FINTECH AND DIGITALISATION REPORT

2020

APRIL

"It would appear that we have reached the limits
of what it is possible to achieve with computer technology,
although one should be careful with such statements,
as they tend to sound pretty silly in 5 years."

John von Neumann (1949)

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Without prejudice to its primary objective – to achieve and maintain price stability –, the Magyar Nemzeti Bank shall support the maintenance of the stability of the financial intermediary system, the enhancement of its resilience, its sustainable contribution to economic growth; furthermore, the MNB shall support the economic policy of the government using the instruments at its disposal.

A high level of digitization and financial innovation contributes to achieving these goals, therefore the MNB considers it especially important to develop the digitalisation of the financial system and support the market introduction of innovative financial services in a secure way.

The MNB favours a financial intermediary system that offers competitive and safe financial services to domestic consumers. To this end, the central bank is actively involved in developing an efficient incumbent segment that implements advanced technologies, a vibrant FinTech ecosystem, a supportive environment and a modern regulatory background, while maintaining market integrity.

The MNB's annual FinTech and Digitalisation Report seeks to provide insight into recent domestic and international developments in financial innovation, digitalisation and their underlying technologies, which are becoming increasingly dominant in the Hungarian financial markets. In this way, the MNB intends to contribute to strengthen the digitalisation level of the domestic financial system, to which it intends to provide active support.

The analyses in the Report was prepared under the direction of Anikó Szombati, Executive Director for Digitalization and FinTech development and Chief Digital Officer in the coordination of Digitalization Directorate. The Report was prepared by staff at the MNB's Digitalization Directorate, Directorate of Supervisory Coordination, Directorate Credit Institutions Supervision, Directorate Financial Infrastructures, Directorate Financial System Analysis and Prudential Modelling and IT Supervision Directorate. The main content of the publication was approved by the Financial Stability Council.

The Report incorporates valuable input from other areas of the MNB and the comments of the Financial Stability Council and the MNB's Digitalization and FinTech Advisory Board.

The Report is based on information available for the period ending 25 February 2020.

Contents

Executive summary 7

1 International developments 9
1.1 Global factors supporting the growth of the FinTech sector 9
1.2 FinTech services among consumers and companies 11
1.3 Services offered by FinTech firms 12
1.4 Applied technologies 15
1.5 Financing of FinTech firms 16
1.6 Changes in the regulatory environment 17

2 Domestic FinTech sector 21
2.1 Analysis of the domestic FinTech sector by company size and number of employees 21
2.2 Profitability and export activity of the Hungarian FinTech sector 24
2.3 Development of the domestic FinTech sector 27

3 Digitalisation level of the Hungarian banking sector 28
3.1 Digitalisation of the domestic banking system 28
3.2 Digitalisation of interactions with external stakeholders 31
3.3 Preparedness of management and employees 34
3.4 Digitalisation of internal operations 36

List of boxes

Box 1: The entry of BigTech companies into the financial services market 11
Box 2: Crowdfunding markets in Europe and Hungary's region 17
Box 3: Identification of FinTech companies with Hungarian tax numbers 21
Box 4: Measures to support the promotion of electronic payments 24
Box 5: Description of the bank digitalisation survey and the methodology of the bank digitalisation index 27
Box 6: Cyber risks – A new challenge in the era of digital finances 36

Executive summary

The aim of the annual FinTech and Digitalisation Report, which is released now for the first time and will be published regularly in the future, is to provide insight into domestic and international trends in financial innovation, digitalisation and the underlying technologies behind these trends, as these also play an increasingly important role on the Hungarian financial markets. *FinTech services are related to two well-defined groups of players. On the one hand, the traditional players on the financial market with a longer history – the so-called incumbent institutions – are involved in the development of digital financial channels, services and products, while on the other hand, newly founded companies focusing on the expansion of FinTech services are present on the market. In addition to the incumbent institutions that control most of the domestic financial market, more than 110 companies operating and incorporated in Hungary are currently dedicated to FinTech activities. In this report, we consider the latter group of individually identified companies to be the domestic FinTech sector.*

The FinTech and Digitalisation Report focuses on three main areas. *First, we present a short overview of the most recent international developments on the global FinTech scene. Following that, we provide the first comprehensive analysis of the domestic FinTech sector based on publicly available data. And finally, we summarise the findings of our digitalisation survey conducted in the domestic banking sector, in order to highlight where further improvements could be made to provide better, more accessible and more competitive digital financial services, either based on internal innovations or in partnership with some FinTechs.*

At the international level, the FinTech sector is characterised by dynamic growth in its user base and range of products and services, as well as capitalisation and market valuation. *This trend is supported by specific demand, supply and technological factors. The majority of FinTech solutions are based directly on innovation in retail services, but, at the same time, there is an increasing number of innovative digital service development in the corporate segment too. In terms of the new and advanced technologies, the application of artificial intelligence may have the strongest impact on the financial sector in the short run. Progress in FinTech solutions is also driving regulatory reforms, both at the national and international (European Union) level. However, partly due to limited experiences and information owing to the novelty of the services, and partly because the new services cannot be interpreted under the existing regulatory concepts, there is currently no clearly dominant direction in the regulatory approaches. The process of regulatory renewal can also be supported by the creation of innovative frameworks, mainly via the establishment of innovation hubs and regulatory sandboxes, based on international practice. The MNB was among the first authorities in Europe to establish these frameworks.*

In recent years, the Hungarian FinTech sector has been characterised by dynamic growth, as reflected in both the number of employees and revenue. *While micro and small enterprises account for the majority of Hungarian-owned FinTech firms, in the case of companies in foreign ownership, the ratio of smaller and bigger companies seems to be balanced. Among Hungarian-owned companies, newly founded companies with a history of a few years are typical. The export ratio, which is crucial for competitiveness, is currently much higher at foreign-owned companies. Independently of the ownership structure, most of the companies identified are involved in B2B (business-to-business) services, while the share of companies offering B2C (business-to-consumer) services is less than 10 percent. Overall, however, most of the developments will ultimately result in more competitive, better quality services for retail customers. The most important spheres of activities are data analysis and business intelligence, financial software development and system integration, as well as payment services, with 60 percent of the sector active in these areas.*

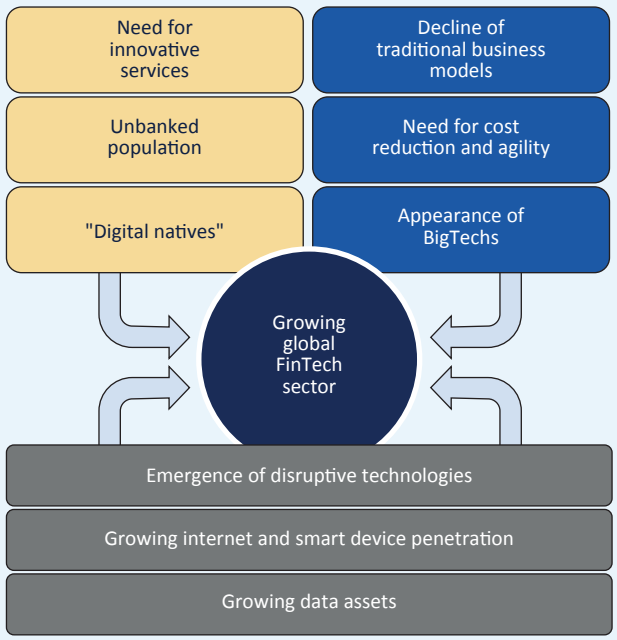
The results of a comprehensive banking system digitisation survey conducted by the MNB show that while domestic incumbents have started the process of digitisation, there is still considerable room for improvement in terms of their digitisation level and preparedness. *The banks covered by the survey account for more than 90 percent of the domestic banking system in the terms of balance sheet total and are aware of the possibilities and importance of digitalisation. In addition, the level of digitisation is not consistent even internally within the institutions. The range of products that are*

either fully available online or that enhance customer experience through digital solutions is growing in the retail segment, while at the same time further improvements are being made for this customer base. These are primarily related to online customer registration and identification, fully digitised extension of personal loans and instant payments. In the corporate segment, fully digital administration is not available, and in the case of the products already in use, digital communication leaves much to be desired compared to the retail business line. In terms of internal operations, further improvements in human resources and systems development would be important to increase the competitiveness and efficiency of the domestic banking system. It is a clearly progressive feature, however, that there is more and more emphasis on ensuring the work competencies and conditions suitable for the digital era and on the digitalisation of work processes in the domestic banking sector. In the banks' medium and long-term business plans, one clear priority is to utilise the possibilities offered by digitalisation, which is indicated by the fact that almost all the institutions have appointed senior executives responsible directly for digitalisation areas. However, now digitalisation managers are members of the board at a few institutions only, and changes in this regard could further enhance digitalisation efforts to increase the competitiveness of the banking sector.

1 International developments

The FinTech sector is growing dynamically in terms of the user base, range of products and services, and its financing and market valuation, and this trend is further supported by specific demand, supply and technological factors. Right now, the vast majority of FinTech solutions involve innovations in retail services, but at the same time more and more innovative corporate products are appearing on the market. Among the new and advanced technologies, the application of artificial intelligence may have the strongest impact in the financial sector in the short run. Although the global FinTech sector's capacity to attract capital was strong in the last couple of years, it was also largely linked to individual, one-off acquisitions. The spread of FinTech solutions is also driving regulatory approach reforms, but there is no clearly identifiable direction in respect of regulatory approaches.

Chart 1
Major global drivers supporting the growth of the FinTech sector



Source: MNB.

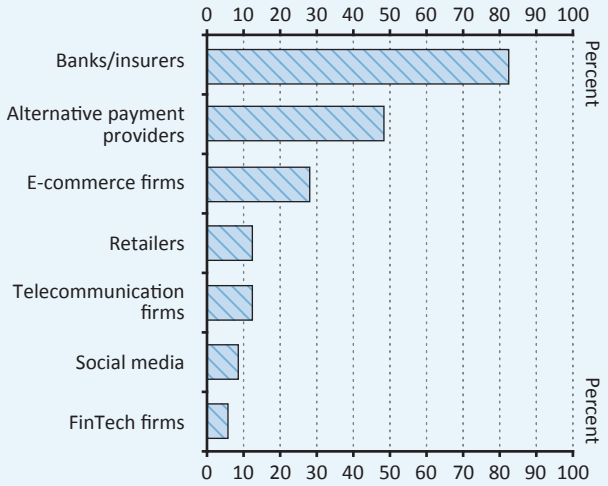
1.1 GLOBAL FACTORS SUPPORTING THE GROWTH OF THE FINTECH SECTOR

The growth of the FinTech sector is supported by specific demand, supply and technological factors. In this report, we use the term FinTech in the sense of the comprehensive interpretation[1] provided by the Financial Stability Board (FSB). The dynamic expansion of innovative financial services is facilitated by some well identifiable driving factors that can be perceived on a global level and that contribute to the growth of the FinTech sector (Chart 1). Looking at the demand side and consumer habits, there is mounting demand for innovative financial services that can be used quickly and comfortably. In addition, the young "digital native" generation, with solvent demand for financial services, without traditional banking relations but internet access, and which primarily manages its finances in the online space, presents good market opportunities for the innovative players.

In parallel with that, the business/operational model of traditional financial service providers is under pressure. Incumbent players also increasingly need more cost-efficient, flexible and agile operations. With the shift of services to the digital space, their traditional business models are under significant pressure. In addition, the entry of BigTech firms with much larger customer bases and technological capacity to the market of financial services presents additional challenges for them.

[1] According to the Financial Stability Board, FinTech is a technology driven financial innovation that can result in new business models, applications or products and can have a significant impact on financial markets and institutions, and on financial services themselves (FSB (2017). Financial Stability Implications from FinTech). https://www.fsb.org/2017/06/financial-stability-implications-from-fintech/

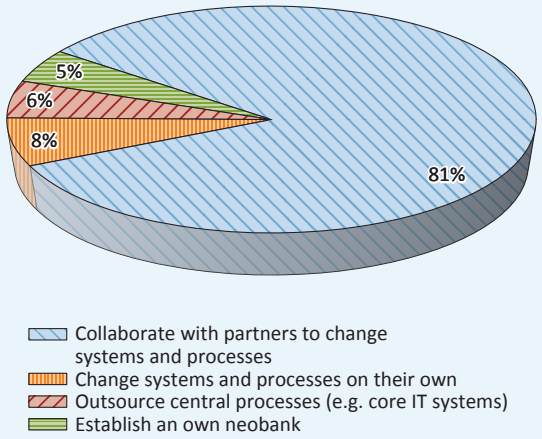
Chart 2
What types of institutions do consumers trust in terms of data management?



Note: Based on responses from 7,600 consumers in eight countries. Respondents could mark more than one institution.

Source: Capgemini (2017). World FinTech Report.

Chart 3
European banks' views on the most efficient form of conducting digital transformation



Note: Neobanks (or internet-only banks) are new financial institutions that provide partial or full banking services while they do not have physical branch networks and operate solely on online platforms.

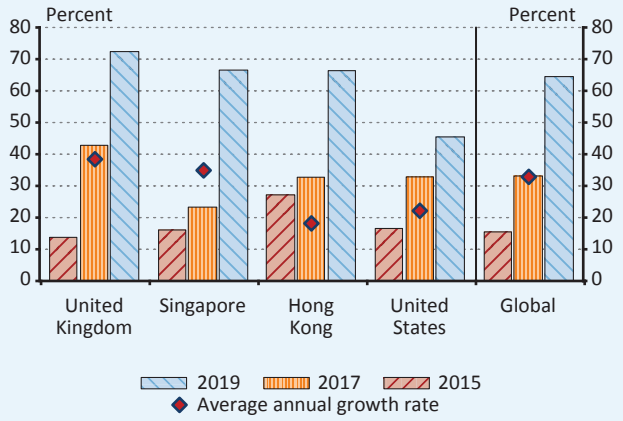
Source: Finextra Research (2019). The Future of Payments.

Technological development is another catalyst for growth in the FinTech sector. The appearance and utilisation of innovative technologies – for instance artificial intelligence – may have a disruptive effect in the financial sector. Due to the growing internet and smart device coverage, more and more consumers – some of whom previously had no banking relations – are accessible in the online space. Furthermore, using proper data analysis procedures, the high-frequency, unstructured data available for financial service providers can be transformed into valuable information.

Both incumbents and FinTech companies play important roles in the efficient utilisation of growth-supporting factors. The growth of the FinTech sector, i.e. non-traditional financial players, was conditional upon genuinely new business approaches and corporate culture. With their advanced analysis methods and innovative ways of thinking, these financial service providers can quickly recognise market opportunities and introduce value-enhancing solutions that previously have been less used in financial intermediation. Thus, they can effectively trigger the reform of the financial system. Incumbent institutions also play key roles in ensuring that the results of the innovation wave are widely applied. The established infrastructure and customer bases of traditional players mean that innovative solutions can be leveraged on a large scale. By carefully analysing the available information base, incumbents can draw conclusions about current market needs, and the more conscious utilisation of such data may also define the direction of future developments. From the aspect of sustainability, security issues are also increasingly important. In this area traditional players' awareness of overall regulatory and data protection requirements and compliance with such are vital. Moreover, consumer confidence in these institutions is still very strong (Chart 2).

