



FINTECH AND DIGITALISATION REPORT



2021
MAY

*“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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Published by the Magyar Nemzeti Bank

Publisher in charge: Eszter Hergár

H-1054 Budapest, Szabadság tér 9.

www.mnb.hu

ISSN 2732-3145 (print)

ISSN 2732-3153 (on-line)

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.

The Report is based on information available for the period ending 31 March 2021.

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Executive summary

The aim of the MNB's annual publication of the FinTech and the Digitalisation Report is to provide insight into global and domestic financial digitalisation processes. In the financial markets, innovations, digitalisation and the development of technologies supporting them are also becoming more and more important. FinTech services are related to several 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. On the other hand, newly established companies focusing on the provision of dedicated FinTech services as well as the product and service diversification efforts of large technology companies are increasingly inducing an increased presence in financial services. The development of the FinTech sector can be seen also in Hungary; in addition to the incumbent players that fundamentally determine the domestic financial market, there are already 130 companies registered in Hungary that deal with 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 four main areas. First, we present a short overview of the most recent international developments on digitalisation processes and the global FinTech scene. Following that, we provide a comprehensive analysis of the domestic FinTech sector based on publicly available data. In addition, we summarise the findings of our digitalisation survey currently 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 developments or in partnership with some FinTechs. Finally, the report also provides an overview of the digital development of the domestic insurance sector, based on our findings from our questionnaire survey, similarly to the methodology used for the banking industry.

On the whole, the COVID-19 pandemic has had a significant positive impact on international digitalisation processes, but has also highlighted important challenges in the area of cybersecurity and regulation. Through COVID-19, digitalisation processes have accelerated in all industries, so the development of companies with an originally digital business model (e.g. FinTech companies in financial intermediation) has been positively affected by the situation. However, behind the generally favourable picture, there are several factors to consider. On the one hand, the unfavourable economic environment made the operation and profitability of several companies more difficult, and on the other hand, in connection also with the previous one, several FinTech companies had to diversify their activities. Different effects were also observed according to the FinTech area of activity and to the maturity of the companies. However, with several years of digital development, some business models and advanced technologies have entered a more mature phase, while partnerships between market players become more and more widespread, with the strengthening of new types of objectives (e.g. financial inclusion, sustainability). The increased digital presence has also drawn attention to the increase in the frequency, sophistication and thus the dangers of cyber attacks and cyber incidents, so security issues should be managed with priority. Furthermore, due to the continuous technological development and the renewal of business models, the lack of a unified approach in the development of regulatory and supervisory frameworks and approaches related to digitalisation becomes more and more obvious, while international coordination progresses somewhat slowly in this respect. The development of appropriate responses is also influenced by the increasing blurring of boundaries between individual economic sectors, for example, large technology companies also see the provision of various financial services as an important diversification step. There seems to be a growing need for the modernisation of financial regulations, both globally and in Europe, and it is an increasingly important task to implement them in coordination with the broader economic policy directions.

The dynamic expansion of the domestic FinTech sector continues, while the companies of the sector are primarily present in the market as B2B ("business to business") service providers, the potential partners of the incumbents. Based on the data at the end of 2019, the sales revenue of the Hungarian FinTech sector shows a continuously increasing trend, with improving profitability, and the vast majority of Hungarian FinTech companies – with the exception of micro-enterprises – were also profitable in 2019. The number of employees in the sector increased in 2019, and, despite the economic downturn caused by the coronavirus pandemic, in 2020 as well; FinTech companies now employ more than 6,000 people. The vast

majority of FinTech companies in Hungary primarily have a B2B (“business to business”) business model, and regarding the areas of service, they are the most active in financial software development and systems integration, data analysis and business intelligence, and payment services. In terms of size, the sector is dominated by micro and small enterprises, and start-ups are growing at a fairly high rate in the early stages of their development.

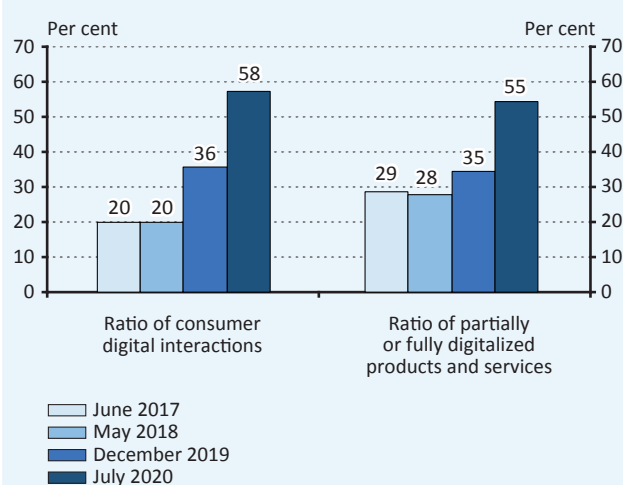
Based on the comprehensive digitalisation survey of the banking system prepared by the MNB, the level of digitalisation of the domestic banking system is still medium, but several players achieved significant catching up in the past year. In the case of the examined group of banks, which covers more than 90 per cent of the domestic banking system in terms of balance sheet total, the digitalisation of institutions showed significant development in 2020. The digital development was primarily observed directly in the previously especially underdeveloped segments, i.e. in the digitalisation of the contact with external stakeholders and customers and in the online availability of products and services. At the same time, it is worth emphasizing that the pandemic situation may have had a significant impact in 2020 on the prioritisation of developments related to external stakeholders. As a result, less resources were allocated to developing the digitalisation of internal operations, which is also reflected in the results of the survey. In view of this, it is worthwhile for the domestic banking sector to give higher priority to developments affecting internal systems and processes in the future in order to exploit the opportunities of digital transformation and strengthen the competitiveness of the sector. In connection with the implementation of a comprehensive digital development covering all sub-areas, an MNB recommendation, which is also a novelty at international level, was issued in March 2021, providing guidelines for the actors of the banking sector. The recommendation expects credit institutions to develop a comprehensive digital transformation strategy and timetable and to send it to the central bank.

In the case of domestic insurers, the relatively high level of development of external relations is accompanied by a slightly lagging internal digitalisation, which is why the sector, like the banks, is characterized by a moderately developed level of digitalisation. In the domestic insurance sector, there are substantial and relevant differences between the market players in terms of the type and number of products and services available, so some players take a different approach to the digital transformation in several cases. At the same time, the results of an MNB survey covering more than 90 per cent of the domestic insurance sector, based on gross premium income, show that institutions are at similar level when examined in terms of their digitalisation development – moderately developed on the basis of an overall score. Insurers are well positioned primarily regarding the online access to products and the level of digitalisation of the related administration for both life and non-life products. In the internal operation, a positive picture emerges about the development of the systems as well, several institutions are at the forefront of renewing their systems, but there is a need for a greater degree of development in connection with the digitalisation and automation of internal processes. At the same time, there is room for significant development in terms of managerial and employee skills related to the digital transformation, which may comprehensively contribute to the digital development of individual institutions in the future.

1 International overview

The pandemic caused by COVID-19 has significantly accelerated the global digitalisation processes. On the whole, it had a positive effect on the FinTech players, which fundamentally have a digital business model, but at the same time a heterogeneous picture emerges behind the positive overall performance depending on the area of activity and the maturity of the company. With the continuous development of the global FinTech sector over the years, digital business strategies are also entering a new phase: open, ecosystem-based operations are coming to the fore, the use of modern and advanced technologies is becoming even more prevalent, and financial inclusion and sustainability goals are becoming increasingly important for innovators. At the same time, the strategic importance of digitalisation, which is partly based on partnerships, becomes decisive also among incumbents. As a dark side of technological development, the frequency and sophistication of cyber-attacks and cyber incidents are also showing an increasing trend, so special attention needs to be paid to this area. In connection with the development of digitalisation, regulatory reactions still not show a harmonised approach, and international coordination is progressing only slowly. Given that the boundaries between economic sectors are becoming increasingly blurred, the most spectacularly in the role of large technology companies, there is a growing need to modernise financial regulations globally, and also in Europe, and to align them with the wider economic policy directions.

Chart 1
The global effects of COVID-19 on corporate digitalisation



Note: Based on a global survey covering all regions, industries and company size categories, in which 899 company executives participated as respondents.

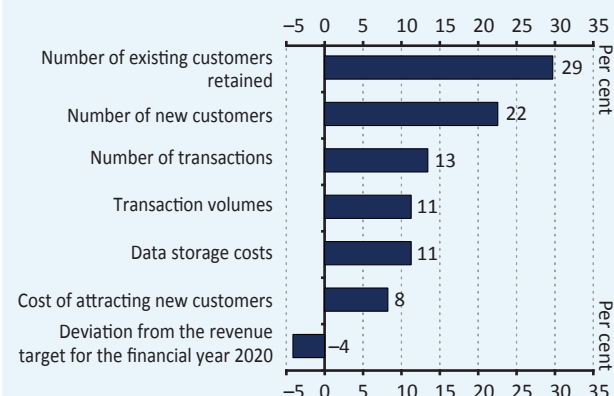
Source: McKinsey (2020): How COVID-19 has pushed companies over the technology tipping point — and transformed business forever.

