business models, one of the most widespread of which is the note-based model employed by Lending Club, in which credit applicants can register their credit needs and personal information on the Lending Club website. After this, Lending Club assesses the credit applicant's creditworthiness and determines the applicant's risk rating using its own credit rating system. Credit applicants are classified to groups from A to G based on the expected repayment risk, and the interest rate imposed is determined based on this. Then investors can choose which loan they wish to invest in, based on the information provided by the clients, and the size and risk rating of the loans. The interest payable by the credit applicant cannot be influenced by the investors; however, they can decide what portion of the loan they wish to finance (the minimum amount to be invested is USD 25). If the full amount of the loan is collected, a designated bank grants the loan and sells an external note to Lending Club at the amount of the loan. Then Lending Club sells on this note to the investor. The obligor of the note is the borrower, i.e. Lending Club does not take responsibility for repaying the loan. In the case of a potential default, the risk is borne by the investor, although Lending Club helps in the collection.

Lending Club and other similar online marketplace lenders compete with traditional banks in costs. Thanks to full-scale operation and the regulatory arbitrage resulting from indirect lending, they can operate with operating costs 300–400 basis points lower than traditional banks. Nonetheless, Lending Club, which is one of the largest and longest-established players on the market, has been in the red since its launch in 2011, which justifiably calls into question the sustainability of the business model (*Lending Club 2016*).

Similar to online marketplace platform lending, the goal of crowdfunding is to help individual lenders and borrowers meet online; however, borrowers tend to be newly created companies, sole proprietors or community/individual projects. Potential supporters may browse among the projects and may fund the projects that appeal to them. Thanks to today's digital technology, countless users, initiators and potential donators can cheaply and easily join these sites (*Kuti – Madarász 2014*). The most widespread forms of crowdfunding include the donation- or gift-based model and the equity model (*Belleflame – Lambert 2013*). Crowdfunding largely depends on the network effect created by social media, where contributors increase the chances of raising the total amount of the funding by sharing the campaign among their friends.

One feature of this segment is that both online marketplace lenders and loan brokers engaged in crowdfunding lend only indirectly: they act as intermediaries between those providing the loan and those obtaining it, but assume no direct credit risk. In addition, due to the indirect lending model, players are exempt from the numerous regulatory requirements pertaining to banks. This regulatory arbitrage entails several risks, which calls into question the sustainable and safe

functioning of the sector. Players grant loans under less regulated and controlled conditions, primarily to borrowers with a high risk rating.[8]

Although many people expect that traditional bank lending will lose ground on account of the spread of online lending solutions, we should not forget that the conflict between access to credit and the protection of borrowers cannot be resolved by the new players either. Even though the new players in lending represent an important source of finance in certain segments (for example in start-up financing), bank lending is not expected to come to an end. This is because the increasing popularity of alternative credit providers is not a result of a new, sustainable lending model but a business cycle, which is mainly supported by low interest rates, the loss of confidence in banks and the regulatory arbitrage.

3.3. Technology companies as fintechs

In the fintech sector, start-ups are not the only ones that have become more active. Several large, non-bank companies have recently started providing financial services. The most successful have been large technology companies. This is because they have several features that help them successfully overcome the barriers to entry to the banking market: they have an existing, large customer base, the appropriate IT infrastructure and a solid reputation. Technology companies principally offer payment services to their existing clients, but several of them take part in lending as well. The information pertaining to the companies that we considered relevant is summarised in *Table 3*.

[8] The information provided by borrowers is often not verified by the players extending the loan. For example Prosper, one of the largest actors on the market, verified borrowers' employment status and sources of income in the case of merely 59 per cent of the loans provided between 2009 and 2015.