Stronger co-operation among service providers may result in sustainable growth. Although competition between FinTechs and incumbents seemed to intensify in the first phase of the emergence of FinTech firms, initiating and strengthening co-operation became increasingly important for both sides when the possibilities offered by the synergies were recognised (Chart 3). The spread of partnerships may ensure that the improvement of customer experience and competitiveness takes place in a safe and sustainable manner, while also preserving stability on all financial markets.

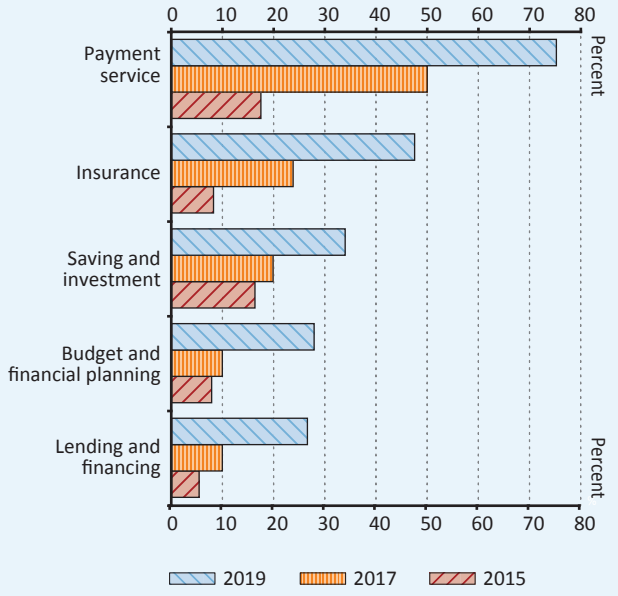
Chart 4
Development of the share of regular retail FinTech users in certain markets and globally



Note: As a proportion of digitally active consumers. By regular FinTech users, we mean consumers who used FinTech services on at least two occasions in the last six months. Based on an online large-sample consumer survey completed in 27 countries.

Source: EY (2019). Global FinTech Adoption Index.

Chart 5
Share of regular retail FinTech users by service type



Note: As a proportion of regular FinTech users. Based on an online large-sample consumer survey completed in 27 countries.

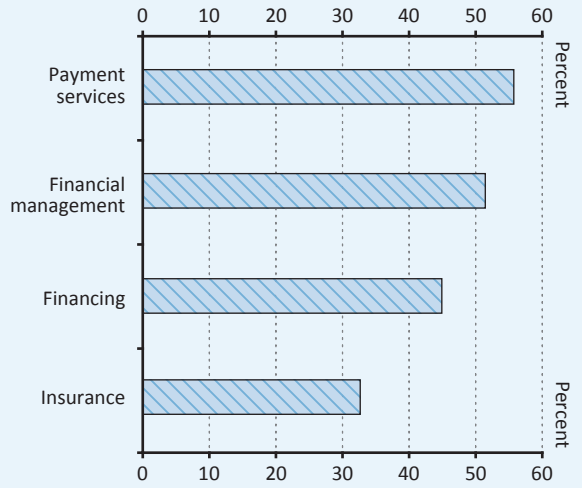
Source: EY (2019). Global FinTech Adoption Index.

1.2 FINTECH SERVICES AMONG CONSUMERS AND COMPANIES

The consumption of FinTech services has increased dynamically around the world in recent years. In 2019, the ratio of retail consumers regularly using FinTech services within the digitally active population – i.e. within the approximately four and a half billion active internet users – reached 64 percent at the global level (Chart 4). Globally, the use of FinTech services has increased by around 30 percent on average over the past five years. On the developed countries' leading FinTech markets – e.g. in the United Kingdom, Singapore, Hong Kong or the United States – similar average growth of 20-40 percent was also experienced in the use of innovative financial services since 2015. The level of application of FinTech solutions is typically higher in regions with less advanced traditional financial systems, for instance in China and India. In these countries, the ratio of regular retail users is 74 percent on average, while on markets with established financial systems, such as Europe and the United States, this ratio is 55 percent.

From the range of innovative services, most users typically utilise payment services. The ratio of regular FinTech users has seen a dynamic increase within each retail product segment since 2015. In 2019, most consumers – i.e. 75 percent of regular retail users – used innovative payment services, such as e-money services for making international transfers and peer-to-peer payments, cell phone payment applications and electronic wallets related to virtual means of payment (Chart 5). Innovative insurance products are also extremely popular. In 2019 almost one half of consumers used mobile phone applications to take out insurance and online comparison sites to select the most favourable offers.

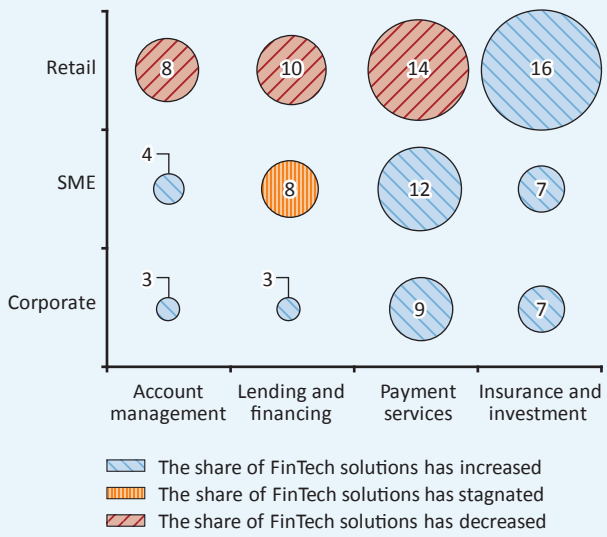
Chart 6
Share of SME FinTech users by service type



Note: As a proportion of regular SME FinTech users. Based on executive interviews conducted in five countries.

Source: EY (2019). Global FinTech Adoption Index.

Chart 7
Distribution of FinTech solutions and their changes in each customer segment by service type



Note: The data shows the distribution of services offered by the largest international FinTech companies by customer segment and service type, the sizes of the bubbles are proportional to that. The figures do not add up to 100 percent due to rounding. The colours of the bubbles indicate the changes in the ratios of each customer segment and service type between 2014 and 2018.

Source: McKinsey (2018). Panorama FinTech database.

Among small and medium-sized enterprises, the use of FinTech solutions is still lower on a global level. In 2019, the ratio of companies regularly using FinTech services within digitally active SMEs was only 25 percent, which is significantly below the retail segment. Most of these enterprises also primarily used innovative payment solutions and financial management tools (Chart 6). In 2019, more than one half of SMEs used online payment processing systems and online invoicing and accounting tools.

1.3 SERVICES OFFERED BY FINTECH FIRMS

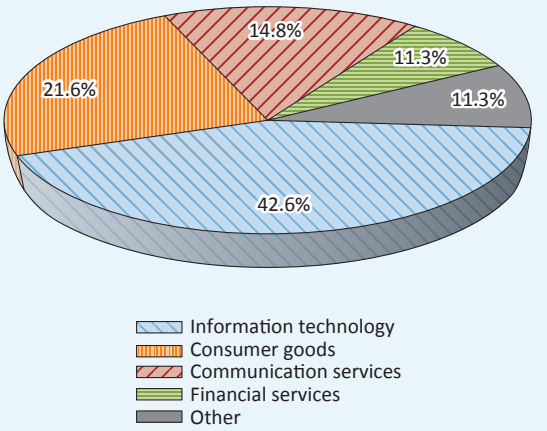
The majority of FinTech solutions are retail services, but more and more innovative corporate products are also appearing on the market. The spread of innovative financial services affects a wide range of customers and service types. In 2018, almost half of the FinTech solutions available on the market were produced for retail purposes: 31 percent were for SMEs and only 22 percent were for large companies (Chart 7). However, changes in the distribution of services indicate that the FinTech sector's customer base may shift towards the corporate segment, as the ratio of available products increased in the SME and large company segments and dropped in several fields of the retail segment between 2014 and 2018.

Most innovative financial services appear on the market of payments in the retail and the corporate segments. In addition, the change in the distribution between the two segments indicates a gradual strengthening of the role of corporate payment system developers (Chart 7). In addition, the market presence of various innovative insurance and investment products, such as online home insurance, online brokerage and investment consulting, and crowdfunding investment, is also increasingly significant.

Box 1
The entry of BigTech companies into the financial services market

Certain information technology companies, now called BigTechs, which offer their services on various digital platforms, were among the fastest growing companies of the 2000s. Thanks to the wide availability of their platforms, they have succeeded in building a strong ecosystem with millions of customers. In addition, their main strength is connecting their users directly and generating user data and interaction which provides them with a great deal of information on their users. They can personalise the services provided by their platforms based on this data, which increases the activity of their customers and provides them additional data. The significant amounts of data and their efficient use have enabled BigTech companies to gain a significant market share in their initial services market, to become dominant players in the global economy, and to increasingly diversify their services over time, including entering the financial services market (Chart 8).

Chart 8
Distribution of global BigTech firms' revenue in 2018



Note: The sample includes the following companies: Alibaba, Alphabet, Amazon, Apple, Baidu, Facebook, Grab, Cocoa, Mercado Libre, Rakuten, Samsung and Tencent.

Source: BIS (2019). Big tech in finance: opportunities and risks.

In addition to the new, emerging FinTech companies, BigTech companies have acquired a significant share of the financial services market. The business considerations behind market entry include access to new financial data, the diversification of revenue sources, the expansion of core platform services and enhancement of customer loyalty via improved user experience. At the moment, their role is mainly important in the payment services provided by their own platforms, which account for more than one billion users in total.[2] In China, for example, more than 75 percent of retail payment transactions (by transaction number) are completed through non-financial institutions (less than 10 percent in value).[3] For these companies, the technology background is available to expand their financial services beyond payment services. In China, this trend is quite noticeable, where thanks to the regulatory environment, there is a wide range of products available from local to BigTech companies, from lending to insurance.[4]

The appearance of BigTech companies may increase competition in the market, contribute to the quality of services and make the financial product range available to a wider range of consumers. These new players are expanding the range of financial services providers and through their technological capabilities (such as their existing and easy-to-use digital platform, large amounts of customer data), can encourage other institutions to deliver more accessible and personalised products. In addition to the improvement service quality, there is also improvement in "financial inclusion" thanks to BigTech platforms used by those customers for whom the traditional banking services were hardly or not accessible. BigTech companies can provide access to financial resources to many SMEs that previously did not meet the requirements of traditional financial institutions, which is a great benefit in supporting economic growth, especially in emerging countries. It can foster lending that BigTech companies may not require collateral to approve the claim, but may also find other ways to secure repayment discipline (for example: deduction from transactions, restriction of access to the ecosystem).

[2] Source: Merchant Savvy (2020). Amazing Stats Demonstrating The Unstoppable Rise of Mobile Payments Globally https://www.merchantsavvy.co.uk/mobile-payment-stats-trends/

[3] Source: FSB (2019). BigTech in finance – Market developments and potential financial stability implications https://www.fsb.org/2019/12/bigtech-in-finance-market-developments-and-potential-financial-stability-implications/

[4] Source: Oliver Wyman (2020). The State Of The Financial Services Industry 2020. https://www.oliverwyman.com/content/dam/oliver-wyman/v2/publications/2020/January/Oliver-Wyman-State-of-the-Financial-Services-Industry-2020.pdf

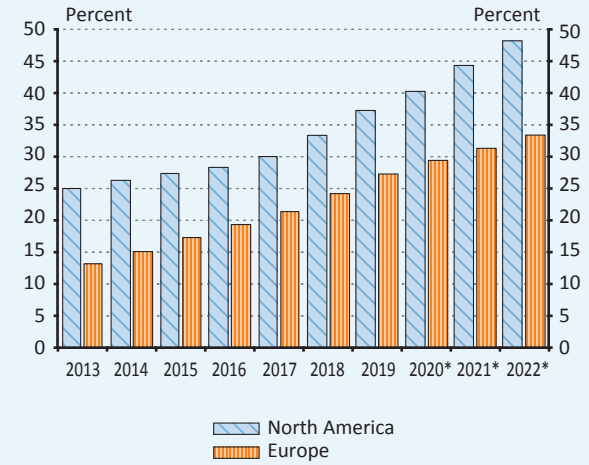
Despite the advantages, the emerging BigTechs may also bring many risks to financial stability and consumer protection as well as to market competition. BigTech companies have access to a large amount of unique data which is not available to financial institutions. Thus, BigTech companies have a significant advantage in developing their products, which can have a distorting effect and the access to financial data can only reinforce this. As an additional risk of distorting competition, with their widespread platforms they can create an environment and business model that, in addition to promoting their own services, can hinder or suppress the opportunities of other institutions. In addition, they use typically closed, non-interoperable solutions for financial services that can lead to fragmentation of the payment market, and they restrict competition which creates a negative impact on innovation over the long term.

Eliminating the risks related to BigTech companies and strengthening competition are both in the interests and partly the responsibility of regulatory authorities. Key steps include mitigating the excessive competitive advantage of BigTech companies thanks to large amounts of data (for example, through public access to information or customer access) and avoiding possible positive discrimination of their financial services in social media and other BigTech platforms. Although national regulatory authorities have the right to determine the terms and conditions under which these firms are authorised to provide financial services, which are mainly subject to existing regulations for the service in question, the services of BigTechs are often cross-border, leaving a very limited scope for national legislation in developing the appropriate legislative framework.

Among the potential future services of BigTech companies, stablecoin initiatives deserve particular attention. The so-called stablecoins are digital payment instruments whose prices, with full coverage, are tied to a low-risk money market asset portfolio and thus less exposed to volatile investor sentiment. The main goal of stablecoin initiatives is to make the payment services more efficient and widely accessible, bypassing the traditional banking infrastructure. The Libra project announced by Facebook in the summer of 2019 created one of the biggest resonances among the stablecoin initiatives, is planned to be available this year, but regulatory reactions following its announcement and its withdrawal from some initial support projects may question the date of launch.