1.1 THE PANDEMIC CATALYSED DIGITALISATION AT GLOBAL LEVEL

Under the effect of the pandemic, consumers increasingly turned to digital channels. Following the appearance of COVID-19, in order to avoid the spread of the virus and as a result of government lockdowns, interactions and shopping habits have changed radically, with consumers turning to digital channels. Previously, it was worth examining consumer behaviour, including openness to digital solutions, along age segments (e.g., baby boomers, members of generations X, Y, and Z). As a result of the pandemic, the importance of differentiation has diminished after all consumer groups have been forced into the digital space. This is well illustrated by the fact that the proportion of companies' digital interactions with consumers increased by 22 percentage points in six months, thanks to which more than every second interaction took place via digital channels (Chart 1).

Global digitalisation processes have accelerated significantly and these changes will remain with us even after the pandemic is over. The effects of COVID-19 have led to widespread changes: they affected consumers, companies, the FinTech sector, financial institutions and regulators alike. The digitalisation revolution that took place in 2020 not only transformed the behaviour of economic actors in the short term, but also brought lasting changes that could continue to shape fundamental patterns of production, service provision and consumption in the future.

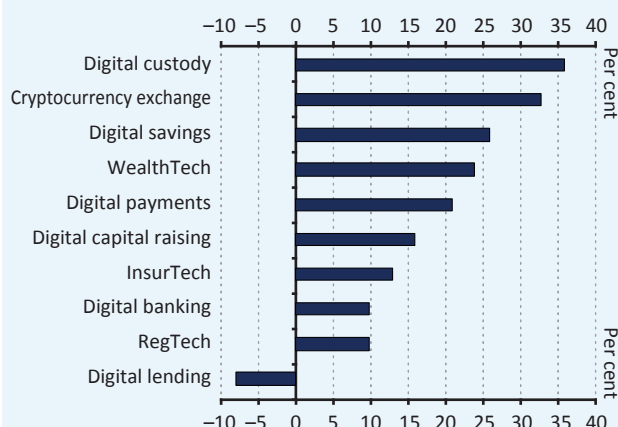
Chart 2
Changes in the key indicators of the global FinTech sector



Note: Annual change between the first half of 2019 and the first half of 2020. Nearly 1,400 FinTech companies in 169 countries participated in the survey.

Source: World Bank Group (2020): *The Global COVID-19 FinTech Market Rapid Assessment Study*.

Chart 3
Changes in transaction volumes for some types of FinTech services



Note: Annual change between the first half of 2019 and the first half of 2020.

Source: World Bank Group (2020): *The Global COVID-19 FinTech Market Rapid Assessment Study*.

1.2 THE PANDEMIC SITUATION HAS A SIGNIFICANT IMPACT ON FACTORS SUPPORTING THE GROWTH OF THE FINTECH SECTOR

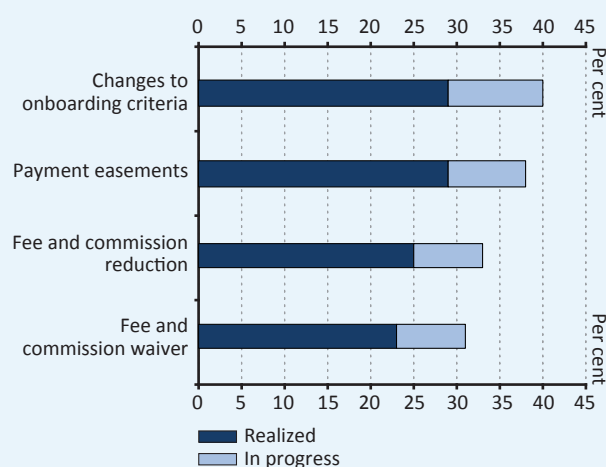
As a result of the pandemic situation, most FinTech players were able to significantly increase their customer base, but in 2020 they fell slightly short of their previous revenue plans. In the challenging 2020 year, the sector as a whole was able to grow in terms of transaction volume and number of transactions compared to the previous year (Chart 2), while also making significant progress in maintaining and renewing customer relationships and attracting new customers. However, in line with the growth, costs also increased, mainly due to the increase in costs related to the ever-appreciating data storage, cyber and data protection, and the involvement of new customers. On the other hand, there is less room for cost-side adjustment for FinTech companies, as in many cases they are in the early stages of their life cycle or operate from their investor's capital, producing a loss. Despite the growing customer base, the players in the sector fell slightly short of their previous revenue plans for 2020.

Behind the overall positive performance of the FinTech sector, a heterogeneous picture emerges according to areas of activity. The pandemic affected worst the lending FinTechs, whereas this type of service, in a unique way compared to the previous year, could not grow. Also, companies more closely involved in tourism, dealing with foreign exchange conversion or travel insurance, came under pressure, but they were able to mitigate the negative effects by diversifying their product portfolio. The biggest growth can be seen in the segments related to digital investment services, such as digital custody, cryptocurrency exchange, digital savings and WealthTech (Chart 3).

FinTech players have dynamically adapted to the new conditions caused by COVID-19. Two-thirds of them implemented several changes to their services sales model (Chart 4). In addition, FinTech companies that used to be present with only one or two services also placed increasing emphasis on diversification: 60 per cent of them have introduced a new product or service and another 32 per cent are in the process of doing so. The most popular of these were non-financial services with significant added value and cybersecurity innovations.

The strict government lockdowns typically had a positive impact on the performance of players in the FinTech sector. Based on both the volume and number of transactions, it can be observed that the stricter the government lockdowns were in 2020, the better the performance of FinTech

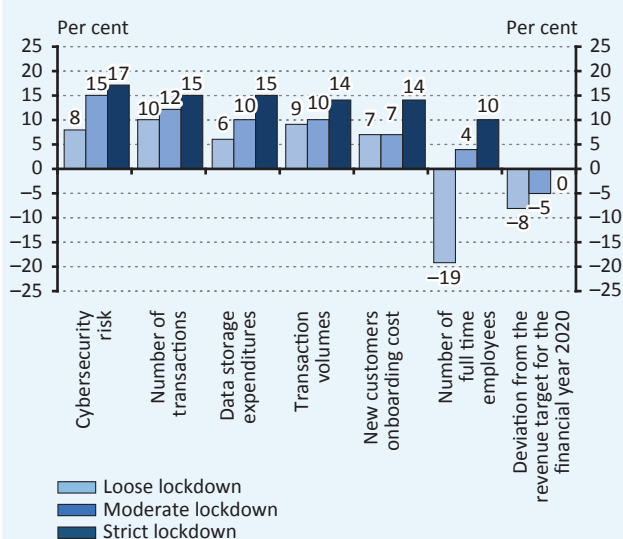
Chart 4
Most commonly applied changes to products and services already provided



Note: In the proportion of the respondents.

Source: World Bank Group (2020): The Global COVID-19 FinTech Market Rapid Assessment Study.

Chart 5
The effect of different levels of lockdowns on certain indicators describing the operation of FinTech companies



Note: Annual change between the first half of 2019 and the first half of 2020.

Source: World Bank Group (2020): The Global COVID-19 FinTech Market Rapid Assessment Study.

companies was. With strict lockdowns, transaction growth was about 50 per cent higher than with light lockdowns (Chart 5), but this was also accompanied by an increase in operating costs. The strictness of the lockdowns is also reflected in the development of sales revenues, which, due to the flexible operation, also had an impact on the number of employees. All of this is a good reflection of the fact that when tighter closures put more pressure on traditional business models, FinTech companies were able to more successfully assert their competitive advantage arising from their innovative, flexible solutions.

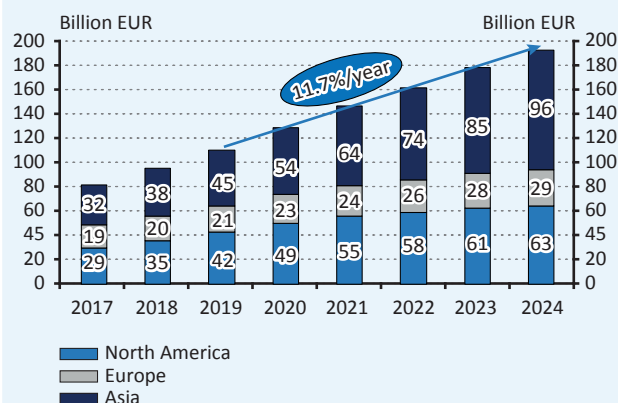
1.3 THE CONDITION OF THE FINTECH ECOSYSTEM DURING THE PANDEMIC

During the pandemic, the financial technology sector entered a new phase. The current situation awakened both incumbent institutions and emerging FinTech companies to the importance of closer collaboration to market share and expand product offerings. Although FinTech companies fell slightly short of previous revenue plans last year, growth is expected to continue with a focus on Asia and the United States (Chart 6).

FinTech and digitalisation business strategies increasingly focus on open, even ecosystem-based and personalized solutions. The development of the FinTech solutions and the market is shown by the fact that most innovations no longer focus only on the implementation of a digital alternative to a traditional process or service segment (e.g. money transfers, transactions), but also on the renewal of the entire financial intermediation. An increasing trend in this approach is open banking, where the vision is to transform the financial sector into a “plug-and-play” form that provides low entry costs and a more competitive financial sector. In this system, the customers own their data and can choose who, how and when can use it.