Table 3
Financial services provided by technology companies

Company	Financial product and service	Launch date
Google	**Google Wallet** – mobile wallet and mobile payment solution for storing and using the virtual copy of users' existing bank cards, credit cards and loyalty cards. The services currently have about 16 million users, and it is only available in the United States.	2011
	Google Checkout – electronic wallet service that enables users to make payments to several online merchants after the registration of card payment information. The service has been unavailable since 2013.	2006
	Android Pay – mobile payment solution enabling tap & pay on mobile phones with a compatible Android operating system.	2015
Apple	**Apple Pay** – mobile wallet and mobile payment solution. It is currently available in 12 countries, and it is estimated that transactions worth USD 10.9 billion were conducted with this solution in 2015.	2014
	Apple ID – personal ID that, when linked to a bank card or other payment account, users can use for real-time payment without a card for purchasing content on the mobile phone.	2013
Amazon	**Amazon Payment** – electronic money institution and electronic wallet service that enables users to make payments to several online merchants after opening an electronic money account and registering their card payment information.	2013
	Amazon Wallet – mobile wallet and mobile payment solution for storing and using the virtual copy of users' existing bank cards, credit cards, loyalty cards and gift cards.	2014
	Amazon Loans – short-term current account loan service for retailers selling on Amazon's platform.	2012
	Amazon Local Register – mobile POS terminal service that enables merchants to accept cards over a smartphone or tablet.	2014
eBay	**Paydiant** – mobile wallet service that trading companies and other market participants give their own brand name to.	2010
	Braintree – payment and card acceptance service for merchants for online and mobile payment.	2007
	PayPal – electronic money institution that holds an account for its clients that can be topped up with a bank card payment, bank transfer or collection order from their retail or corporate bank account.	1998
	PayPal Credit – payment service through which merchants can provide trade credit to their customers. Loans are provided by Comenity Capital Bank.	2015
	Venmo – mobile wallet service that enables users to initiate transfers to each other on their mobile phones.	2009
Facebook	**Messenger Payments** – peer-to-peer, real-time, direct transfer service for the users of the chat service. It is currently only available in the United States.	2015
	E-money licence – Facebook has a licence to issue electronic money in Ireland, however, it does not offer other services to its clients yet.	2016
Samsung	**Samsung Pay** – mobile payment solution enabling tap & pay on compatible Samsung mobile phones.	2015

The main points of Chapters 2 and 3 are summarised in *Table 4*. The changes in digital technology should be examined taking into account several aspects, for which a matrix-like approach could be the most suitable. The first three rows in the table show the fintech companies, their advantages and disadvantages compared to banks in the payment sector, lending and the technology sector. The other rows illustrate the presence or absence of changed consumer habits, technological progress and revolutionary innovations in the above-mentioned dimensions.

Table 4
Summary of the advantages and disadvantages of fintech companies

		Fintechs in the payment sector	Fintechs in lending	Technology giant fintechs
Fintech companies		M-Pesa, AliPay, Apple Pay Ripple	Lending Club, Kickstarter, SoFi	Google Facebook Samsung
Advantages of fintechs compared to banks		managing bank accounts as an "infrastructure"; technology	lack of regulation	brand; confidence; capital
Disadvantages of fintechs compared to banks			circumvention of capital requirements is unsustainable	rules
Changing consumer habits	Emergence of a new generation		√	√
	Undermined confidence in banks	√	√	√
Technological progress	Spread of mobile phones	√	√	√
	Cloud-based storage	√	√	√
	Machine learning	√	√	√
	Artificial intelligence		√	√
	Big data			√
Revolutionary innovation	Distributed ledger technology (DLT) Blockchain	√	√	√
Macroeconomic environment	Monetary policy		√	√
	Regulatory arbitrage	√		√
	Prudential regulation	√	√	√

4. Conclusion

This study sought to establish the extent to which the traditional banking business models are influenced by technological progress and the spread of the Internet and digitalisation, and to what extent the increasing prominence of the fintech sector influences the individual areas of the banking sector.

We examined both the supply and the demand reasons and drivers. The combined effect of the changed consumer habits due to digital solutions, the new solutions that emerged on account of technological progress and the regulatory changes was that masses of new players appeared in the banking industry in recent years, offering some product or service to consumers that are normally provided by banks. The examination of the emergence of the new players and the changes on the financial market is important and timely from the perspective of both competition on the market and regulation.

This study analysed the changes in two areas, payment and lending. It presented the fintech solutions affecting and influencing these fields, the impact of the solutions on market developments as well as the main risks. The results of our research show that fintech solutions will influence the financial sector in various ways. In the area of payments, substantial changes have occurred as a result of technological advancement with respect to the means of payment, retail payments and payment systems, which primarily entailed a reduction in costs and the improvement of the quality of the service. In parallel with this, the new technologies (e.g. blockchain) paved the way for the emergence of several new payment services, circumventing the traditional intermediary system of banks. However, cross-border solutions not subject to banking regulation raise numerous prudential and information security issues, the examination of which is important and timely from a regulatory perspective.

Meanwhile in lending, online marketplace platform lending and crowdfunding have grown into new, popular sources of finance. These mainly indirect forms of financing have become widespread mainly in risky segments underserved by banks (such as small enterprise lending and student loans). Nevertheless, the study argues that the increasing popularity of alternative credit providers is not the result of a new, sustainable lending model but a business cycle, which is mainly supported by low interest rates, the loss of confidence in banks and the regulatory arbitrage.

The last part of the study briefly describes the financial services offered by large, non-bank companies. In parallel with the start-ups, several companies, mainly large technology enterprises, entered the market to provide financial services, utilising their relationship to clients and their existing technology infrastructure.

The study sought to establish the extent of the impact of the increasing prominence of the fintech sector on the individual areas of the banking business. However, this question points to several areas that require further examination. We believe that among these, the examination of the regulation of non-bank players and the impact of fintech solutions on banking models and banks' innovation capacity are important avenues for further research.

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