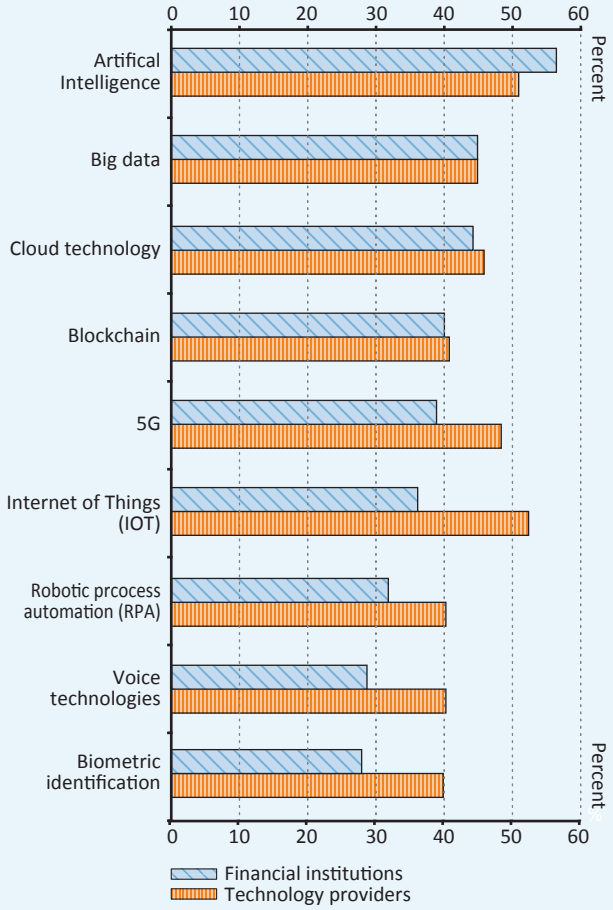
The risks associated with stablecoin initiatives can pose significant challenges for central banks and financial regulators. The spread of the use of stablecoin entails risks in many ways. In this case, a significant portion of the cash flow may shift to an unregulated area, with the risk of money laundering and financing of terrorism, and the enforcement of consumer protection rights could become uncertain as well. In terms of financial stability, the additional lending services and the lack of deposit insurance may be the sources of risk. The use of stablecoin can also put pressure on a bank's profitability as a result of increased competition in payment and deposit solutions and the information advantage of BigTech companies. In the field of payment services, closed solutions provided by stablecoin – regarding the risks previously highlighted – can have a significant negative impact on market competition and innovation. In addition, there may be serious data protection concerns about the confidential treatment of financial transaction data. From a monetary policy perspective, stablecoin initiatives have less importance in medium term, but the loss of full coverage may entail serious risks. A parallel currency may worsen the efficiency of monetary transmission and may also have significant money market implications for the allocation and reallocation of the underlying asset portfolio.

Chart 9
Investment in new technologies as a percentage of banks' IT spending



Note: Data in years marked by an asterisk are forecasts.
Source: Deloitte (2019). Banking and capital markets outlook.

Chart 10
Assessing different technologies by their impact on financial services over the next 2 years



Note: Based on answers given by technology managers working for 248 financial institutions and 260 technology, media or telecommunication service providers.
Source: PwC (2019). Global FinTech Report.

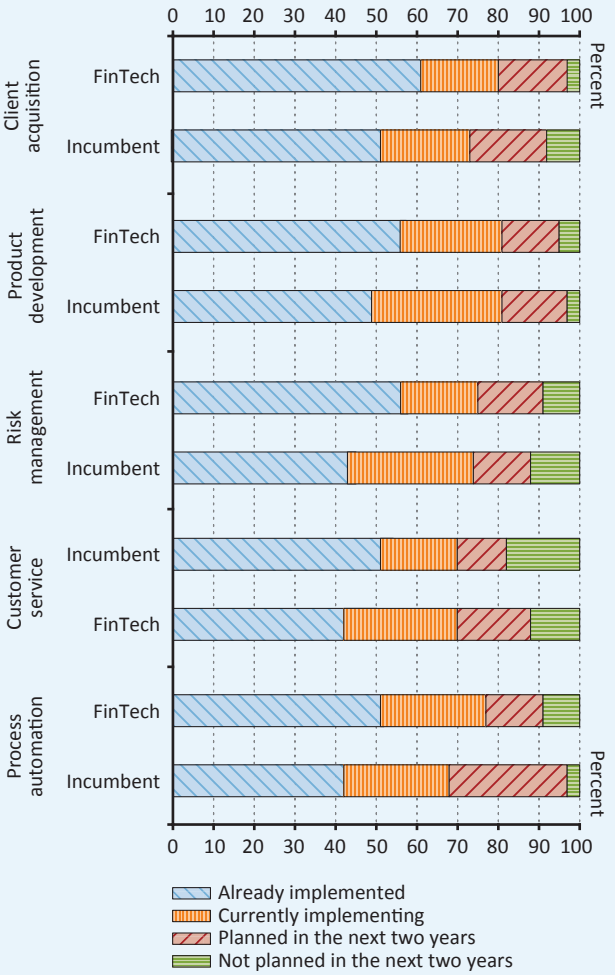
1.4 APPLIED TECHNOLOGIES

The application of new, advanced technologies is very important for institutions in the financial sector. The business model of FinTech firms entering the financial markets is typically based on advanced, innovative technologies, and therefore these service providers are able to efficiently adapt to the changing conditions and are able to keep the customer experience at a continuously high level with their solutions. Therefore, it is obvious that the digital transformation of the incumbent financial sector should cover the whole institutional operation. Complete digitalisation of the services and simplification of the administration processes are of key importance for customers, as the competition for clients is directly perceptible in these areas. Incumbent institutions can achieve this most efficiently by paying special attention to the development of their internal systems and workflows, with a view to reforming the whole value chain. The need to create an advanced, supportive technology infrastructure has been recognised by banks around the world, and the implementation of new technologies – for instance artificial intelligence and its variations such as machine learning or robotic process automation (RPA) – has become more important recently, along with the corresponding modernisation of operations (Chart 9).

Based on the expectations of financial institutions, over the short run the use of artificial intelligence may have the most significant impact on business processes. In the opinion of the majority of financial service providers (more than 55 percent), the use of artificial intelligence may result in the most significant operational changes at their institutions. In addition, over the short run market players see the biggest potentials in the application of big data, the cloud and blockchain technologies. The expectations of technology service providers partly confirm this: according to these companies, along with artificial intelligence and the cloud, the Internet of Things (IOT) and 5G technology may be the biggest factors in transforming business processes in the financial sector (Chart 10).

Artificial intelligence is already used for several financial business processes. Incumbent players and FinTech firms use technology solutions based on artificial intelligence in several areas, mainly for customer acquisition, product development and risk management processes. At the same time, there seems to be a significant difference between the particular business processes regarding the solutions already implemented for the business processes: among the innovative service providers, the ratio of companies using already established solutions that rely on artificial intelligence is higher than among incumbents (Chart 11).

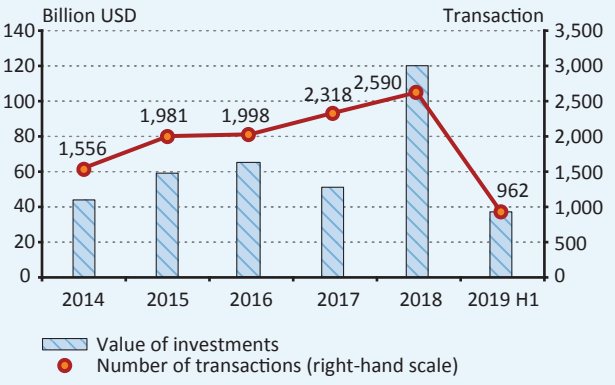
Chart 11
Adaptation of artificial intelligence into particular business processes by type of institution



Note: Based on answers given by 151 institutions in 33 countries.

Source: Cambridge Centre for Alternative Finance (2020). A Global AI in Finance Services Survey.

Chart 12
Evolution of investments in FinTech companies



Note: 2019 H1 contains the data available until 30 June 2019.

Source: KPMG (2019). The Pulse of FinTech.

However, when the ongoing developments are successfully implemented, the currently experienced differences will decrease or even disappear in each application area.

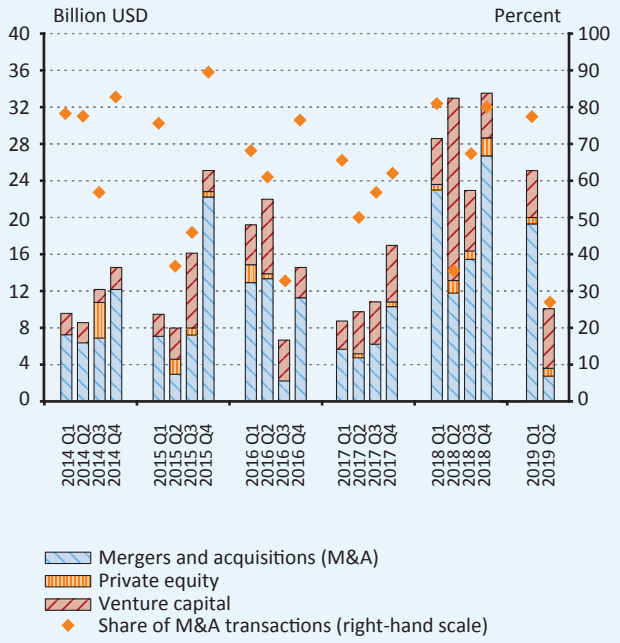
1.5 FINANCING OF FINTECH FIRMS

The strong capital-attracting ability of the global FinTech sector in recent years showed some slight weakening in 2019 H1. With some fluctuations, investments in companies offering innovative financial services have increased since 2014, both in terms of investments value and in the number of transactions. In 2018, which was outstanding in this respect, the value of investments increased by almost 140 percent compared to the previous year to reach some USD 120 billion (Chart 12). Compared to that, the first two quarters of 2019 saw a slight decline. If we compare – to adjust for the one-off impact of 2018, which displayed an outstanding investment value – the first 5 months of 2019 to the average value of investments for the previous 5 years, it shows a more favourable development over time, but the number of transactions lags behind.

For the time being, dynamic growth is promoted by individual, large investments. The available data sources basically distinguish three main sources of financing in the calculation of the capital flow to the sector. So-called private equity is the lowest in volume, which is provided during development and expansion phases, while venture capital is provided on a larger scale to companies at early stages. The third category consists of acquisitions aimed at the most successful companies. The ratio of this type of financing shows significant variation but is high overall, at around 65 percent, indicating that the financing dynamics of the sector are fundamentally determined by larger individual acquisitions. The sector has received as much as USD 240 billion since 2014 in this form of capital injection, from the total investments of USD 365 billion (Chart 13).

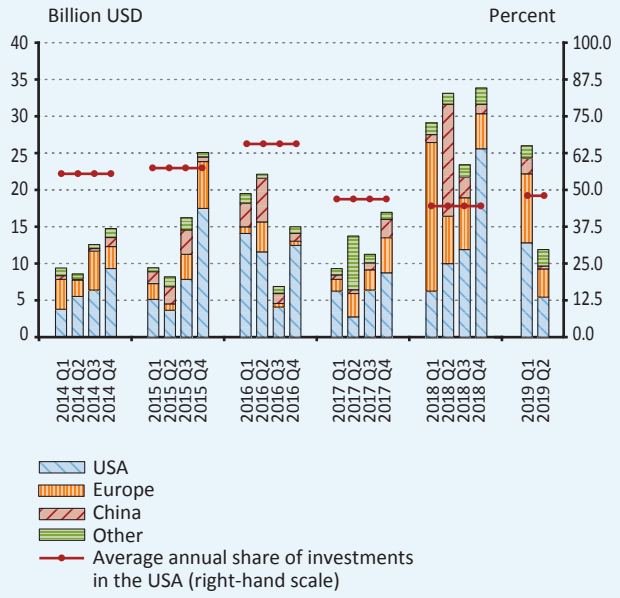
Although with less dominance, companies in the United States are still the most attractive targets for FinTech investments. As for the regional composition, FinTech companies operating in the United States still receive the most capital, accounting for almost half of the total financing (Chart 14). Regarding China, it is worth mentioning a significant one-off impact, namely that in 2016 and 2018 Q2, Ant Financial received extremely high financing amounting to USD 4.5 billion and 14 billion respectively, with the latter figure representing the highest fund-raising in the world. In addition to venture capital and private equity investors, sovereign wealth funds (SWF) and pension funds that are traditionally classified as conservative have also appeared as FinTech investors.

Chart 13
Global FinTech investments by form of financing



Note: 2019 Q2 contains the data available until 30 June 2019.
Source: KPMG (2019). The Pulse of FinTech.

Chart 14
Global FinTech investments in a regional breakdown



Note: 2019 Q2 contains the data available until 30 June 2019.
Source: KPMG (2019). The Pulse of FinTech.

The number and market value of FinTech unicorns shows a sharp increase. In 2019 Q3, the number of FinTech firms with a value over USD 1 billion was already 58, and their total market value exceeded USD 210 billion.[5] Most of these are registered in the United States (33 companies), while Europe has 10 and China has 5 FinTech firms of high valuation. The dynamic development of the sector is indicated by the fact that 20 unicorns were "born" in 2019, and their total capitalisation increased to more than one and a half times the original value in the span of just one year.

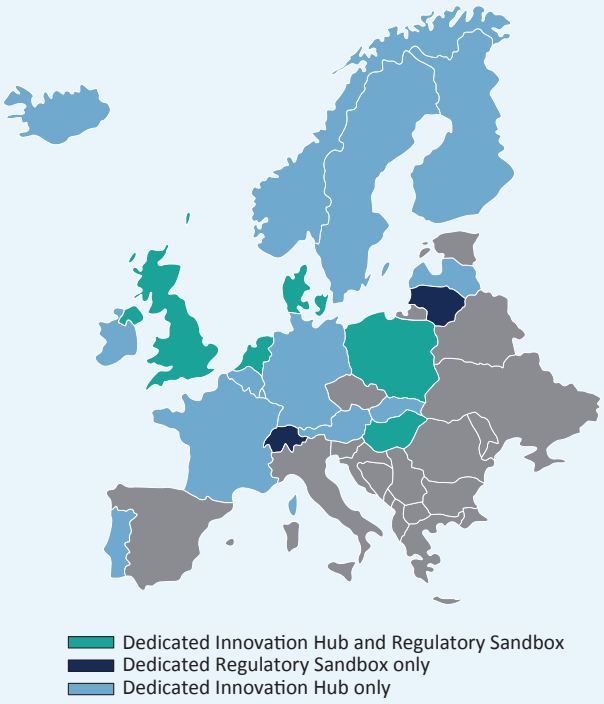
1.6 CHANGES IN THE REGULATORY ENVIRONMENT

The development of the FinTech sector has a significant impact on both the banking system and the regulatory environment as well. New technologies introduced by market players and continuous innovation force the national and international financial regulatory authorities around the world to react. Regulatory authorities are working harder and harder to adapt to new market developments and elaborating solutions to ensure they can extend their regulation to cover the typically rapidly developing cross-border services. The objective of renewing regulations is to make sure that all stakeholders are able to take full advantage of the potentials offered by innovations, and, at the same time, to ensure that FinTech solutions operate within proper frameworks, whilst maintaining the security and stability of the financial system. Beyond the wealth of opportunities, the potentials offered by FinTech solutions may also involve significant risks, especially for consumers, which is why regulatory authorities pay special attention to consumer protection.

Regulatory reforms can be supported with the establishment of innovative frameworks. The strengthening of relations between regulatory authorities and innovators may facilitate the provision of information to market players intending to introduce new solutions, and may facilitate the revision of regulations when necessary, as well as allowing for the better understanding of the potential risks involved in innovations. In line with these objectives and in order to support the spread of FinTech solutions, it may be a progressive step to set up new regulatory frameworks. Based on international best practices, the two key tools for supporting FinTech solutions are the establishment of Innovation Hubs and Regulatory Sandboxes (Chart 15). The MNB was one of the first authorities in the region to establish such frameworks.