The so-called neobanks operating without a physical branch grew dynamically in the new situation. As a result of the pandemic, the fully digitalised provision of services and the support of online payment solutions have become particularly important, which is why the aggressive expansion of neobanks, which was generally financed from the resources of capital market investors, continued. The business models of these providers place particular emphasis on open ecosystem-based operations, thus supporting more personalised service use. It is questionable when aggressive customer acquisition will be replaced by a strategy that focuses on profitable operations, because then it will be possible to really differentiate the extent to which neobanks can provide value-added services to

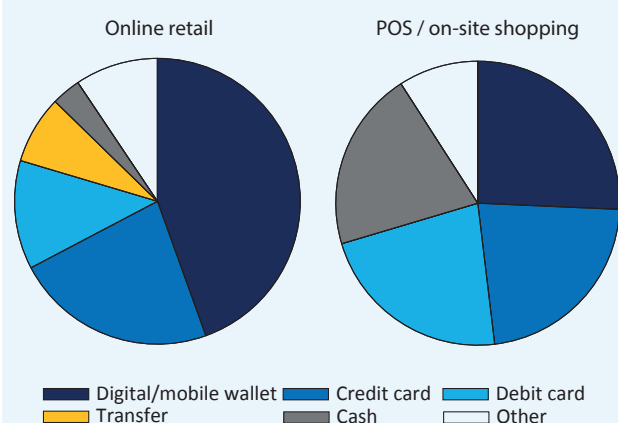
Chart 6
Sales forecast for the global FinTech sector



Note: Facts up to and including 2018. Data converted to EUR based on USD values at EUR/USD exchange rate of 1.18 in September 2020.

Source: Deloitte (2020): Fintech – On the brink of further disruption.

Chart 7
Distribution of payment methods for different retail transactions (2020)



Note: In the proportion of transaction volume.

Source: Worldpay (2021): Global Payments Report.

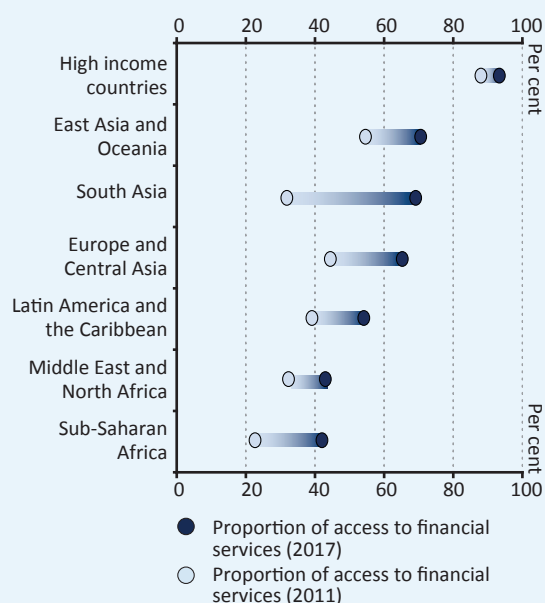
customers in the long run compared to traditional banking players.

The spread of digital banking also enhances the user experience and increases expectations in this respect. The potential of digitalisation goes beyond placing traditional processes in the digital space, and substantial efficiency increases can be achieved with increasing customer satisfaction. In this regard, the spectacular development can be seen in the opening of bank accounts: from the submission of the request to the provision of the account, the number of “clicks” required from the customer on various interfaces is drastically reduced. This process was initiated by the rise of neobanks, but several incumbents have already also optimised their digital account opening processes. On the other hand, innovative digital solutions are becoming more and more important in the execution of payment transactions, a good example of which is the development of mobile wallet solutions available on smartphones. This service allows for the secure storage and quick retrieval of payment information, whether online or during a purchase in store (e.g. via NFC). In both examined shopping categories, this payment method has become dominant globally, with a penetration on the basis of transaction volume of almost 50 per cent at online shopping and 25 per cent at physical acceptance locations in 2020, while further growth is expected in the medium term (Chart 7).

In 2020, the inclusion of those previously without a bank or mobile payment connection into digitalised financial services became particularly emphasised. The maintenance of businesses and the need to access online payment solutions all justified the fact that during the pandemic, FinTechs should accelerate the inclusion of those previously without a bank connection into the financial services market, especially in the field of payment services, further strengthening the development of the last decade (Chart 8). Primarily through the intensive use of remote customer onboarding and KYC (Know Your Customer) technologies, the FinTech sector, in addition to digital wallet services, is at the forefront of supporting peer-to-peer lending, with the use of alternative scoring procedures, the transformation of cross-border transfers and even the transfer of public sector subsidies making technological results available to a wide range of social groups.

The development of the sector is no longer driven only by start-ups and emerging incumbents, but BigTech companies – also known as tech giants – become increasingly important players in the financial services market. These technologically advanced and mature companies increase competition in the financial services

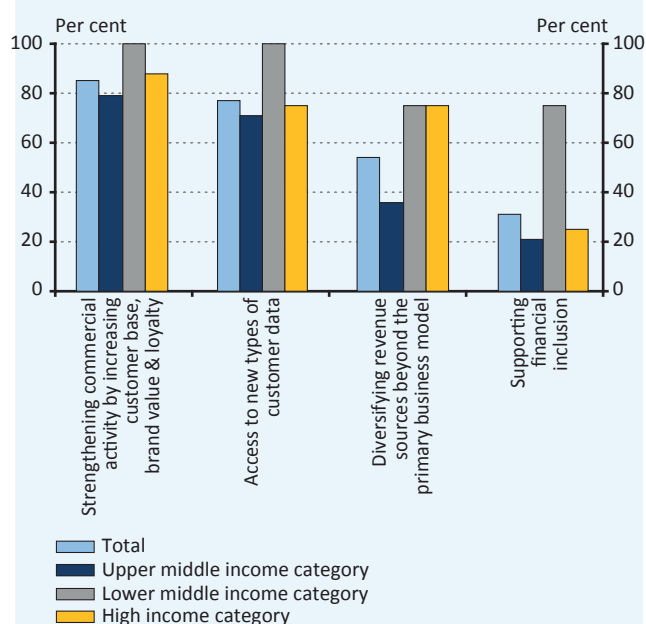
Chart 8
Proportion of population with access to financial services and its change in the population over the age of 15 years



Note: High-income countries, which form a separate category, have been excluded from the data of each region.

Source: World Bank, Global Financial Inclusion Database.

Chart 9
Motivations for BigTech companies to appear in financial services in developing and emerging countries



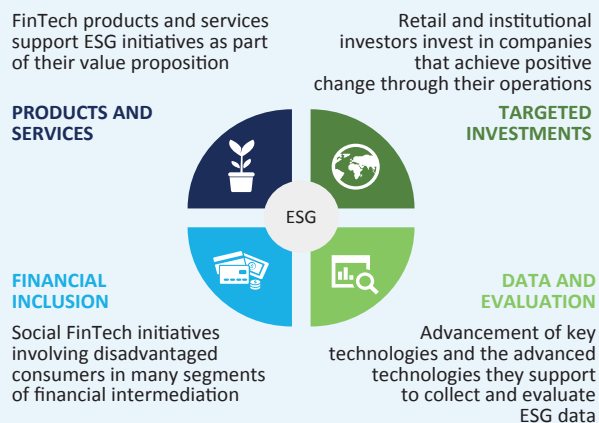
Note: Motivations of BigTech companies to start operating in a given category of country based on self-declaration. According to the World Bank methodology, the meaning of the income categories in terms of GNI/capita indicators in 2018: Lower middle: 1,026-3,995 USD, Upper middle: 3,996-12,375 USD, High: 12,376 USD or above.

Source: FSB (2020): BigTech Firms in Finance in Emerging Market and Developing Economies - Market developments and potential financial stability implications.

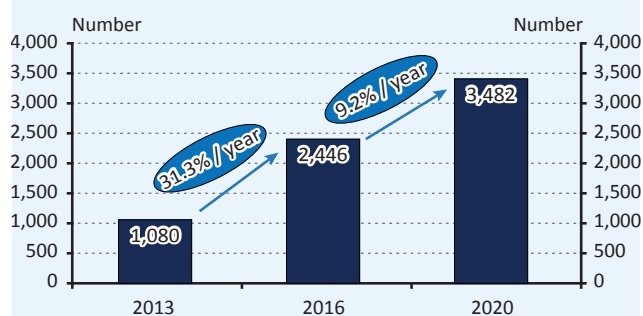
market, which improves both service quality and efficiency. They can also facilitate financial inclusion by getting their multi-million customer base to learn about digital financial services (Chart 9). At the same time, the potentially negative aspects of the growing presence of BigTech companies in the financial services market have recently begun to emerge. While FinTech companies are typically small, competitive players focused on a certain niche market – and have increasingly partnered with incumbents in recent times – this is typically less the case for BigTech companies. From a regulatory and consumer protection point of view, one of the biggest risks, apart from their mainly data-driven activities, could be the cross-border financial services activity and the high degree of market concentration, which can lead to serious problems in the event of even a minor service outage.

In the financial services market, in addition to digitalisation, the promotion of sustainable development has become decisive, which is already increasingly internalised by FinTech companies. The financial services sector has undergone a major transformation in recent years, driven by digitalisation, but sustainability has now become a priority as well. In addition to general engagement, FinTech companies at the forefront of digitalisation can contribute to sustainability goals primarily through the use of IoT (Internet of Things) technologies to measure greenhouse gas and other harmful emissions, quantify the ecological footprint of current activities, measure the share of investment portfolios supporting green goals, and actively manage their portfolios based on investor objectives (Chart 10).