[5] Source: CB Insights (2019). Global FinTech Report. https://www.cbinsights.com/research/report/fintech-trends-q3-2019/

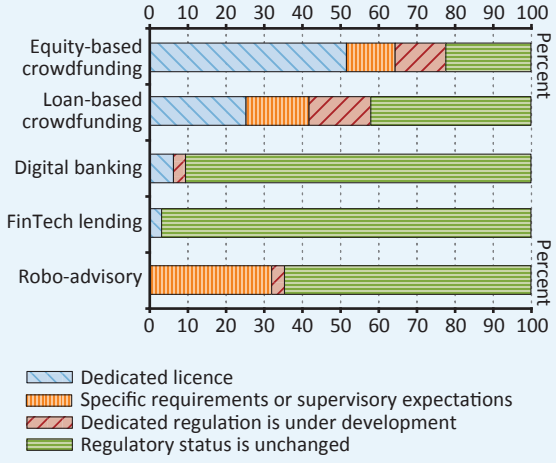
Chart 15
Innovation Hubs and Regulatory Sandboxes in Europe



Note: The map shows Innovation Hubs that offer guidance on one single platform in connection with banking, insurance and capital market innovations, and the Regulatory Sandboxes that allow for testing under exemption from certain regulations or under licences issued for a limited scope of activity.

Source: MNB, based on EBA and websites of national authorities.

Chart 16
Regulatory approaches to various FinTech solutions



Note: FinTech lenders are credit brokerage firms that operate exclusively through an online platform. In contrast to crowdfunding, these firms provide loans from their own resources. The category of digital banking refers to institutions that collect funds and provide banking services via electronic channels and are also covered by deposit insurance.

Source: BIS (2020). Policy responses to fintech: a cross-country overview.

In the regulation of FinTech business models, different approaches can be identified at the international level. Possible steps include adjusting existing regulations to new business models, establishing new regulatory authorities or acts of law, and, if necessary, prohibiting certain FinTech activities may also be an option. There is no universal solution, although there are new areas where several countries are using basically identical measures.

For the most part, existing banking system regulations are also applied for newly established digital banks. The idea in this case may be to provide a level playing field and to ensure that newcomers satisfy the same conditions as traditional banks, without distorting competition. In addition, harmonisation of the regulations may require less co-ordination among individual countries when the existing national regulations are applied for the creation of digital banks and their online lending services. The regulatory framework for crowdfunding solutions – a new way of raising capital and lending – is not uniform worldwide, and in some countries (such as Austria and Germany), a dedicated type of activity license is required to start operations, while elsewhere the provision of services involves unique conditions and supervisory requirements (Chart 16).

In the regulatory framework of some countries, internet-only banks belong to a unique category, and their foundation and operating conditions may differ from traditional institutions with branch network business models. In the financial sector, internet-only banks have emerged as a new business model in the last decade, providing financial services exclusively or predominantly through digital channels and typically operating without a branch network. Although it is not common in international regulatory practice to apply different requirements for the foundation and licensing of internet-only banks, there are some examples (Lithuania, South Korea, Taiwan and Singapore) for specific types of licenses. In these countries, there is a potential restriction in the field of activity, which can be accompanied by lower capital requirements.

Entry into force of the PSD2 directive in the EU may significantly facilitate the integration of new financial innovations and advanced technologies into the financial system. Since the 2008 economic crisis, the EU has put strong emphasis on encouraging financial innovation, as indicated by the entry into force of the PSD (Payment Services Directive) in 2009 and the E-money Directive. Following this path, PSD2 entered into force in 2019,

providing an additional opportunity for the spread of digital solutions in the financial system. In the PSD2 framework, new FinTech companies can create value-added services using the bank account information of the customers directly through active banking partnerships, increasing competition in the market and the development of technology innovations and personalised products. The framework is not only beneficial to new entrants, but also allows traditional banks to provide more personalised and flexible services through technological development.

In addition to new business models, the technology behind these models requires special regulatory attention. Rapid technological developments create new challenges for regulators, as advanced technologies can have a significant impact on already existing business models. Therefore, regulators should pay special attention – in addition to financial institutions and services – to new technologies too. In this respect, regulatory bodies need to be extremely careful in two aspects. On the one hand, new solutions (cloud service, DLT, AI) can imply many types of risks regarding data protection, cybersecurity and new third-party threats. On the other hand, existing public authority is often insufficient to enact comprehensive regulatory tools. In order to provide the necessary regulatory coverage, most countries are either extending existing regulations or are in the process of exploring the possible approaches to technologies. This process can also be substantially supported by the expansion of the innovation hubs and regulatory sandboxes, where market ideas that go beyond current regulation can be tested under real but controlled conditions.

Box 2
Crowdfunding markets in Europe and Hungary's region

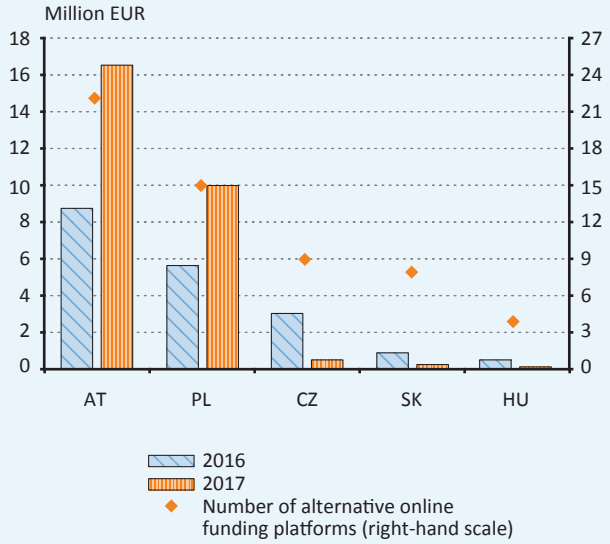
In the early phases of growth, small and medium-sized enterprises and companies often run into financing difficulties. Most SMEs do not have enough capital to ensure continuous operations and implement the development projects required for growth and thus need external financing. However, they are often unable to meet the conditions for bank loans, as they cannot produce the collateral required by banks and are not able to report business results for 2-3 previous years. Consequently, they can access funds only at high costs or in insufficient volume, and in extreme cases, they may be completely driven out of bank financing, which threatens not only their growth potential but their operations as well.

Crowdfunding is an alternative financing form realised on internet-based platforms, which may offer financing possibilities for companies that cannot access funds from other sources. Crowdfunding platform service providers offer online possibilities for companies to present their projects that require financing. Investors that are available in large numbers in the online space make their decisions based on these presentations and make their investments, usually involving smaller amounts. On the investor side, this means lower exposure and investments with moderate risks, while for the company it results in a diverse and therefore more stable financing background. There are several forms of crowdfunding that have spread recently, but from these, from financing and regulatory points of

view, the investment-based and the lending-based crowdfunding methods are of special importance.

In Europe, and in some of the countries of the region, crowdfunding has become one of the most widespread fund-raising tools in recent years. In Europe, the crowdfunding markets of Germany and France are the most active: in the former, almost EUR 190 million, and in the latter, as much as EUR 170 million were raised for this purpose in 2017. As for Hungary's region, significant market activity and expansion can only be seen in Austria and in Poland (Chart 17). The case of Austria is remarkable because since 2015 – like Germany – dedicated regulations have been in place to assist the safe development of the crowdfunding market. As a result, with the mediation by the 15 online platforms operating in the country, in 2017 almost EUR 17 million in additional funds were raised without influencing the lending by banks in a negative way.

Chart 17
Development of funds from crowdfunding in the countries of the region



Note: Funds from crowdfunding show funds coming from equity, reward, real estate and donation-based crowdfunding. The diagram shows the number of platforms involved in alternative financing in 2017.

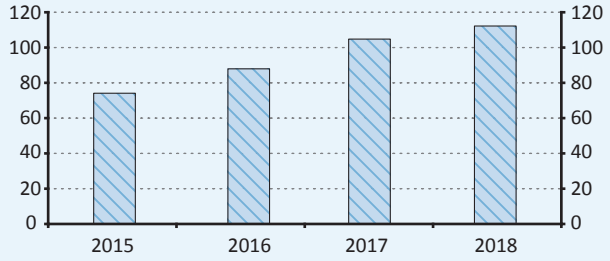
Source: Cambridge Centre for Alternative Finance (2019). The fourth European alternative finance benchmarking report.

A properly regulated crowdfunding market may play an important role in mitigating SMEs' difficulties in accessing financial resources. Supporting the establishment of the crowdfunding markets and developing the proper regulatory framework are tasks of special importance for the financial regulatory authorities. On the one hand, this creates financing possibilities for the SME sector that has difficulties in this respect. On the other hand, in the case of the expansion of the market and the establishment of the online platform service infrastructure, this may offer a competitive alternative to traditional financing forms and may assist in making the banking sector more competitive. Therefore, the European Commission is working on related regulations as part of its FinTech Action Plan, focusing on the activities of cross-border crowdfunding services providers. Dedicated regulation would be important in Hungary as well; on the one hand local platforms could operate in a transparent legal environment, and on the other hand, possible domestic aspects could be considered in the elaboration of the detailed rules.

2 Domestic FinTech sector

Presently, there are more than 110 companies operating in Hungary which have Hungarian tax numbers and provide FinTech services. In 2018, these companies directly employed approximately 5,000 people in total. In terms of size, most Hungarian-owned FinTech firms are micro and small enterprises, while in the case of companies with foreign ownership, the ratio of smaller and bigger companies is balanced. Regardless of ownership structure, most of the identified companies perform B2B services (business-to-business), while the ratio of B2C (business-to-consumer) companies is less than 10 percent. The most important scopes of activity in the sector are data analysis and business intelligence, financial software development and system integration as well as payment services; roughly 60 percent of companies are active in these areas. The profitability of the sector is high, which can be primarily attributed to larger foreign-owned and export-oriented companies. In respect of the number of employees and sales, the Hungarian FinTech sector – especially in the case of small businesses – was characterised by strong growth in recent years.

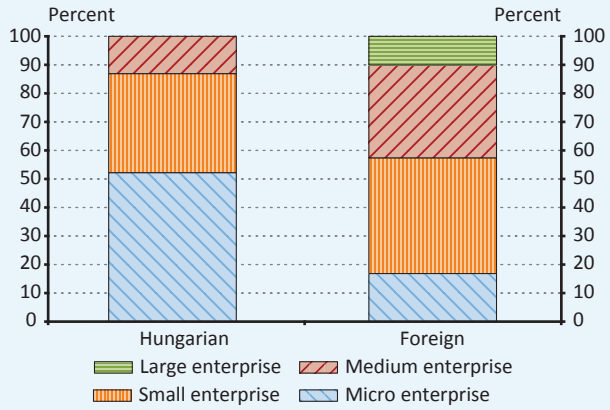
Chart 18
Number of companies operating in 2019 in FinTech activities in Hungary



Note: FinTech companies were identified in 2019, and companies that submitted accounts to the National Tax and Custom Authority (NTCA) at least in 2018 are shown.

Source: NTCA, MNB.

Chart 19
Distribution of Hungarian- and foreign-owned FinTech companies by company size



Note: Company size was determined based on 2018 reports and year-end or yearly average staff number data. Hungarian-owned companies below 50 percent are considered as foreign companies.

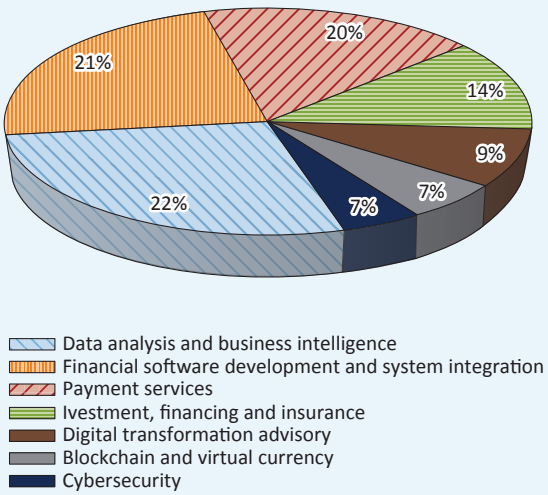
Source: NTCA, MNB.

2.1 ANALYSIS OF THE DOMESTIC FINTECH SECTOR BY COMPANY SIZE AND NUMBER OF EMPLOYEES

In 2018, there were more than 110 operating companies involved in FinTech activities in Hungary (Chart 18). FinTech firms were identified from the set of incorporated enterprises which declared activities in line with the underlying FinTech definition and were operating in 2019 by processing and reviewing their official webpages (see Box 3). By the domestic FinTech sector, we only mean companies with a Hungarian tax number, operating in corporate form and involved in business activities in 2019 (in their cases, the latest annual reports were submitted in 2018). Most of the companies identified as FinTech were already operating in 2015, and they were active in other areas besides financial technology services. 73 percent of domestic FinTech firms are Hungarian, while 27 percent are owned by foreign parties.

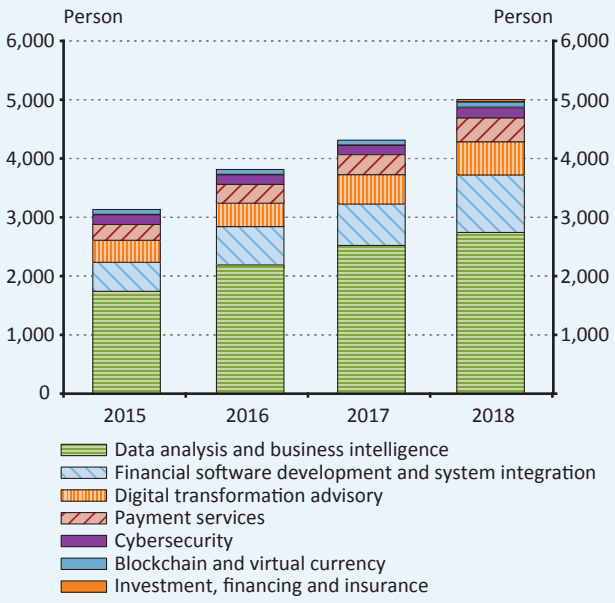
Among FinTech firms with Hungarian ownership, micro companies are dominant. More than 85 percent of Hungarian-owned companies belong to the micro and small company segment. On the other hand, almost 44 percent of the FinTech companies in foreign ownership can be classified as medium-sized or large companies, while in the micro category – which accounts for 50 percent of the Hungarian-owned companies – the total share of foreign companies is less than 11 percent (Chart 19). Most of the foreign-owned companies were founded earlier, and their earlier scope of activities was supplemented to include FinTech services. Among Hungarian-owned companies, the number of newly established firms which were founded especially to provide FinTech services is relatively high.

Chart 20
Distribution of FinTech companies by service scope



Source: NTCA, MNB.

Chart 21
Distribution of the number of employees by service scope at domestic FinTech companies



Source: NTCA, MNB.

The domestic FinTech sector conducts most of its activities in the fields of data analysis and business intelligence along with financial software development and system integration. Independently of the ownership structure, the domestic FinTech sector can be characterised by providing B2B services, while the ratio of B2C services is below 10 percent with respect to the number of companies, and typically involve payment services, investment, financing and insurance. Areas that cover a significant number of companies are data analytics and business intelligence, financial software development and system integration as well as payment services, each with a share of 20-22 percent (Chart 20).[6] Among the companies identified as FinTech, companies with Hungarian ownership are typically involved in cybersecurity, and in investment, financing and insurance services. In the case of foreign-owned companies, data analytics and business intelligence together with digital transformation consultancy play more important roles.

The dynamic growth in the number of people employed in the sector did not significantly change the proportion of employment among the service areas. Among FinTech companies, from the aspect of the number of employees, data analysis and business intelligence is the dominant service type. Together with financial software development and system integration, almost 70 percent of the employees in the FinTech sector work in these two areas (Chart 21). Within 3 years, the total number of employees increased by 60 percent. The two service sectors with the most rapidly growing staff numbers are investment, financing and insurance, which started from a relatively low base, and financial software development which employs a significant part of the workforce at FinTech companies. Foreign-owned FinTech firms typically have a significantly higher number of employees, although the employment growth was substantially stronger among Hungarian companies.

[6] For the categorisation of FinTech companies, see, among others, Gromek, Michal (2018): Clarifying the Blurry of FinTech: Opening the Pandora's Box of FinTech Categorisation https://www.researchgate.net/publication/323836300

Box 3
Identification of FinTech companies with Hungarian tax numbers

The identification of FinTech enterprises operating in Hungary poses serious a challenge as no official statistics are available for the set of such companies. So far, anecdotal information and individual surveys have been used to collect firms actively engaged in the FinTech industry. Furthermore, the MNB has managed to gather information on the size of the industry from official and informal inquiries made at the central bank.

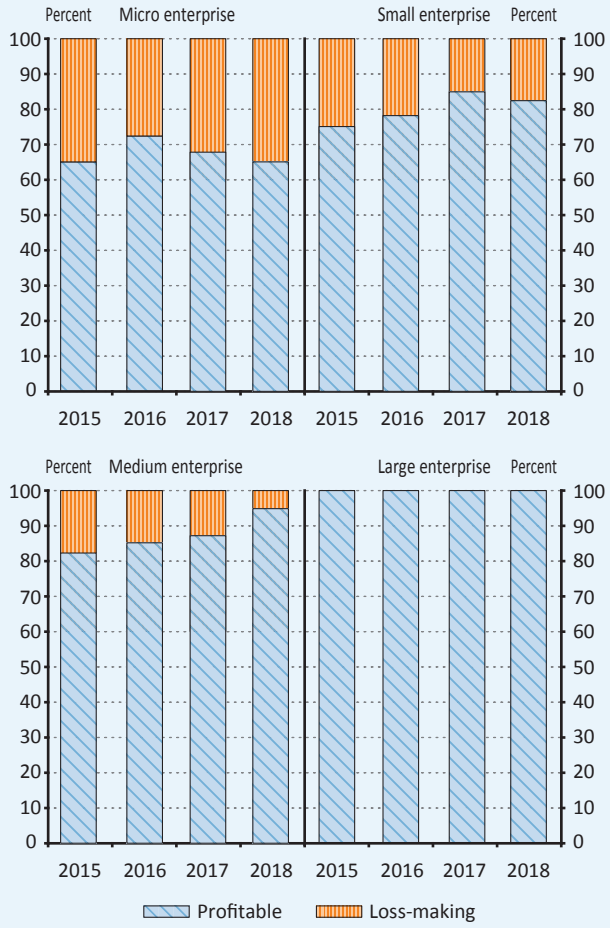
In our identification efforts, we consider the set of companies involved in FinTech activities according to guidelines established by the Financial Stability Board (FSB).[7] These activities include the provision of various banking services, mobile banking, financial consultancy, investment advice, crowdfunding, blockchain and crypto currencies, RegTech, operation of payment systems, business analytics related to finances, InsurTech, cybersecurity solutions related to finances, various IT solutions associated with finances, as well as financial computer programming and system integration. Therefore, **it is not only B2C („business to consumer") companies, but also B2B („business to business") companies that we take into consideration, and most FinTech companies in Hungary fall into the latter category.** In the identification process, as our focus is on the Hungarian FinTech market, we do not consider companies without a Hungarian tax number, despite them offering cross-border services primarily due to lack of information.

From all the corporate entities in Hungary, we were looking for FinTech companies in the set of companies whose main activities belonged to the two-digit NACE Rev.2. activity code of *Computer programming, consultancy and related activities*, and *Information service activities*. Approximately 15,000 such companies were in operation during 2019, by using Bing and Google Search API, we found their official websites, from which we downloaded textual data from pages containing relevant information. We also compiled a Hungarian and an English FinTech dictionary (several hundred terms each), which included the most frequently used financial and technological (FinTech) phrases by using relevant corpora. The terms were ranked based on the frequency of the occurrence of adjectives and nouns together, which do not necessarily have to be one after the other. Our first-round FinTech list included the companies that belong to the websites with the highest numbers of hits (approximately 300), and this was manually checked to include firms that offer services in accordance with the FSB's definition.

It is important to emphasise that we focus on FinTech firms with a Hungarian tax number. The set of selected firms does not contain those which are active in the Hungarian market by providing cross-border service from abroad. The reasons are that we do not have information on qualitative or quantitative characteristic of businesses, and the identification of foreign-registered firms is a resource-intensive procedure. In addition, often it is hard to determine the specific activities of Hungarian branches or subsidiaries of large international companies otherwise providing FinTech-type services, all we know is that the international company is involved in such activities (based on the information available on their websites).

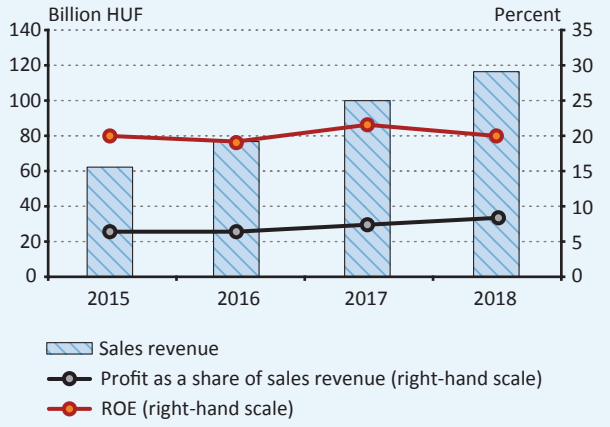
[7] https://www.fsb.org/2017/06/financial-stability-implications-from-fintech/

Chart 22
Distribution of profitable and loss-making companies of the domestic FinTech sector by size



Source: NCTA, MNB.

Chart 23
Profitability of FinTech sector



Source: NTCA, MNB.

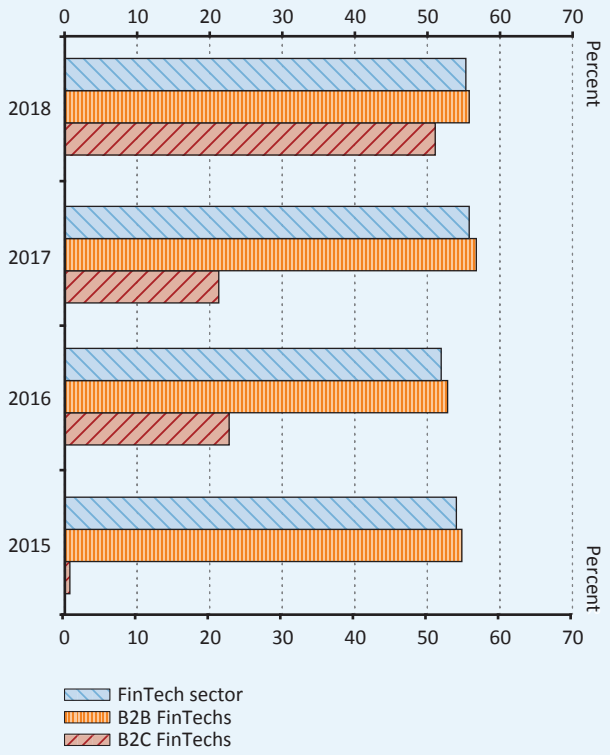
2.2 PROFITABILITY AND EXPORT ACTIVITY OF THE HUNGARIAN FINTECH SECTOR

In the case of domestic FinTech companies, the larger their size, the better their profitability. In 2018, 66 percent of micro companies were profitable, while in the category of small and medium-sized companies, this ratio was over 83 and 95 percent, respectively (Chart 22). Small and medium-sized companies show a sustained improvement in the period under review, while the varying performance of micro companies is mainly the result of new companies entering the market.

The domestic FinTech sector is characterised by improving efficiency paired with high profitability. The ROE (return on equity) of the sector was around 20 percent in the period, while the return on sales (ROS), that indicates efficiency increased from below 7 percent to over 8 percent (Chart 23). The strong increase in revenues in the sector can be mainly attributed to the improved performance of large and medium-sized enterprises that started their operation prior to 2015. In addition to sales revenue, ROE and the efficiency indicator are strongly influenced by the large, foreign-owned companies, but the profitability of some smaller Hungarian enterprises is also well above average in the sector. In respect of all three indicators, smaller companies are characterised by rapid growth, while the return-on-equity ratios of medium and large companies have been stable, with improving return on sales.

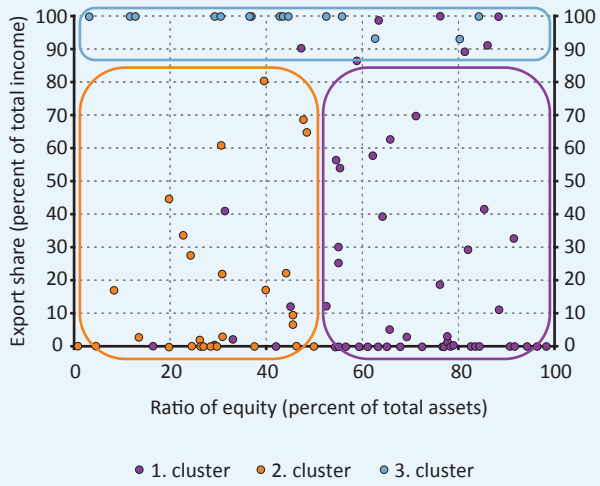
The high export share of the FinTech sector is primarily due to the activities of larger companies providing B2B services. The turnover-weighted export ratio of B2B FinTech companies was between 50 and 60 percent between 2015 and 2018, to which B2C companies have caught up by 2018 (Chart 24). The unweighted export ratio (i.e. the ratio which disregards the size of total sales) was significantly lower in both categories, reaching 35-40 percent in B2B and 10-20 percent in B2C. In the case of foreign-owned companies with strong export orientation: in 2018, nearly 75 percent of their total revenue came from exports, while in the case of companies with Hungarian ownership this rate was 25 percent. Between 2015 and 2018, the export revenues of Hungarian companies increased by almost 23 percent, while this increase was 10 percent for foreign companies, but it is important to note that this dynamic can be primarily attributed to the base effect. Hungarian-owned companies seem to have further possibilities in increasing their export

Chart 24
Change in export sales revenue ratio of B2C and B2B FinTech companies (weighted by sales revenue)



Source: NTCA, MNB.

Chart 25
Grouping of companies in the domestic FinTech sector



Note: Companies in the Hungarian FinTech sector were divided into three groups by k-means cluster analysis, which was carried out on the following seven variables: export share (percent of total sales revenue), ratio of short-term debt (percent of the balance sheet), ratio of equity (percent of the balance sheet), staff costs (percent of sales revenue), profit after taxation (percent of sales revenue), added value (percent of balance sheet), and sales per employee.

Source: NTCA, MNB.

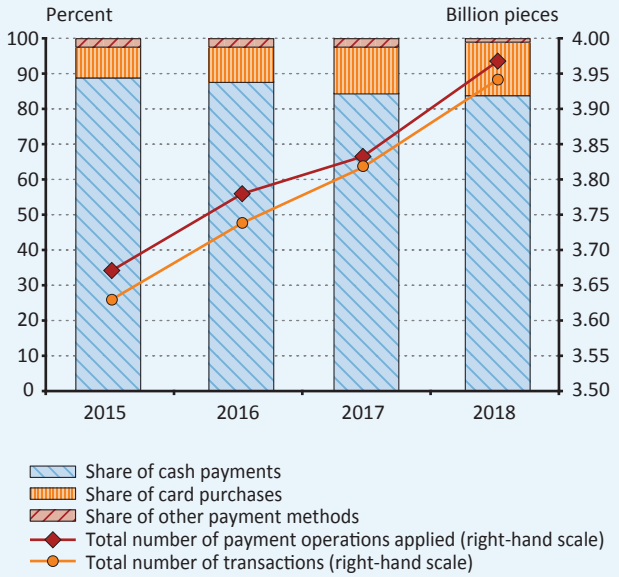
revenues, which may also have a positive effect on their profitability in the future.

Domestic FinTech companies may be classified into three main groups, where the key grouping considerations are reliance on equity and the share of export revenue. In this classification, we considered seven variables, and company data indicated that there are three main company profiles, which could be clearly distinguished (see Chart 25). The first group includes companies with high capitalisation and varying external sales ratios. The second group contains mainly Hungarian companies with low capitalisation, while the third group includes companies which produce almost exclusively for export markets and have varying capitalisation. Based on the above points, service export is the key division between the third group and the other two groups, and in the latter, the ratio of Hungarian and foreign-owned companies is 50-50. If we look at the ratio of foreign companies within the groups, these companies are clearly over-represented in the third group.

Box 4
Measures to support the promotion of electronic payments

Over the past few years, demand for cash in retail transactions has been continuously shrinking in Hungary. The amount of cash in circulation in Hungary has increased significantly in recent years, both in terms of its value and its ratio to GDP. However, it is important to emphasise that this does not mean increasing usage of cash, as the holding cash mainly serves savings purposes instead of transaction purposes, due to the low interest rate environment. This is supported by data from the online cashier system (OPG) of the National Tax and Customs Authority: Between 2015 and 2017, the ratio of cash transactions dropped by more than 5 percentage points (see Chart 26), and the decrease in value was even more significant as the share of card transactions exceeded 30 percent.

Chart 26
Distribution of the number of payment operations among different payment methods according to the online cashier machine database



Note: The sum of cash, card and other payment operations may exceed the number of actual transactions, as there may be transactions where multiple payment methods are used at the same time.

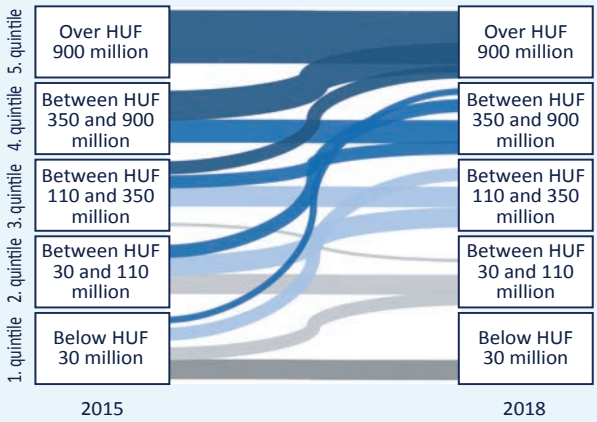
Source: NTCA, MNB.

The increasing use of electronic payments was strongly supported by central bank and government measures in the past few years, as well as by the innovative FinTech payment solutions. About 20 percent of Hungarian FinTech firms are also directly involved in the operation and development of payment services, indicating the extra potentials in the sector and the changes in payment structure. Currently, the main driving force of electronic payments are transactions by card, with an annual 20-25 percent increase in turnover, which was facilitated by several steps taken earlier. The pilot POS terminal installation programme of the MNB in Fejér county laid the foundations for a national programme launched by the Ministry of Finance in 2016, and thus the domestic card acceptance network has been significantly expanded. Under a central bank initiative, interbank fees related to payment cards were regulated in 2014, one year before the European regulations. These central measures are supplemented by the programmes of market actors, for example the card issuing companies. In the field of money transfers, one important improvement was that in 2015, under a central bank initiative, the number of daytime settlement cycles was doubled, so the funds reach the beneficiaries even faster. Another important step was the recent introduction of the online cashier system and the establishment of the Financial Awareness Strategy, which greatly reduced the use of cash in the grey economy and improved the financial education of the population.