The spread of FinTech solutions is substantially supported by the underlying innovative technologies. Artificial intelligence has become indispensable by now in almost all areas of financial processes and institutional operations to ensure efficient and customer-oriented operations. New types of analytical technologies based on large-scale databases (big data) have revolutionised both forecasting and personalisation. In this case, machine learning can be used for intelligent customer profiling and portfolio management without human intervention. Similarly, self-learning algorithms have become indispensable in the field of fraud prevention and risk management. RPA, or robotic process automation, can free up human labour for creative workflows by performing repetitive, scheme-like workflows such as data collection, information compression or transaction management quickly and without error. Artificial intelligence is also opening up the space for innovative processing of natural languages, making it possible to manage a significant part of customer communications on a machine-based basis. With written or voice-directed banking, customers can use a voice assistant to navigate in

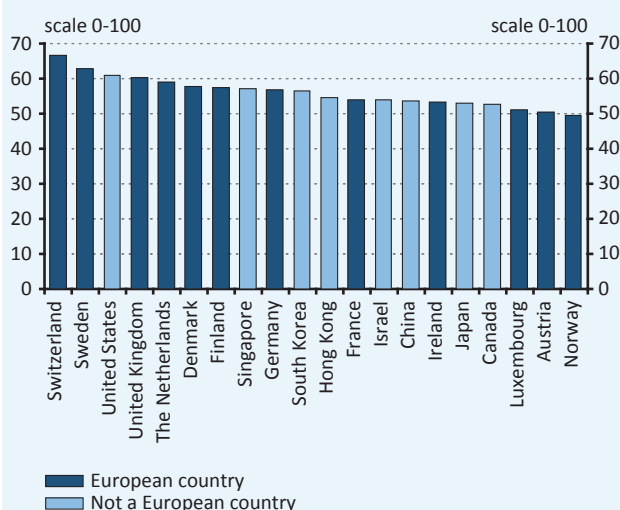
Chart 10**Four key areas where FinTechs can support sustainability (Environmental, Social, Governance – ESG) goals**

Source: Gomedi (2021): ESG meets FinTech: A strategic analysis.

Chart 11**Developments in the number of European FinTech companies**

Note: Data collection on April 8 2020.

Source: Deloitte (2020): Fintech – On the brink of further disruption.

Chart 12**Ranking of leading countries in the field of innovation**

Source: Global Innovation Index (2020): Who Will Finance Innovation?

their affairs, manage their accounts, initiate transactions and plan their expenses, incomes and investments with a complex financial assistance service. The operation of AI-based functions usually involves the use of cloud-based services due to the need for large databases, fast or timed processing capabilities and scalability. The use of blockchain technology in financial transactions has also accelerated in recent times – and not just because of the rise in the popularity of cryptoassets. In essence, the tokenisation of financial instruments, i.e. their virtual mapping, trading, automated clearing and settlement, or the emergence of related smart contracts, is significantly growing, and as is the drive to create interoperability between traditional and blockchain-based infrastructures. In addition, biometric technologies are increasingly used by FinTech companies, especially for identification and authentication functions.

1.4 THE STATE OF THE FINTECH SECTOR IN EUROPE

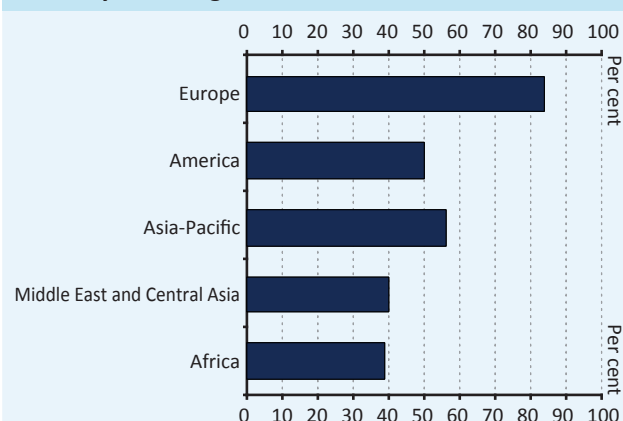
Europe is lagging behind the US and China in FinTech activity, but there are a number of features that could allow for a dynamic catching-up. Despite a near tripling in the number of FinTech firms on the continent between 2013 and 2020 (Chart 11), the supply of FinTech services still grew at a slower pace compared to other regions due to the earlier development of a more advanced and more widely available financial infrastructure. However, the pandemic could help the continent to increase its activity in all FinTech segments, building on the growing openness of economic actors to innovation (Chart 12) and on the advanced digital infrastructure (Chart 13).

In addition to the opportunities, there are also significant challenges ahead of the FinTech businesses in Europe. The pandemic that started in 2020 has created serious obstacles for them as well as amplified their vulnerabilities preventing them from growing. The main problem is the narrow service focus and the fact that there are still only a few FinTech businesses that operate profitably: while before the COVID-19 the best incumbent banks in Western Europe were making profits of €150-350 per customer, the leading digital financial players in Western Europe typically made losses of €30-40 per customer.¹

Following a global pattern, most FinTech companies in Europe are now also focused on payment services, but insurance and business services become also increasingly dominant. The largest inflows of investor capital continue to flow to payment service providers and banking platforms, and investors remain confident of further dynamic growth

¹ McKinsey (2020): Detour: An altered path to profit for European fintechs, <https://www.mckinsey.com/industries/financial-services/our-insights/detour-an-altered-path-to-profit-for-european-fintechs>

Chart 13
Proportion of digital transactions in the population over 15 years of age



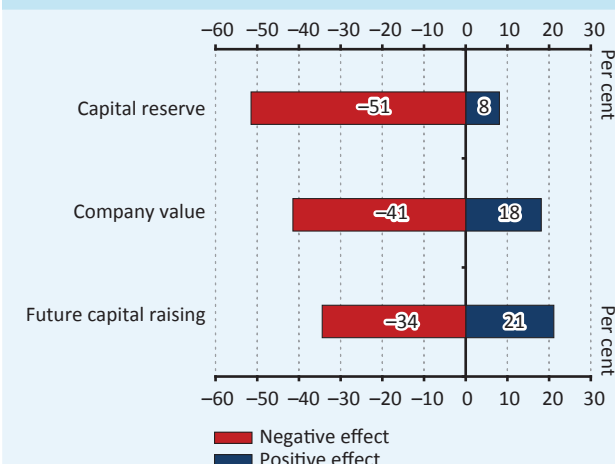
Source: World Bank Group (2018): *The Global Index Database 2017*.

Chart 14
Distribution of the number of European FinTech companies by type of service provider



Source: Deloitte (2020): *Fintech – On the brink of further disruption*.

Chart 15
Change in the financing situation of FinTech companies in the light of the pandemic situation based on the assessment of the company managers



Note: In the proportion of the respondents.

Source: World Bank Group (2020): *The Global COVID-19 FinTech Market Rapid Assessment Study*.

in this sector. Alongside these services, however, there has also been an increase in the number of businesses using and exploiting the potential of cryptoassets and distributed ledger technologies (DLT). In addition, companies operating in the area of RegTech (Regulatory Technologies) are starting to gain increasing market shares, and further dynamism is expected in the future due to the evolution of technology and the changing market conditions (Chart 14).

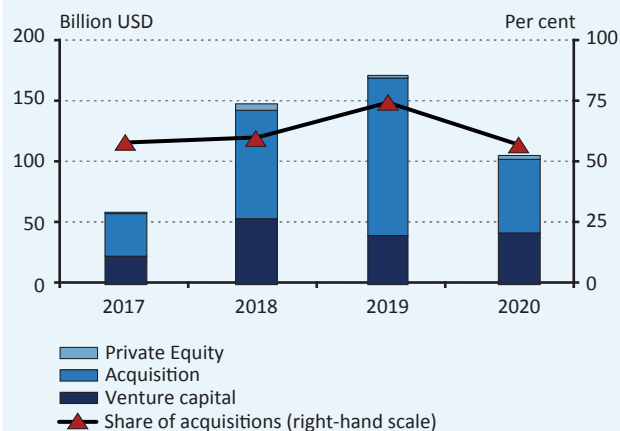
1.5 FINANCING OF FINTECH FIRMS

The emergence of COVID-19 has negatively affected the FinTech sector from a financing perspective. As risk-sensitivity increased, there was a significant fall in investment. According to FinTech executives, the pandemic has not only negatively impacted the capital position but also the value of their companies (Chart 15). Business leaders are least negative about the impact on future capital raising opportunities.

After the shock, investment appetite improved in 2020, but the upturn seen in previous years has stalled. After recovering from the initial shock of the pandemic, by the second half of 2020, FinTech firms adapted to the changed situation and investor confidence improved after the initial uncertainty. Despite this, the total value of global FinTech investment in 2020 was below the previous year, halting several years of growth. The decline in investment in FinTech companies is mainly due to the lack of large acquisitions which in previous years were the most important source of funding (Chart 16). However, the positive developments in the second half of the year are encouraging, with the value of investments doubling and acquisitions increasing fivefold compared to the first half. However, cross-border acquisitions were essentially paused throughout 2020, and the role of venture capital increased instead. Many of the acquisitions seen in the second half of the year are related to mature FinTech and BigTech companies, mainly due to service diversification and geographic expansion. Globally, it can also be observed that larger, well-capitalised companies find investors easily, while the small, early-stage FinTech companies face funding difficulties. In both the short and long term, the ability of more mature, stable companies to attract capital may be the determinant owing to the risk-averse investor behaviour in the wake of the coronavirus crisis.

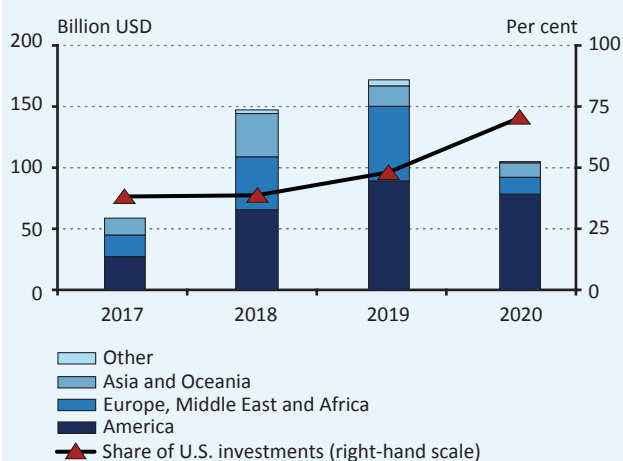
In 2020, the concentration of FinTech investment in the US reached a record high. Most investment will continue to flow to the Americas and within that to the United States. In 2019, US FinTechs already accounted for nearly 50 per cent

Chart 16
Global FinTech investments by form of financing and the significance of acquisitions



Source: KPMG (2020): The Pulse of Fintech.

Chart 17
Global FinTech investments by region and importance of the United States



Source: KPMG (2020): The Pulse of Fintech.

of global investment, but this rose to unprecedented levels in the year of the pandemic, with 71 cents of every dollar invested in the FinTech sector going to the US (Chart 17).

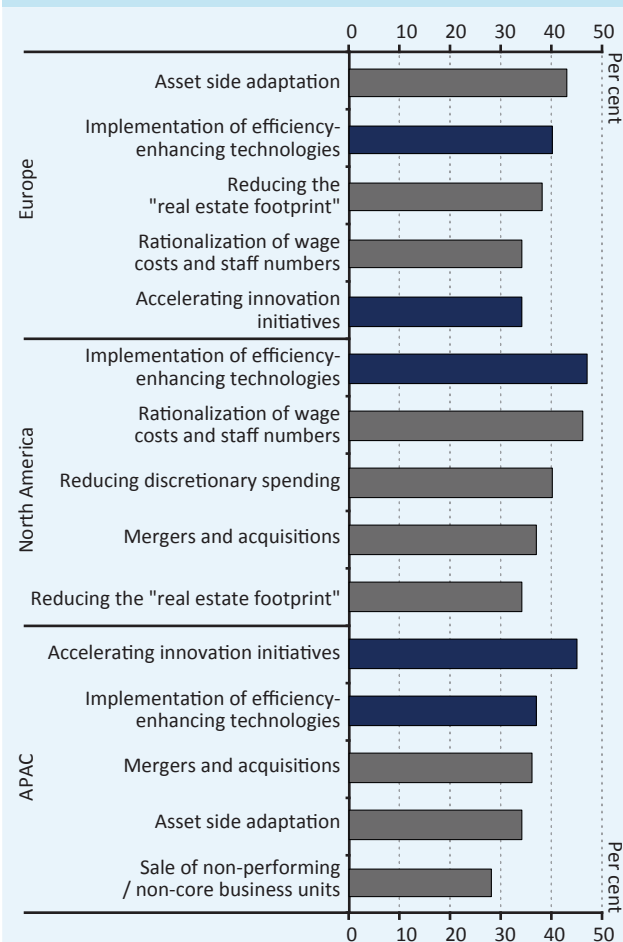
Although payment services remain the most popular of the various service types, the pandemic has led to an appreciation among investors of certain segments that were previously less relevant. Interest in payment services has increased as the pandemic has brought digital payment solutions to the fore. As BigTech and non-financial companies are increasingly opening up to embedded payments and end-to-end services, the demand for B2B (business to business) payment services also grows. In addition, last year saw leaps and bounds in a number of segments that were previously less relevant from a financing perspective. The rise of RegTech can be traced back to companies working to rapidly digitalise processes, looking for cost- and time-effective ways to manage regulatory requirements in a changing business environment. The increase in cybersecurity investments is a result of companies around the world looking for answers to the growing cybersecurity challenges associated with working from home and the increasing use of digital channels. In addition, FinTech companies working with blockchain technology and cryptoassets are also gaining attention.

1.6 INTERNATIONAL LANDSCAPE ON BANKING DIGITALISATION AND BANK-FINTECH COOPERATION

Digital transformation is becoming increasingly strategic for the banking sector. The pandemic and its economic impact have also forced traditional institutions in the financial sector to adapt quickly. During the COVID-19, service providers who were already prioritising digital developments have become easier to reach from the customer side, and digitalised workflows have led to more resilient operations during the crisis. As external and internal banking developments are ramping up, the incumbents are increasingly committed in the longer-term to the overall digital transformation of the whole organisation, and its successful implementation becomes a strategic priority. Within this, particular emphasis should be placed on a high-value proposition in financial services, where value means simple, fast and convenient services in addition to affordable pricing. In addition, in a challenging economic climate, the operating models of the banks will only be sustainable with digitalisation to ensure more compact and flexible operations.

The digital transformation of banks can bring innovation also in terms of the technologies used and organisational

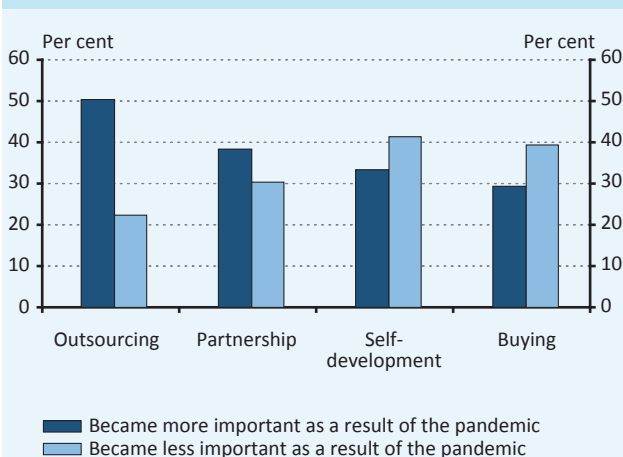
Chart 18
The TOP5 steps planned to maintain financial and operational stability over a 6-12 month period by region



Note: Steps related to digitalisation are marked in dark blue.

Source: Deloitte (2020): 2021 banking and capital markets outlook.

Chart 19
The planned form of implementation of banking developments and investments in the light of COVID-19



Source: Deloitte (2020): 2021 banking and capital markets outlook.

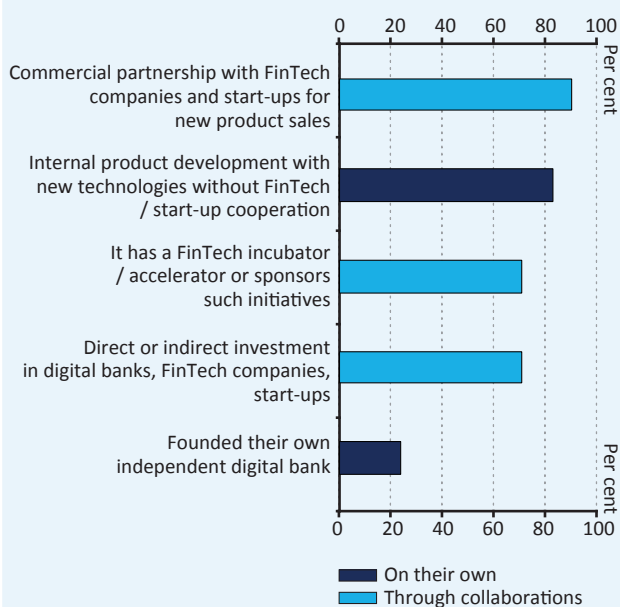
culture. The implementation of advanced technologies enhancing efficiency is also a priority for all regions in the context of recovering from the crisis and adapting to the economic environment in 2021, although European and North American banks are less likely to accelerate innovation initiatives (Chart 18). In addition to the technology-driven transformation, a kind of cultural transformation has also begun, helping to lay the foundations for modern technology in the right mindset. Thus, special emphasis is placed on employees, in which, in addition to maintaining and improving productivity, their well-being and satisfaction also appear.

The successful digital transformation of banks can increasingly take place on the basis of FinTech-incumbent collaborations. The pandemic period has highlighted the need to accelerate digital developments for the incumbents in all financial systems around the world. In connection with rapid adaptation, the incumbents are increasingly recognizing the potential of partnerships, as FinTechs, start-ups and innovative suppliers with existing solutions and available "off-the-shelf" products can implement time-critical developments faster, providing the necessary high level of expertise without having to perform significant system improvements in the banking infrastructures. In view of all this, the framework for cooperation with various external actors (e.g. outsourcing, FinTech partnerships) is expected to strengthen in the long term (Chart 19).