Despite the favourable trends, further measures are needed to encourage the use of electronic payments. Apart from the favourable card trend, the MNB considered that additional steps were necessary to expand domestic electronic payment turnover, and therefore it was among the first to launch the mandatory, uniform implementation of domestic instant payments, which may offer a cash-free alternative in basically any situation. Besides the development of the central system, the national POS terminal installation programme may be broadened and transformed so that it can support not only card payments, but also instant payments. It may be advantageous to support the development of the payment infrastructure with certain regulations, e.g. making it mandatory for specified merchant-groups (which can be gradually expanded) to accept electronic payments, as defined in the competitiveness programme of the MNB. In addition, the banking sector is clearly expected to develop user-friendly payment services relying on the central infrastructure of instant payments: based on these developments, banks should facilitate the widespread use of instant payment for most of their clients through package pricing (i.e. eliminating transaction fees directly linked to transfers).

Instant payment service, which has been available from 2 March 2020 for the clients of payment service providers, may fundamentally alter the payment behaviour of corporate and retail banking clients even in the short run. The launch of the instant payment system was successful and during its first two weeks of operation more than 5.3 million transactions were initiated of which 90 percent were settled within 2 seconds. The introduction of this system can fundamentally change domestic payment behaviour as the uses of instant payment are much broader than intraday transfer, thus providing an electronic alternative for many payment situations which could previously only be solved with cash payment. Although the emergence of complementary innovative payment solutions (e.g. sending and receiving messages of claims for payment, mobile payment of integrated cashier systems) is only expected to take place gradually, the potential opportunities of the instant payment can incentivise client to utilise this comfortable and simple cashless payment option besides card payment. In light of these considerations, the spread of electronic payments may be given a new impetus to grow dynamically, to the detriment of cash payments.

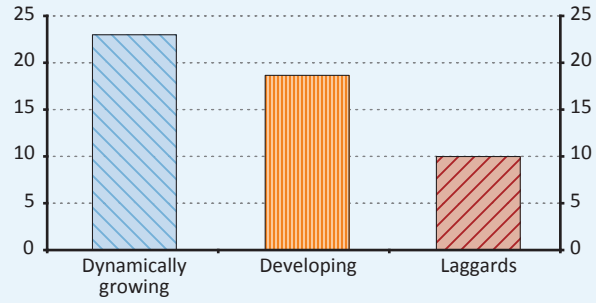
Chart 27
Sales revenue-based dynamics of FinTech companies between 2015 and 2018



Note: The 2015 sales revenue category limits were also used for the 2018 sales revenue data. The thickness of the lines is proportional to the number of companies that changed category.

Source: NTCA, MNB.

Chart 28
Development of FinTech micro companies between 2015/2016 and 2018



Note: We examined the performance of micro companies appearing in the database in 2015 or 2016 in terms of the number of employees and sales revenue. The sales revenue of dynamically growing companies exceeded HUF 300 million by 2018 and their number of employees has permanently increased over 10 persons. Developers' sales revenues or number of employees exceeded HUF 50 million or 10 persons. The laggards did not meet any of the criteria given.

Source: NTCA, MNB.

2.3 DEVELOPMENT OF THE DOMESTIC FINTECH SECTOR

The majority of domestic FinTech companies were able to increase their revenue between 2015 and 2018. About 80 companies involved in domestic FinTech activities were divided into quintiles based on their sales revenues in 2015, after which we examined in which quintiles they were according to their sales in 2018 applying the 2015 quintile boundaries for the 2018 revenue. From the first quintile, more than 60 percent of companies moved to the 2nd and 3rd quintile and moreover, some enterprises climbed to the 4th quantile by 2018 (Chart 27). That is, those companies were able to significantly improve their revenues. From the 2nd quintile in 2015, nearly a dozen of companies succeeded in moving to higher categories. At least one half of the firms in the 3rd and 4th quintiles managed to move upwards, so their sales increased dynamically compared to 2015. In summary, the sector showed a significant development between 2015 and 2018, and most of the companies managed to improve their positions and move to a higher level of revenue. This was especially true for B2C businesses.

By 2018, in almost 80 percent of companies formerly categorised as micro improvement in terms of revenue and employment was observed. Almost 45 percent of the observed companies managed to achieve dynamic growth, while 35 percent can be categorised as developing business (Chart 28). Only less than 20 percent of these companies were unable to achieve significant progress. As to their ownership structures, approximately 40 percent of Hungarian companies and almost two thirds of foreign companies belong to the dynamically growing category, while this ratio is 45 percent and 8 percent for developing companies. In the group of companies that fell behind (i.e. laggards) the ratio of Hungarian companies is lower compared to the ratio of foreign companies.

3 Digitalisation level of the Hungarian banking sector

At the end of 2019 and start of 2020, the MNB assessed the digitalisation level and preparedness of domestic incumbent banks in two phases. The results of the survey show that – although the banking system as a whole is aware of the opportunities and challenges related to digital transformation – significant room remains for improvement. Products need significant improvements for extending full online access, and in the internal operation of banks, it is still possible to make further progress in both human resources and at the system level. The development may be facilitated by the commitment of the institutions at the management level and by the management of digitalisation at a strategic level as a high priority. It is a positive feature that there is more and more emphasis on the provision of work competencies suitable for the digital era and on the digitalisation of work processes.

Chart 29
Digitalisation development index of the domestic banking system by subcomponents

Note: The weighting was done in proportion to the total assets of the institutions surveyed.

Source: MNB.

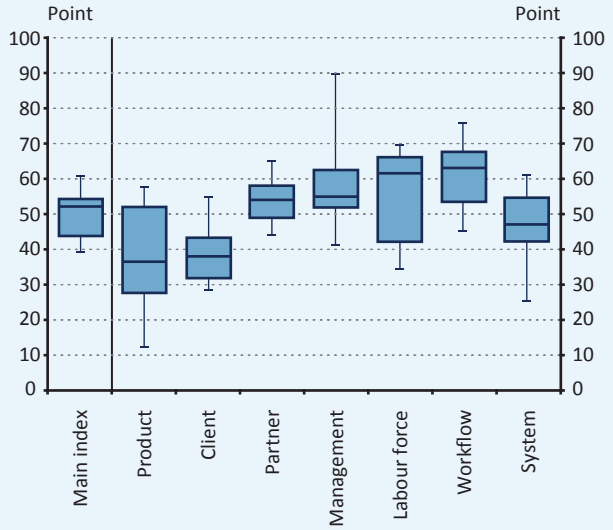
3.1 DIGITALISATION OF THE DOMESTIC BANKING SYSTEM

In 2019 Q4, the MNB assessed the digital maturity level of the domestic banking system via a detailed survey. The survey, which has 7 pillars and consists of almost 250 questions, covered the typical areas of the entire banking operation (Chart 29), in order to provide a comprehensive picture of the current digitalisation situation at large domestic banks (see Box 5). The institutions completing the survey covered more than 90 percent of the banking sector's balance sheet total. Based on the results of the survey, in January a series of personal interviews were conducted with the affected institutions to provide a more thorough evaluation.

All in all, the digital maturity of the domestic banking system is at a medium level. On a scale normalised from 0-100, the whole banking system achieved an evaluation level of 51 in the composite index and the median bank reached 53. However, with regard to each digitalisation pillar, there seems to be significant differences among the banks, while the examined institutions of the banking system show similar characteristics on the whole (Chart 30). As to the digitalisation of internal operations, the sector shows a more favourable picture, while the digitalisation of contacts with external stakeholders needs to be improved in many respects.

In interactions with external stakeholders, several areas requiring development can be identified. In particular, developments to ease digital access to products and modernise contact with clients need to be considered. From the seven examined aspects, the banking system achieved the worst performance in the client and product pillars.

Chart 30
Range of the points by pillars and the total points of the digitalisation development index of the domestic banking system



Note: The chart represents the minimum, the maximum, the lower and the upper quartiles, and the median values.

Source: MNB.

It makes the picture more complex that – in terms of online access and in the use of products – there are significant differences between the examined institutions, meaning that some banks have already made considerable progress. Contacts with official partners (government institutions, authorities) show a higher level of digitalisation on the whole, while there are smaller differences between the institutions in this matter.

The ongoing digitalisation of internal operations can support the renewal of the banking sector. The domestic banking system achieved the best results in the pillars of the digitalisation of the workflow and the digital skills of the labour force, with an only medium-level standard deviation among the institutions. The management at banks are mostly committed to digital transformation, but because of the large differences between the institutions, the digital maturity of the sector in this regard can be classified as medium. In the internal operations, the systems category shows room for improvement, and digitalisation and automation need to be improved as soon as possible in this respect.

Box 5
Description of the bank digitalisation survey and the methodology of the bank digitalisation index

Preparation of the digitalisation survey was supported by various factors. Developing the digitalisation of the financial sector and supporting the introduction of innovative and efficiency-enhancing solutions in a secure framework is highly important for the MNB. An accurate overview of the current situation of the domestic financial system plays an essential role in order to create the proper tools to improve digital competitiveness. For this purpose, in the second quarter of 2019 the MNB undertook a thorough survey, the goal of which was on one hand, to explore the digital maturity of the domestic credit institutions in detail, and on the other hand, to identify those areas, where the system-level application of digital technologies can achieve meaningful progress in competitiveness and efficiency benefits.

The digitalisation survey fully covers the typical areas of banking operations. The survey, which was created by the MNB, consists 7 thematic parts. With the preliminary separation of these 7 pillars, it is possible to assess the digitalisation level of the banking system in a structured way by measuring the digital availability of financial services for clients or the digital competency of the labour force or the preparedness of the banks' IT system.

The digital maturity survey was conducted in the second quarter of 2019. In accordance with the 7 pillars, the selected institutions answered almost 250 questions. According to the size of their balance sheet total, total loan volume and customer deposits, the institutions that completed the survey covered more than 90 percent of the banking system. After the survey, oral interviews were conducted, which gave us the opportunity to assess each topic in detail, overview strategic plans and clarify the background of the answers.

We created a composite index in order to evaluate the results numerically. As the very first step of the index methodology, we constructed sub-indexes for all seven areas, which were created on the basis of the answers to 26 questions on average. We used only used those questions that were useful enough to define a clear ranking among banks, so positive and negative answers were definable from the aspect of digitalisation. In addition, from the original 250 questions we omitted those that were answered with texts, as these answers could not be standardised properly.

We grouped together numerous questions that are related and could be combined, to increase the variation of the answers. All in all, when developing the index, we included more than 180 questions, the majority of which could be interpreted as category variables – (yes/no, multiple choice, five-grade scale), only some questions were possible to interpret directly as number values (interval scale) (Table 1). The rate of questions without an answer was low (approximately 1 percent) and their distribution was quite random, and thus they did not distort the results. Where it seemed justified on the basis of the nature of the question, we standardised the answers with the balance sheet totals or the staff numbers of the banks.

Table 1
Types and number of questions by pillar of bank digitalisation survey

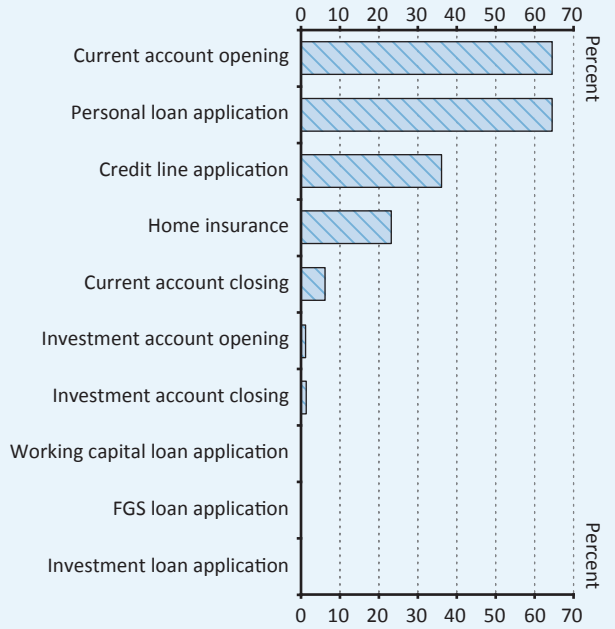
Pillar	Examined topics	Variables that can be standardised (piece)	Variables omitted (piece) (no standard deviation)	Variables involved (piece)
Product	• Sales and administration channels • Supporting digital solutions with pricing tools	50	15	35
Client	• Clients and their habits • Improvement of financial awareness • Marketing and communication	40	7	33
Partner	• Keeping contact with external partners and organisations • Co-operations and developments	16	2	14
Management	• Strategic goals • Management's commitment	15	4	11
Labour	• Employees' competence • Attraction of digital talents	21	1	20
Workflow	• Implementation of new IT process • Harmonisation and data sharing, flow of information among areas • Automation of data management processes • Product development, controlling and feedbacks, complaint management • Cybersecurity procedures	40	1	39
System	• Basic system parameters • System layers • System integration • Cybersecurity	38	6	32
Sum of questions		**220**	**36**	**184**

Source: MNB.

The weight of each variable was determined by the method of Principal Component Analysis. The final objective of our procedure was to combine the variables into one dimension, and this dimension requires the application of a reduction algorithm. We selected the principal component analysis (PCA) as a multiple-variable statistical procedure for this purpose, which weights variables not on expert basis, but on the basis of the information contents of the variables.

Min-max transformation was applied to convert qualitative variables into numerical form, where 1 means the theoretically best answer, and 0 means the worst for a given question, depending on the observations. The sub-indexes were received as the simple index amount of the weight of the variables based on PCA and their converted values. The final index was received by multiplying the weights and values of the seven sub-indexes received with PCA. Based on the result of the sensitivity test (the omission of certain questions, the merging of questions and the application of alternative PCA procedures), the ranking of the banks only changed marginally, and the differences among the main index values were insignificant.

Chart 31
Digital availability of services accessible under current regulations via digital channels (weighted average)



Note: The weighting was done in proportion to balance sheet total of the institutions surveyed. During the mean calculation those institutions which are not selling that particular product were not considered.

Source: MNB.