The majority of European banks are already in some form of direct or indirect cooperation with several FinTechs or innovative start-ups and are not exclusively envisioning their digital transformation on their own. Accordingly, both the partnerships for the implementation of specific developments (direct form) and the operation of incubation laboratories set up for sponsorship or mentoring purposes (indirect form) are already very important (Chart 20). In addition, PSD2 allows many external, innovative service providers to connect to banking infrastructures in other ways.

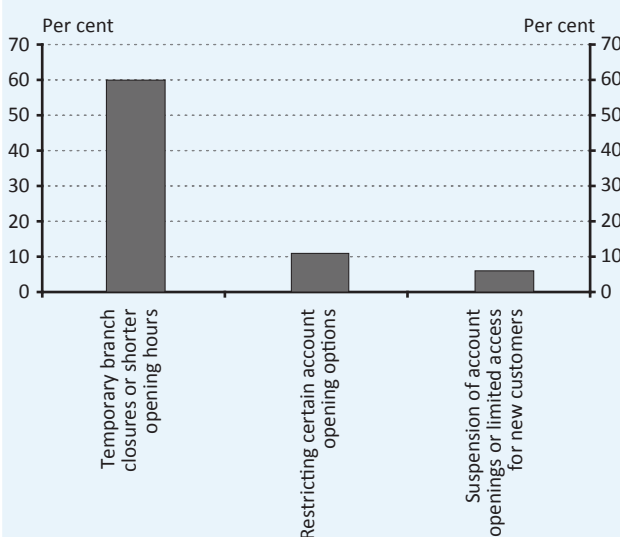
In the future, the starting point for partnerships can be not only a bank, but also a FinTech. The growing demand for transparent, comparable and digital services as well as platform-based, ecosystem-level service models are becoming increasingly important in financial intermediation. At the same time, the direction of the bank–FinTech cooperation, with the rise of the so-called Banking-as-a-Service (BaaS) phenomenon, can even turn around. Namely, this is where the FinTech or platform which already has a stable customer base, integrates the banks' financial services – via API connections – into an interface that is easily accessible to customers, while, in

Chart 20
Prevalence of approaches to digital transformation among European banks



Source: EBA (2020): Risk Assessment of the European Banking System.

Chart 21
Bank reactions to restrictions due to COVID-19 based on an international survey



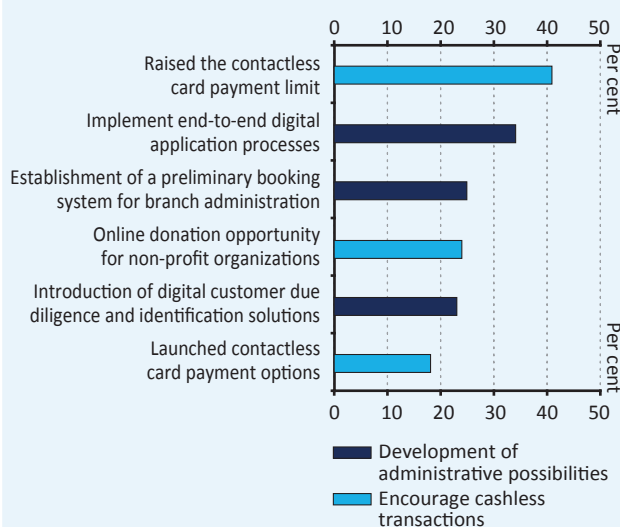
Source: Deloitte (2020): Digital Banking Maturity.

the background, there are existing secure and regulated financial infrastructures.

In order to maintain customer relationships and steer them towards digital channels, the banking sector had to implement several digital developments in the very short term. The restrictions imposed to reduce the spread of the coronavirus, the reduced branch opening hours and the growing need to avoid face-to-face meetings have also directly affected the operation of the banks' customer channels. Although the availability of digital banking channels and, in parallel, their utilisation have been constantly evolving in recent years, new customer acquisition, product and service requests and related administrative processes have been paper-based and required personal appearance. Thus, in this respect, some market participants were unprepared for the pandemic situation, and completely offline banking practices became temporarily unsustainable. This is evidenced by the fact that about a tenth of banks had to suspend certain product request processes for a short period of time (Chart 21), while some service providers had to introduce new end-to-end product request processes, completely digital and paperless from request to disbursement (Chart 22) in a relatively short time. Banks are also increasingly recognizing that the digitalisation of customer relationships needs to go beyond the online space. Regarding that administration in bank branches remains a priority for many customer segments and product types (Chart 23), a number of banks have implemented digital developments to support this in order to ensure proper and secure use (e.g. advance online appointment booking - 25 per cent of banks).

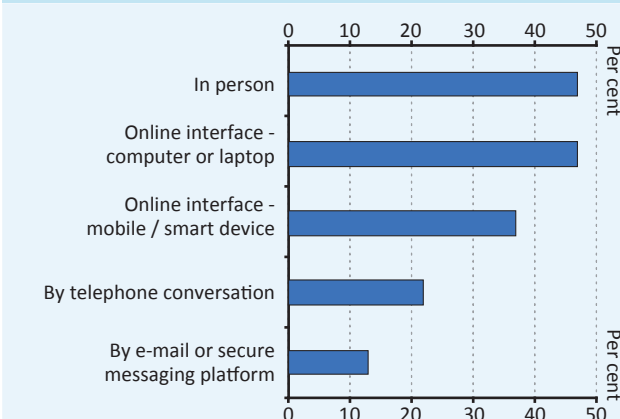
In addition to the digitalisation of external interactions, the modernisation of internal operations is becoming increasingly important along a deep, long-term, strategic commitment. The coronavirus and the related limitations have also become a catalyst for the efficient operation of internal systems, digital infrastructures and institutions. Most institutions plan with higher budgets to accelerate these investments (Chart 24). The commitment is also supported by the fact that banks, which have been tackling technological development at a strategic level from an early age, have taken the lead in adapting to the crisis easily and quickly. The work within the institutions took place mainly in the online space during the lockdowns, so the survival of remote forms of work may be decisive in the future as well. In connection with these, leapfrog progress can also be forecasted in terms of cyber and data protection developments and investments.

Chart 22
Developments made by banks as a result of COVID-19 and lockdowns, based on an international survey



Source: Deloitte (2020): Digital Banking Maturity.

Chart 23
TOP5 channel preferences for opening a bank account or requesting a new product



Note: Based on a consumer questionnaire of 47,810 people conducted in 28 countries. A respondent could mark up to three channels from a list of 11 items.

Source: Accenture (2020): Global Banking Consumer Study.

In terms of the IT resource requirements of banks, the year 2020 was less prominent, despite the expectations.

Although the sudden increase in digital presence, both on the customer side and in internal operational issues, could have resulted in a significant increase in IT spending in the banking sector in 2020, this has only been partially realised. This is partly due to the fact that IT and digitalisation are becoming more and more widespread in the operation of banks. IT expenditures are already playing a key role in day-to-day operations, developments or even in adapting to legal and supervisory provisions, while direct investments in IT for efficiency or cost reduction purposes are also becoming increasingly important. Therefore, IT expenditures have been rising steadily for several years, both in nominal terms and in proportion to sales revenues and operating expenses (Chart 25). On the other hand, due to the coronavirus pandemic and the general economic downturn, development and spending plans were presumably prioritised in favour of IT spending, while institutions may have run into an upper limit on other resources available.

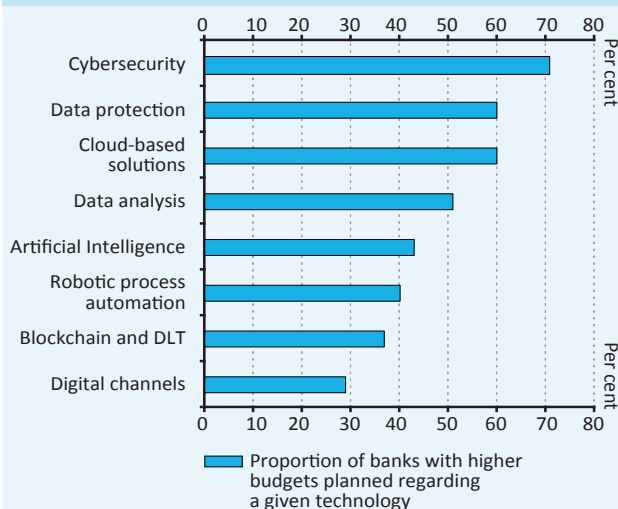
The advancement of the role of digitalisation in connection with the modernisation of banking jobs can be increasingly felt on the employee side as well. The continuous increase in both remuneration and IT working hours shows this (Chart 26), but in this regard it should be emphasised that the higher increase in per capita costs may also indicate that the rationalisation of the number of employees has also begun. The reason for this rationalisation can be both the efficiency-increasing effect of advanced technologies and general cost-cutting plans in the banking sector.

1.7 CYBERSECURITY CHALLENGES DURING THE PANDEMIC PERIOD

The acceleration of digital transformation in the wake of the coronavirus pandemic has created significant challenges in the area of cybersecurity. As a result of the virus situation, the digital presence of both companies and consumers has suddenly increased, increasing the attack surface and exposing certain security issues. Thus, the IT security areas of each institution had to respond in a short time to the new situation caused by the accelerated digital transformation.