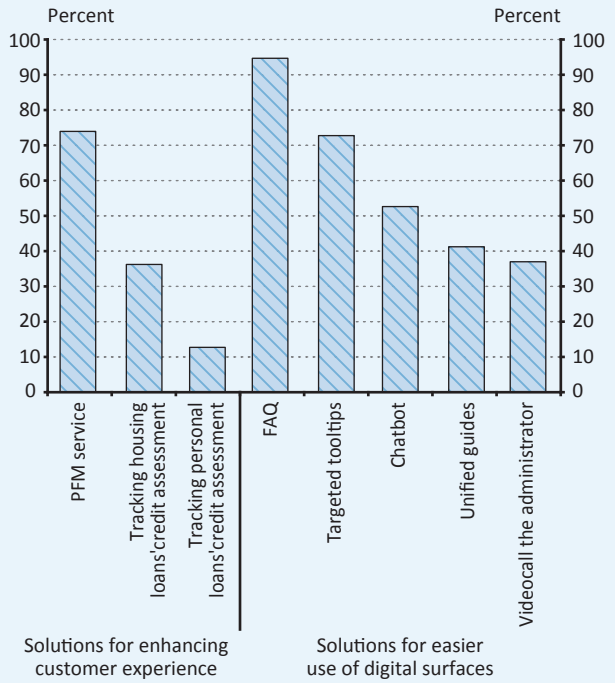
3.2 DIGITALISATION OF INTERACTIONS WITH EXTERNAL STAKEHOLDERS

Despite of the quite wide-ranging possibilities offered by regulations, very few banking products are available in fully online form. In the banking system, personal administration in a branch is often indispensable, even in the case of generally known products. Because of the still existing regulatory limitations and the low level of digital maturity, fully online services are presently only available in the fields of account opening and personal loans. In general, in the case of various applications and account opening processes, electronic client identification and contract signature are not solved yet, and therefore fully online administration is not feasible at most institutions. In addition to the above reasons, the online closing of both the current account and the investment account is made impossible by the fact that the settlement of the funds remaining on these accounts is also not possible without personal attendance (Chart 31).

There seems to be a significant opportunity to enhance digitalisation in the credit application processes as well. At several institutions, in the case of simpler loan products, the client still has to visit the branch not only for identification and signing the contract, but for the preliminary provision of information, clarification of conditions and calculations. In case of corporate loans, personal attendance is required because of the more complex collateral and loan requirements, but processes are hindered in a number of institutions, because even the online submission of the loan application is impossible. Apart from developments in institutions, the modification of the rules of representation (e.g. besides specimen signature, the establishment of new ways of digital representation certificates for companies) may also help in the case of these products.

Institutions attribute more and more importance to the digitalisation of their product range. Although, a wide range of institutions is planning to expand online access to their services, there is still not enough attention devoted to the promotion of digital channels, and therefore only a small portion of product sales comes through this channel. However, there are several ongoing developments in the household segment, mainly in the fields of online client registration and identification, personal loan applications or related to the instant payment system.

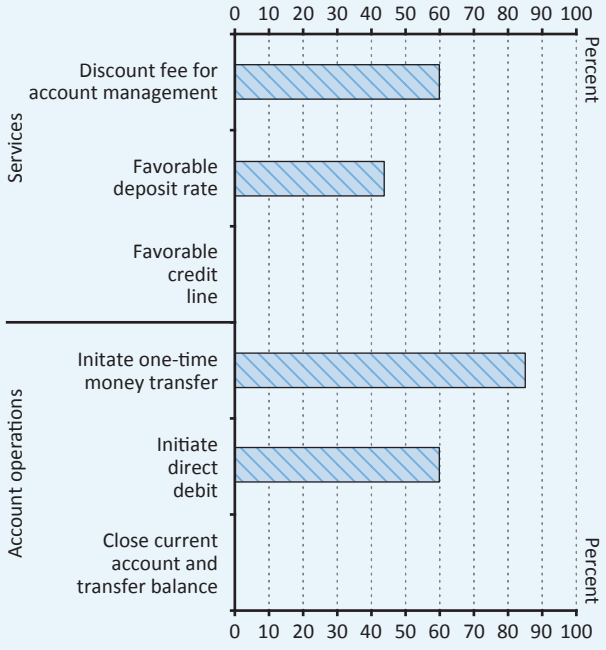
Chart 32
Spread of solutions that exploit potential in digital surfaces



Note: The weighting was done in proportion to the total assets of the institutions surveyed.

Source: MNB.

Chart 33
Applying pricing incentives in case of using certain service types through digital channels



Note: The weighting was done in proportion to the total assets of the institutions surveyed.

Source: MNB.

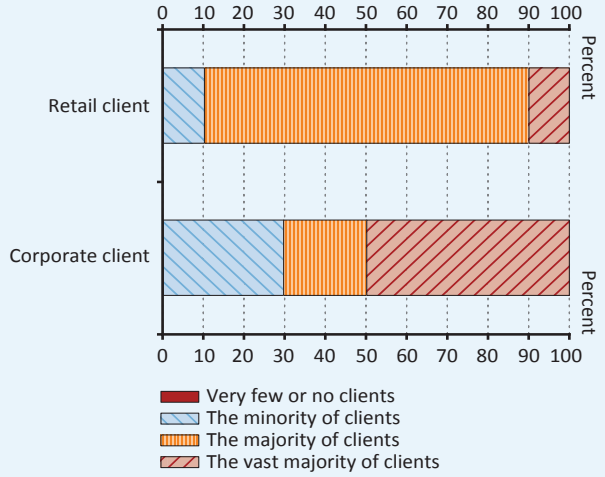
Banks encourage their clients to use digital solutions mainly as another method of administration. At the moment, the product range includes very few solutions that utilise the possibilities of the online space or improve financial awareness. There is still ample room for growth for the introduction and comprehensive extension of the personal finance management (PFM) services, while the possibility for the customers of real-time monitoring of both personal and housing loan assessments is still rare at domestic institutions (Chart 32).

Banks use various tools to support the simpler management of digital interfaces. Institutions have already completed various developments that support the easier use of the existing digital interfaces and to encourage the administration of issues on these platforms. Targeted tool tips are widespread, and chatbots that are offering live automated communication possibilities are more common on the digital interfaces (Charts 32.) Still, further developments are required to utilise the possibilities provided by digitalisation, since video calls are usually limited, and standardised guides for online information collection are also not widespread. Beyond that, the digitalisation of the administration in the branch also needs to be improved to support the digital transition. In this respect, the universal spread of innovative and self-service branches can be also considered as useful.

In relation to digital administration, pricing incentives are only applied by few banks. Only a few institutions apply pricing incentives for submitting applications via digital channels, and even these institutions use these options exclusively for personal loans and home insurances. At the moment, most banks use differentiated pricing in the case of services related to cash flow, primarily by promoting paper-free account management and by supporting the initiation of certain administrative processes through digital channels (e.g. transfers, group collection orders) (Chart 33).

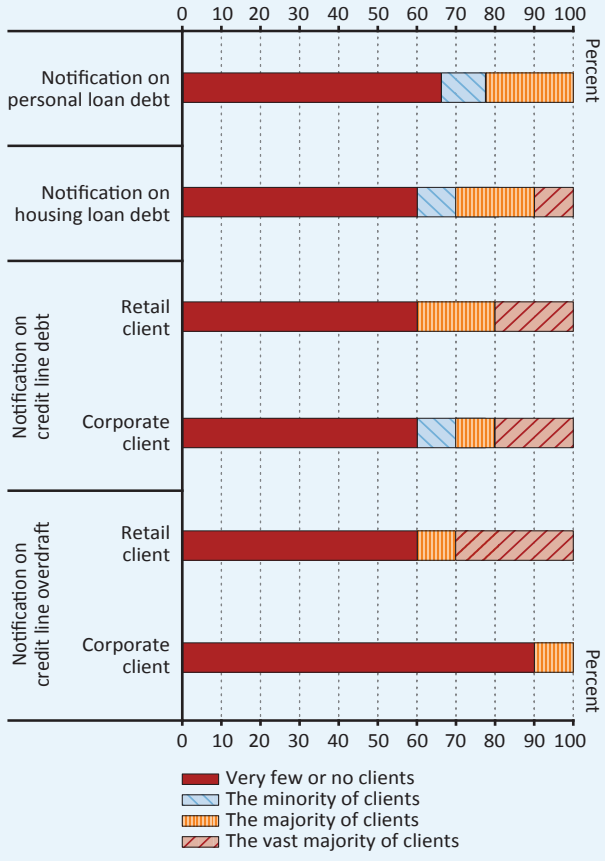
Most clients receive their bank account statements in digital form. As much as 65 percent of retail clients and approximately 55 percent of corporate clients receive their account statements with the details of their transactions digitally. As for retail clients, only slight differences can be detected between individual banks, but in the case of corporate clients, the availability of digital account statements varies widely (Chart 34). Digital statements can be primarily accessed on the internet bank interfaces, and some institutions send these documents in e-mails as well. All institutions send notifications about the availability of the statements through a digital channel. It is worth mentioning here that SMS messages are no longer used by

Chart 34
How typical is it at particular banks that clients receive their account statement in digital form



Note: In the proportion respondents.
Source: MNB.

Chart 35
How typical it is at particular banks that clients receive digital notifications about their loan product



Note: In the proportion respondents.
Source: MNB.

domestic banks, neither to send statements nor to provide information on the availability of funds.

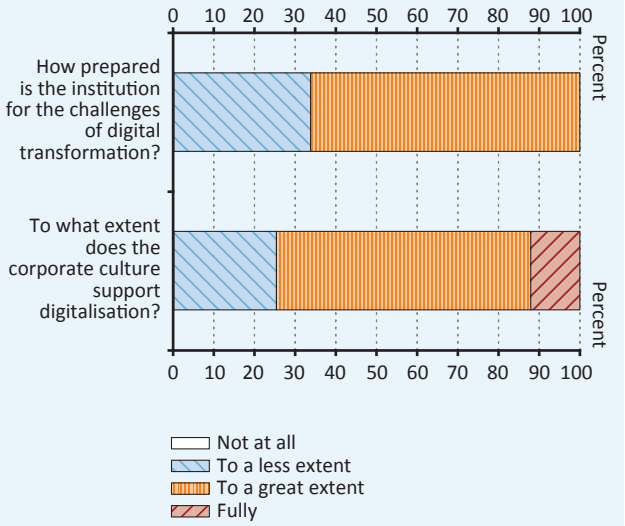
Information on outstanding loans is primarily provided in non-digital form. At most institutions, it is not common that they send notifications through digital channels about their clients' loans (Chart 35). Approximately 10 percent of clients with personal or housing loans receive information digitally about this. Institutions with digitalisation priorities currently focus on the digitalisation of overdraft notifications, which affect the largest number of clients, but even for these products, there is room for significant further development. In the case of these products, very few or none of the clients of 60 percent of the banks receive digital notifications. Additionally, 60 percent of the surveyed banks also usually do not send digital notification about credit line overdraft. In the case of corporate clients this rate is even higher (90 percent).

Digital channels play an important role in keeping contact with internal and external partners. At the sector level, most communication with various authorities takes place on some kind of online platforms. This is facilitated by the fact that at some of the institutions, internal regulations encourage digitalised communication among employees, but there is still room for improvement in this area as well, throughout the sector.

There seems to be more and more willingness to co-operate with FinTech firms and establish partnerships with them. All the institutions believe it is advantageous to collaborate with innovative FinTech companies. Respondents use various approaches to set up co-operation, but more and more institutions use incubation programmes to encourage contacts with innovative companies, which may prove to be more progressive from the aspect of the future implementation processes. There seems to be keen interest in these programmes, but the number of solutions integrated into banks' operations remains low. The realisation in practice of the aforementioned is supported by the fact, that of the four Fintech companies which have an AISP license – with this license, with the client's consent, they have access to customer banking data as a third party – only one of them has launched its open banking service. The essence of the service is that, thanks to an interface, automatically pairing the bank account with accounts payable becomes possible.

Currently, there are three incubator programs operating in Hungary which are supported by banks. The first such initiation by a bank was launched in 2016, and since then two other banks have also created their own framework to

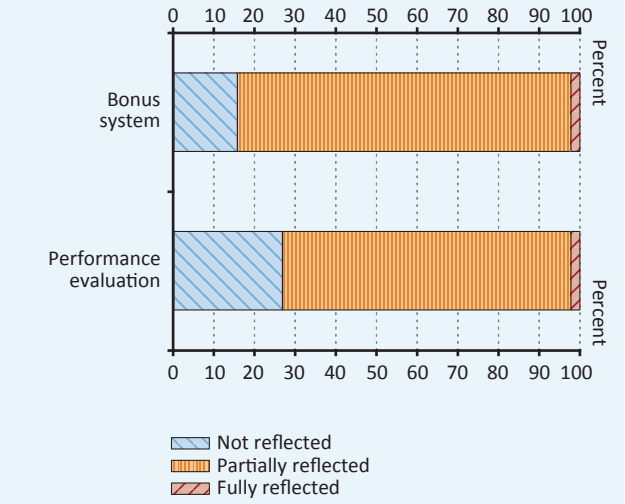
Chart 36
Preparedness and commitment towards digital transformation



Note: The weighting was done in proportion to the total assets of the institutions surveyed.

Source: MNB.

Chart 37
To what extent is the higher recognition of digitalisation tasks reflected in performance evaluation and bonus systems



Note: The weighting was done in proportion to the total assets of the institutions surveyed.

Source: MNB.

support FinTech innovations. The incubation labs develop a strong cooperation with innovative enterprises in the form of infrastructure, professional and sometimes financial aid. Due to the differences in the form of support and goals, the organisational realisation is also diverse at each bank (e.g. as a separate enterprise or a dedicated organisational unit within the bank). More than 750 companies applied to the already operating programmes in total in the case of the affected banks, including both domestic and foreign firms as well. From these applications approximately 90 were approved in total by the banks. Although, the programmes are becoming more popular among the applicants, however the number of solutions which were integrated into banks' operations is still very low.

More intensive banking presence can be detected on the social media interfaces. Nowadays, all institutions are present on a number of social media interfaces, with various intensity: some interfaces are used every day, but on several platforms, activities can be seen with weekly or monthly frequency only. Despite the more intensive presence, institutions do not devote much attention to transferring a significant portion of their marketing activities to digital interfaces. The allocation of resources is moderate: dedicated teams usually have 2-3 members, while the ratio of expenses spent on digital marketing activities is about 30 percent of the total marketing budget at the sector level.

3.3 PREPAREDNESS OF MANAGEMENT AND EMPLOYEES

The management of institutions has already recognised the importance of digitalisation in general. The banking sector as a whole considers digitalisation as one of the key strategic objectives, and most banks presume that they are prepared for the related challenges. Based on the self-assessment by institutions, the corporate culture is fully or highly supportive of the achievement of the aforementioned goals (Chart 36). At most institutions, progress in digitalisation enjoys the highest priority over the medium and long term, as well as the promotion of the use of digital solutions and the improvement of financial awareness.

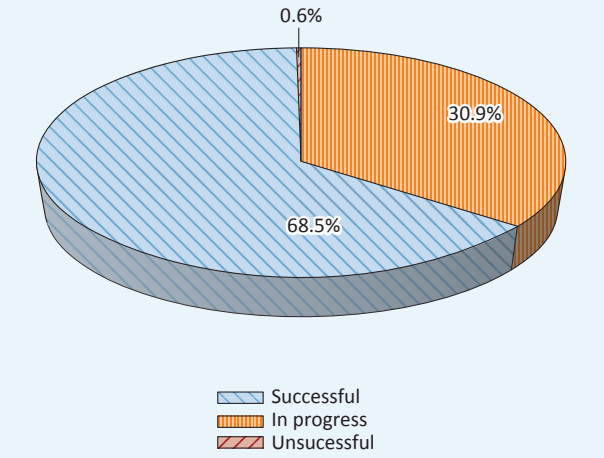
Digital strategies and their implementation steps reflect similar approaches regarding the sector as a whole. In addition to supporting internal developments, all of the examined institutions are building on external developments as well. Although some of the institutions have product-specific and process-specific digitalisation plans in force, the sector typically focuses on a comprehensive and institution-level digitalisation with the expectation of

digital transformation and IT cost optimisation. In order to implement this strategy, each bank has set up dedicated areas responsible for digitalisation. The commitment of the institutions could be strengthened, if managers that are responsible for digitalisation would be the members of the board, although in this respect it looks necessary to set up a more flexible regulatory environment, facilitating the recognition of skills that are increasingly relevant in the digital era. As for the commitment of the management, another area for improvement is that in the performance evaluation systems, digitalisation tasks should have a higher weighting (Chart 37).

There is more and more emphasis on the provision of work competences and conditions that are suitable for the digital era. At the sector level, the ratio of IT professionals with university degrees is still low, at approximately around 3 percent, but for the preparation of the employees for digitalisation, institutions usually provide their employees with software usage trainings, and the application of internal knowledge transfer forums is also widespread. Despite this, the digital competencies and IT skills of current bank employees need improvement in general, even in the opinion of the institutions themselves. In the case of some institutions, the identification of the development areas may be hindered by the fact that they have not assessed the digital skills of their employees at all yet. In general, we can say that advanced internal communication platforms and flexible working hours are provided for most employees at each institution.

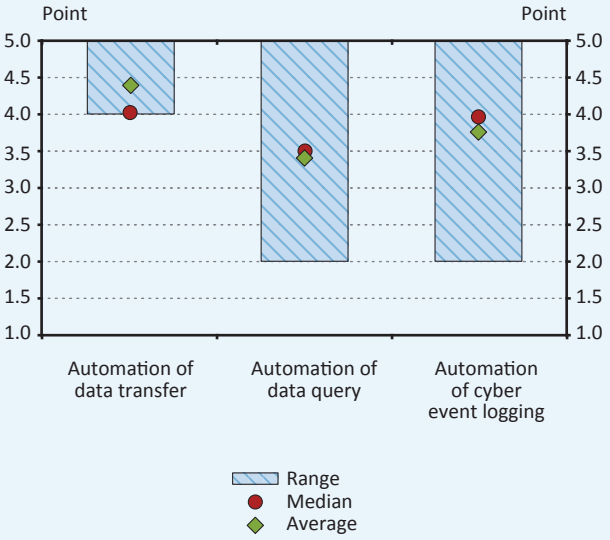
Vast majority of domestic institutions offer the possibility of remote working for their employees. The possibility of working remotely and from home, on the one hand can increase the attractiveness of employers, mainly in the eyes of the younger generation; on the other hand, it facilitates a flexible adaptation for institutions already in normal periods, but especially in case of stressful situations (for example in a pandemic situation). Almost without exception, domestic banks allow remote working for their employees with the use of company laptops and with virtual private networks, so-called VPN. Remote working is supported in almost all specialty areas of banks – for example in product development, risk management or in the IT departments (at 80-90 percent as a proportion of the balance sheet total). In the case of some institutions – due to the nature of the work – there is no possibility for remote working, for example in the fields of treasury, which is heavily involved in daily liquidity management, and branches which deal with personal customer service. The internal rules applied for degree and frequency of remote working differ significantly at Hungarian banks.

Chart 38
Status of the enterprise IT software implementation processes initiated by the banks



Source: MNB.

Chart 39
Evaluation of the automation of the processes of the bank, based on self-assessment



Note: Based on a scale of 1-5, where 1 means that the given process was not automated at all, while 5 refers to a fully automated process.
Source: MNB.

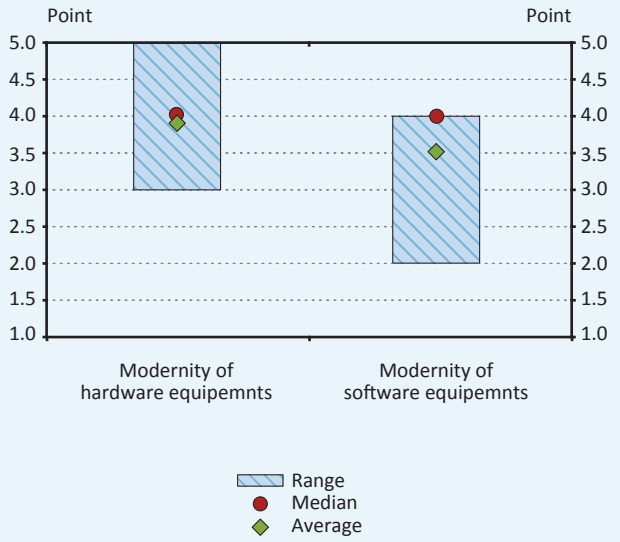
3.4 DIGITALISATION OF INTERNAL OPERATIONS

The banking system pays special attention to the implementation of new enterprise software packages, although there are significant differences in its efficiency. Typically, a quite high number of projects is running in the banking sector which are aimed at implementing enterprise software products, but their spread shows big differences, as there are also less active institutions, but banks leading the implementation find this a key area. Since 2016, more than 300 software implementations have been initiated in the sector, but their complexity and spread vary widely. All in all, the ratio of failed implementations is extremely low, and practically their introduction is continuous (Chart 38), as an implementation process takes 1-1.25 years on average, but for larger projects, it can be longer than 3 years. Although there are continuous developments, and the automation of banks' data transfers, queries and logging tasks is improving, the institutions admitted that there are still some areas to be significantly improved (Chart 39).

Internal communication processes related to basic banking processes are only partially automated. The communication of transactions carried out in the front office, back office and treasury areas to the general ledger or to the accounts usually requires significant amount of manual work for most transactions. In this respect, the back office is the most obsolete, but there are only slight differences between the areas, as institutions usually use the same practice in each field. In the closing of periods and producing senior management reports and analyses, automation is more frequently used, and usually less manual intervention is required in these processes. In the areas of electronic signatures, document management and documentation, as well as monitoring of processes and management approvals, full automation among functional areas within the bank is usually possible in about half of the process elements. The lack of automated approval and standard digital document managing systems is the biggest obstacle to the flow of information in the case of many institutions, but the processes can be usually properly followed by the administrators.

Institutions are in the preliminary phase of the conscious application of their data. Institutions collect various types of transaction data in a digital manner, which are more and more integrated in their product development processes. Although each surveyed institution is able to set up client groups on the basis of client profiles, because of incomplete data collection, the sending of an offer that fits the profile of the client is not always possible from the current product range to the individuals of a given client group. Based

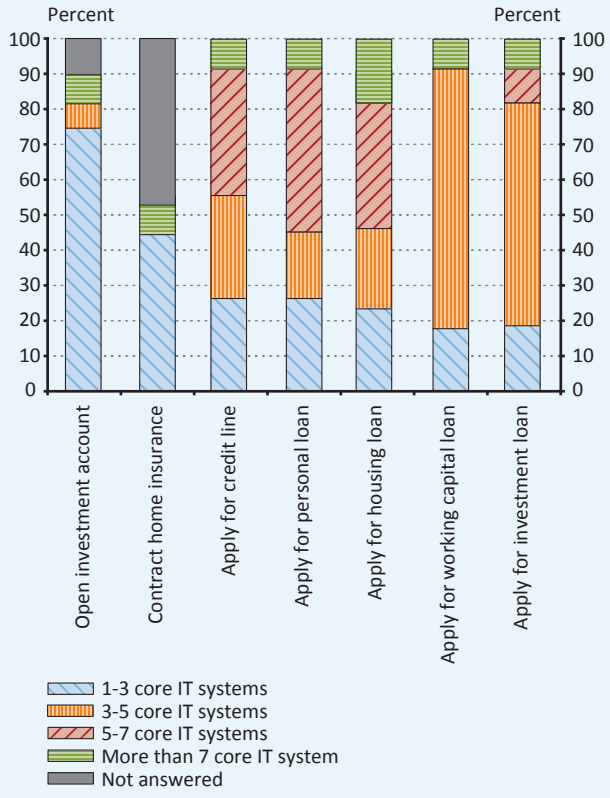
Chart 40
Evaluation of the modernity of banks' equipment, based on self-assessment



Note: Based on a scale of 1-5, where 1 means an obsolete system, while 5 refers to a modern system.

Source: MNB.

Chart 41
Within the various value chains, how many core IT systems are affected by a given process



Note: The weighting was done in proportion to the total assets of the institutions surveyed.

Source: MNB.

on the review of the complaint reporting processes, it is obvious that the reporting interface is available online at each institution, with full functionality, but questions are still answered by the administrators, and therefore the first feedback might take more than 3 working days at several institutions. Additionally, banks still send letters by post with daily frequency to provide information. In this area, and for several elements of the operation, it may be encouraging that digital knowledge management has become extremely important for the institutions, and the existence of targeted courses, software usage trainings and internal knowledge transfer are already general practices.

Agile transformation has already started in some form at most of the institutions and based on the positive experiences it is spreading widely to more areas. At the majority of banks, new products or platforms which usually serve digital customer-access are already being created and brought to market with the help of agile, cross-sectional teams. Usually, the IT, risk management and analytics staff, as well as the branch staff and the UX experts are also involved in these teams. Besides product development, which is aimed at digital channels, an agile way of organising work appears in the fields of risk management or money collection.

Paper-based document management is still dominant in institutions' operations. It is necessary to further develop the internal banking systems and to modernise the hardware equipment, based on the results of the survey and the self-assessment of the institutions (Chart 40). This is proven by the fact that in the case of most of the products, full digitalisation of the process in the value chain is not solved yet, and therefore paper documents are still essential in most cases. In parallel with these processes, the management and filing of incoming paper documents still needs to be improved. Increasing the bandwidth of data transfer and inquiries between the branches and the centre may support developments in the short term.

With regard to digitalisation, the optimisation of process engineering and management of related risks would be also essential. Although digitalisation of the value chains of the whole range of products is not expected on the short run by the institutions, there are plans for the complete digitalisation of the processes of some products at most institutions. Presently, the processes related to individual products affect a various numbers of core IT systems (Chart 41), but for developments facilitating the efficient flow of information and risk management, it is necessary that each institution be able to optimise the systems and processes in the case of a given product range.

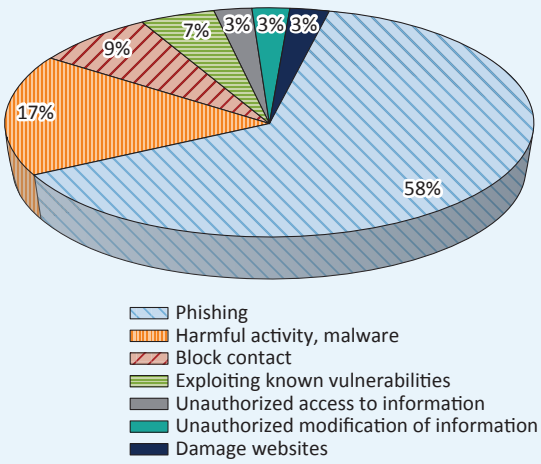
Box 6
Cyber riskS – A new challenge in the era of digital finances

In parallel with the increasing demand for digital financial services, the exposure of financial institutions and their customers to cyberattacks is also rising. As a consequence of various financial services and related administration, as well as the internal processes of institutions shifting more and more to the digital space, cyber threats appear as a new type of risk. Both financial services which handle large amount of data and users which utilise digital solutions are exposed to attacks that are aimed at acquiring the personal and financial data of customers. If the level of resilience of the financial system against cyberattacks is not adequate, it can lead to system-level financial stability risks, as well as severely threaten consumer interests.

Globally, the financial sector is the most affected by cyberattacks. According to market reports, the number of daily cyberattacks amount around 10 million globally.[8] Among these the most common type of incidents are phishing attempts, malware software for hidden copy and transfer of data and man-in-the-middle (MITM) attacks, which are able to infiltrate into and manipulate the communication of two counterparties. In recent years, global actors of the financial sector are the most popular targets of cyberattacks, presumably to obtain direct financial gains.[9] In Hungary, according to data from the National Cybersecurity Institution, 8 percent of reported incidents are experienced in the financial sector.

The vast majority of cybersecurity incidents in the domestic financial sector are phishing attempts which directly target clients. In 2019, according to incident reports arriving to the National Defence Center,[10] more than half of the attacks, 58 percent, against the Hungarian financial system – institutions and their customers – were phishing attempts. The goal of phishing is to obtain personal data, internet banking credentials or credit card data of customers. The most common form of these incidents is spreading unwanted electronic mails that contain the name, logo and other official brand image of the financial institution and consist a reference link to phishing webpages. It also happens, that the attackers send a direct reply to clients, in which they ask for personal information or to download malware software which are attached.

Chart 42
Distribution of financial sector incidents in Hungary (2019)



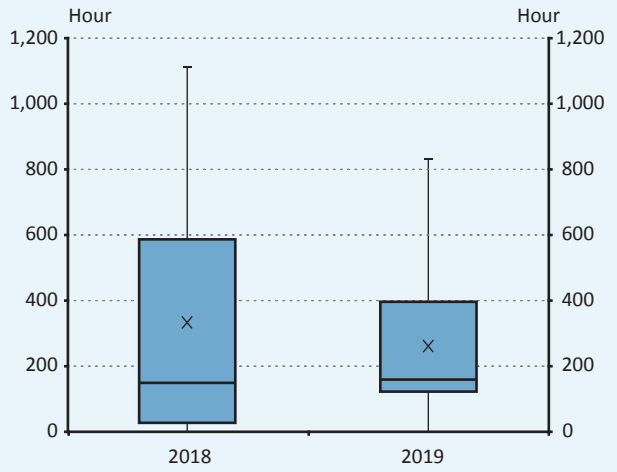
Note: Based on the incident classification taxonomy of the ENISA of January 2018.

Source: National Cyber Security Center.

Besides personal and bank data leaks, cybersecurity incidents can also cause service losses to financial institutions. In 2019, domestic institutions reported 462 incidents in total to the Hungarian central bank. According to MNB data, the reported incidents caused significant service losses –sometimes even 835 hours of loss – for customers and large domestic banks during the previous year (Chart 43). Although, in 2019 cybersecurity incidents caused substantially fewer hours of service loss – 259 hours – compared to 2018, on average, at large domestic banks.

[8] Source: Check Point Software Technologies. Live Cyber Threat Map.
[9] Source: Fireeye Mandiant. M-Trends 2020 Report.
[10] The National Cyber Defence Center groups incidents based on the incident classification taxonomy of ENISA of January 2018 (ENISA (2018). Reference Incident Classification Taxonomy; https://www.enisa.europa.eu/publications/reference-incident-classification-taxonomy/at_download/fullReport)

Chart 43
Extent of service disruptions due to incidents reported by domestic large banks



Note: The chart represents the minimum, the maximum, the lower and the upper quartiles, the median and the mean values.

Source: MNB.

In order to ensure the spread of the secure use of digital financial services it is necessary to strengthen and maintain the cybersecurity of institutions, as well as to broaden the digital awareness of customers. In this regard engagement of the financial regulatory authorities is of special importance, on one hand in the establishment and monitoring of proper implementation of IT security standards, and rules of their supervised institutions, and on the other hand in the development of more aware and prudent customer behaviour and information on actual trends of threats.

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