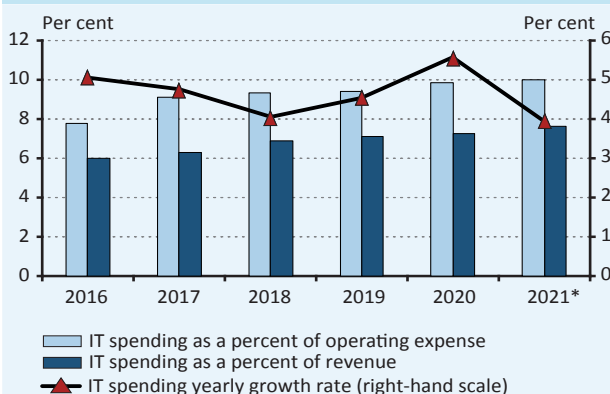
Digital transformation is an option also for attackers using their familiar and proven methods in an even more aggressive and sophisticated manner. Examining the different types of cybersecurity threats, we can see

Chart 24
Technology investments appreciating in short term among banks



Source: Deloitte (2020): 2021 banking and capital markets outlook.

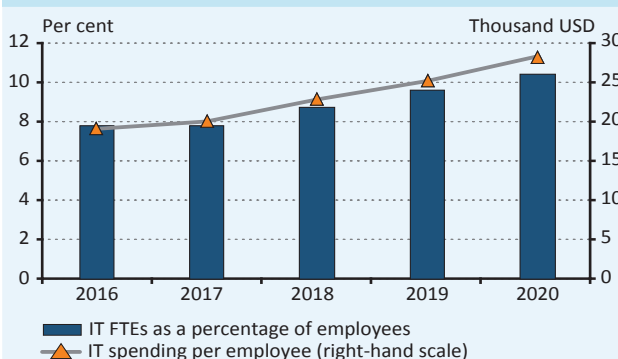
Chart 25
Development of banking IT costs by year



Note: The indicators of the examined IT expenditures were prepared on the basis of the median of the aggregated data of the institutions participating in the survey.

Source: Gartner (2021): IT Key Metrics Data 2021: Industry Measures — Banking and Financial Services Analysis.

Chart 26
Banking IT resources in proportion to the total number of employees



Note: The indicators of the examined IT expenditures were prepared on the basis of the median of the aggregated data of the institutions participating in the survey.

Source: Gartner (2021): IT Key Metrics Data 2021: Industry Measures — Banking and Financial Services Analysis.

that malware and web attacks have remained the most popular methods of attack by hackers (Table 1). At the same time, the frequency of attacks on individuals, such as phishing and identity theft, has also increased. However, with the development of technology, not only has the scale of threats increased, but so has their technological sophistication. Although the types of cyber-attacks have not changed as compared to the past, the development of artificial intelligence and machine learning also provides new tools for malicious cyber-attackers. The motivation behind most of the attacks is still financial, but the majority of cyber incidents remain unnoticed or take time to detect.

The financial system remains the most attractive target for cyber-attacks.

During the pandemic period, the most detected cyber incidents targeted the financial system (Chart 27), 40 per cent of which were intentional and malicious cyber-attacks. Within this, the payment service providers as well as insurance companies and credit institutions were particularly affected. Although the sector has been highly exposed in the past, institutional-level shifts to work from home (the use of virtual private networks for corporate operations) and increased digitalisation of customer interactions (everyday digital communication in banking, deception by reference to the pandemic) have further increased the attack surface.

Because of the novel attacks caused by technological advances, it is crucial that institutions pay special attention to preventing cyber attacks. Effective and flexible cooperation between legislators and cybersecurity professionals can help shaping strategic and regulatory action against cyber attacks. In addition, it may be an effective solution for institutions to build or further develop their internal protection systems that are more resilient to new types of threats. In addition, test environments designed specifically for this area can enable institutions to improve the preparedness of their employees under simulated conditions and to experiment with effective control methods. On the client side, they can be helped if they are properly educated and informed by the institutions about the proper use of their services and the methods to avoid expected dangers.

1.8 REGULATION OF THE FINTECH SECTOR, ITS DEVELOPMENT AND COVID-19-SPECIFIC REGULATORY REACTIONS

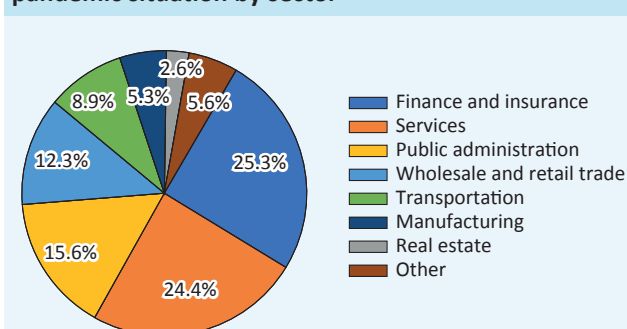
The FinTech phenomenon is a high priority for regulators, even in developing countries due to the pandemic situation. The development of FinTech in recent years has been increasingly sought to be followed by financial regulators worldwide even before the emergence of the

Table 1
Change in the ranking of key cybersecurity threats during the pandemic

#	Threats	Change in the trend	Change in the rankings
1	Malware	–	–
2	Web attack	–	↗
3	Phishing	↗	↗
4	Web application attack	–	↘
5	Spam	↘	↗
6	Denial of service	↘	↘
7	Identity theft	↗	↗
8	Data breach	–	–
9	Insider threat	↗	–
10	Botnets	↘	↘
11	Physical manipulation, damage, theft and loss	–	↘
12	Information leakage	↗	↘
13	Ransomware	↗	↗
14	Cyberespionage	↘	↗
15	Cryptojacking	↘	↘

Source: ENISA (2020): The year in review – ENISA Threat Landscape 2020.

Chart 27
Distribution of cyber incidents related to the pandemic situation by sector



Note: The data were collected from the outbreak of Covid-19 until September 9 2020. The relationship between the cyber incidents studied and Covid-19 was determined according to Advisen's related methodology.

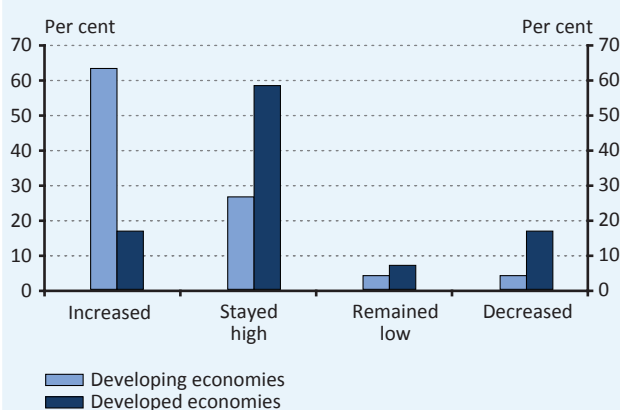
Source: Bank for International Settlements (2020): Covid-19 and cyber risk in the financial sector.

coronavirus, and they have developed various responses and frameworks, even by laying down innovative international collaborations (e.g. [GFIN initiative](#)). FinTech activities were primarily addressed by regulators in developed countries, but COVID-19 has also received increasing attention from regulators in developing countries (Chart 28). Thus, we can now say that the integration of the activity into the financial regulatory framework has worldwide relevance.

Despite the fact that the vast majority of authorities have made the issue a significant priority, the lack of a harmonised approach to creating a regulatory response is becoming more and more evident, mainly due to the rise of global technology companies. Regulation also tends to lag behind financial market developments. In the context of the extremely fast and innovative FinTech development rapidly becoming a global phenomenon, it is even more striking that there are a number of different approaches and methodologies around the world to ensure a level playing field between incumbents and new entrants. Regarding the proper regulation of activities and institutions, a wait-and-see position and a number of different approaches and treatment methodologies emerge worldwide. With the global spread of services provided by cross-border and/or technology providers, more and more salient differences between the practices of different regions are emerging (Table 2). For the time being, uniform, global responses can be detected only in certain sub-areas on the regulatory side.

The resolution of regulatory issues is relevant not only at the level of central banks and financial authorities. Digitalisation and innovation can be observed in the operation of all economic sectors and market segments. This development can also have an impact on the functioning of the economy as a whole and its structure. Taking these factors into account, there is a need for coordinated and uniform planning and rulemaking not only at the level of financial regulations and supervisory practices, but also regarding other related issues such as competition law and competition policy regulation, data management and protection, and data monetization across sectors. The development of a regulatory framework for financial services must therefore be two-pronged in order to reap the full benefits of digital technologies on a level playing field. On the one hand, the renewal of financial services standards needs to be as harmonised as possible between countries and regions, and on the other hand, there is a need for cooperation between all authorities covering a wider range of policy areas, both within and between countries. In addition to competition law issues, the expanded focus should cover the creation and development of comprehensive digital infrastructures, ensuring appropriate cross-sectoral interoperability.

Chart 28
Priority of FinTech solutions among financial authorities in the light of COVID-19 – developing and developed economies



Note: In June-August 2020, 118 financial authorities from 114 countries participated in the survey of the World Bank Group and the Cambridge Centre for Alternative Finance (CCAF). In the proportion of respondents.

Source: World Bank Group (2020): The Global COVID-19 FinTech Regulatory Rapid Assessment Study.

There is already a degree of harmonisation at international level in the development of innovative supervisory frameworks, but differences remain significant. In order to support the proliferation of FinTech solutions within a regulated framework, even prior to the coronavirus, supervisory authorities in many regions were paying attention to setting up new, innovative supervisory frameworks. Innovation Hubs and Regulatory Sandboxes have become internationally widespread and a kind of unified solution, with 75 programmes already in operation worldwide from the latter (Chart 29). However, although these initiatives are typically identical in name, they are diverse in terms of their specific functions and mandates and typically reflect the regulatory and supervisory framework and capabilities of a given country. This can also be seen in the fact that globally the utilisation of each initiative is rather mixed (Chart 30).

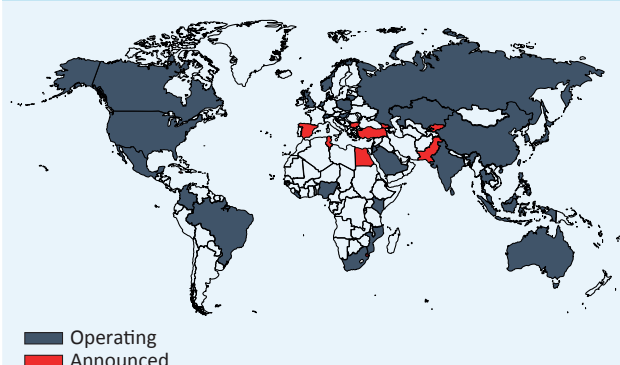
The relevance of innovative supervisory frameworks has been further strengthened by the pandemic situation, while there is a significant and lasting demand for

Table 2
The presence of BigTech firms in the main financial markets and the type of licence they hold

	Type of licence	Amazon	Apple	Facebook	Google	Ant Financial	Baidu	JD.com	Tencent
European Union	Payment service	Yes		Yes	Yes	Yes			
	Lending								
	Bank licence								
United Kingdom	Payment service	Yes		Yes	Yes	Yes			
	Lending								
	Bank licence								
United States	Payment service	Yes	Yes	Yes	Yes	Yes			
	Lending								
	Bank licence								
China	Payment service					Yes	Yes	Yes	Yes
	Lending					Yes	Yes	Yes	Yes
	Bank licence					Yes	Yes		Yes
		Market presence in partnership or joint venture with other financial institutions							
Yes		A group of companies that has an entity that is licensed to provide financial services							
Yes		Market presence in partnership or joint venture with financial services license							

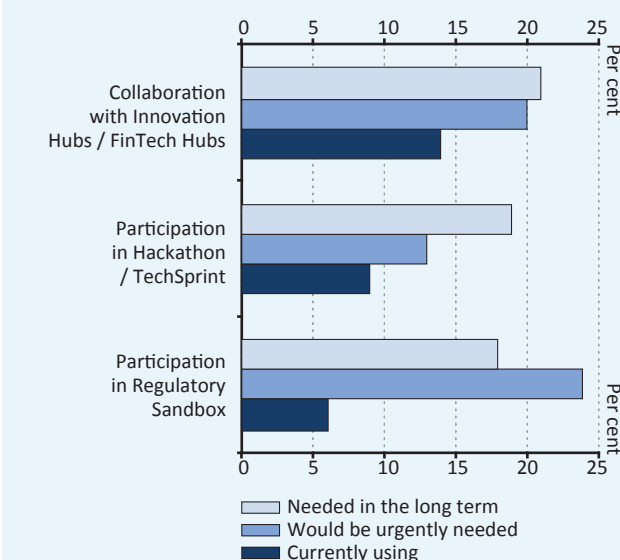
Source: Bank for International Settlements (2021): Big techs in finance: regulatory approaches and policy options.

Chart 29
Regulatory Sandbox programmes in the world



Source: World Bank, 2020.

Chart 30
Usage of and need for supervisory innovation initiatives



Source: World Bank Group (2020): *The Global COVID-19 FinTech Market Rapid Assessment Study*.

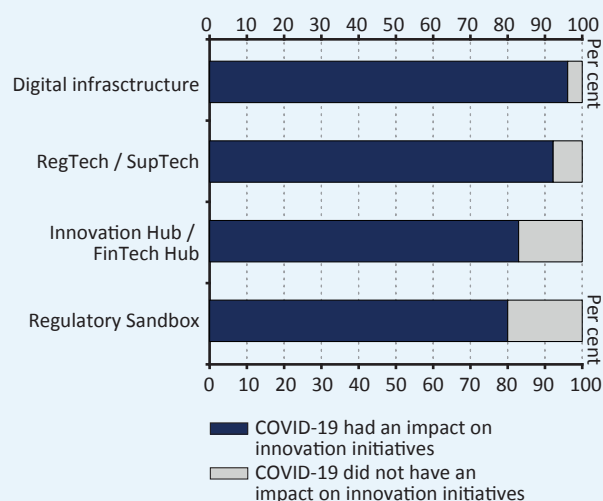
these solutions from FinTech innovators. The digital transformation accelerated by COVID-19 has highlighted that the innovative initiatives of financial authorities satisfy a basic market demand. Some FinTech companies consider it necessary to have these initiatives in both the short and long term (Chart 30). In addition to the growing popularity of these platforms, more comprehensive infrastructure-level initiatives as well as RegTech/SupTech solutions are emerging (Chart 31). The development of innovation initiatives by financial authorities is therefore forward-looking, supporting not only the development of the financial system but also the spread of secure business models.

Due to the strong impact of the pandemic on market functioning, several rapid interventions by financial authorities were needed. The majority of financial authorities have taken measures to increase the availability of digital financial services in the areas of customer identification and authentication processes, digital identity (Chart 32) with the spread of lockdowns. Apart from this, however, no clear trends can be identified, and the authorities have focused primarily on mitigating credit risk in the financial sector in order to maintain stability. Some authorities consider that the FinTech market is still too small or emerging, which does not justify specific measures, and in many cases the lack of FinTech regulatory frameworks has limited the adoption of dedicated measures. At the same time, innovators in the financial sector expect urgent intervention in all areas that support their market entry (Chart 33), although these issues often go beyond the scope of supervision.

Partly as a result of COVID-19, there is a growing need in Europe to modernise regulation within a single framework.

As early as in 2018, the [Financial Technology Action Plan](#) of the European Commission identified a number of priority areas in order to create a more competitive and innovative financial system. Despite the strategic commitment, no significant progress has been made regarding regulatory renewal in recent years. Although, on the supervisory side, [Innovation Hubs and Regulatory Sandboxes have become widespread in Europe](#) as well, there is a growing need for creating a coherent, European framework and regulation for the key areas of digitalisation. The year 2020, partly due to COVID-19, led to significant steps and a complex, cross-cutting package outlining a single European regulatory framework was formulated in September 2020.

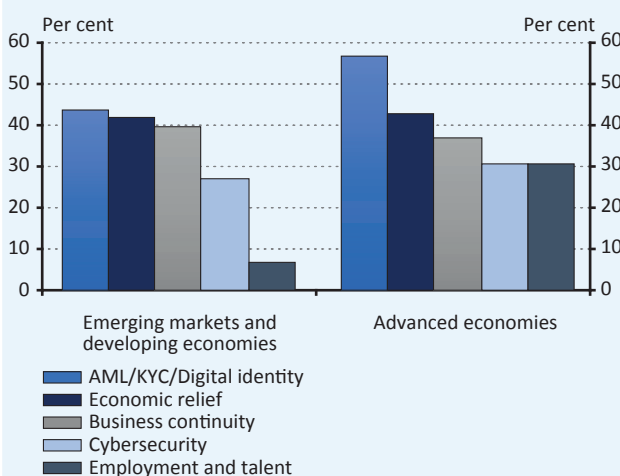
Chart 31
Impact of COVID-19 on innovation initiatives



Note: Digital infrastructures are comprehensive digital frameworks and ecosystems that support FinTech and digital financial services and their provision.

Source: World Bank Group (2020): The Global COVID-19 FinTech Regulatory Rapid Assessment Study.

Chart 32
Instances of various regulatory and supervisory measures during the pandemic



Note: In the proportion of respondents.

Source: World Bank Group (2020): The Global COVID-19 FinTech Regulatory Rapid Assessment Study.

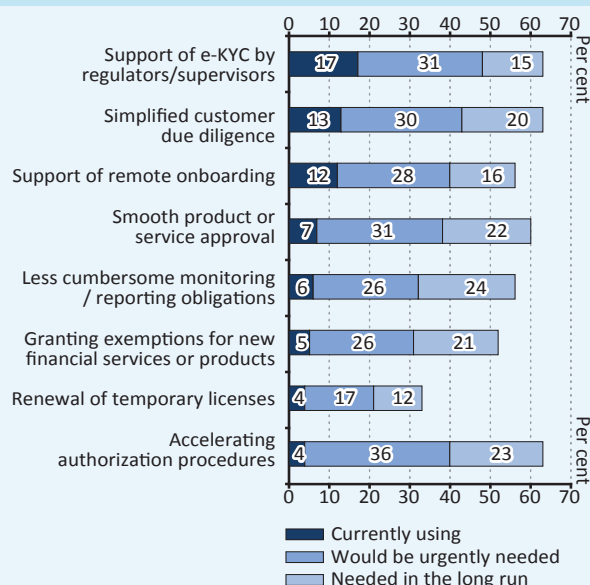
The Digital Finance Package issued by the European Commission contains a number of legislative and strategic proposals for the digital transformation of the European Union's financial sector. The focal points are clear through current events and the social and economic impacts of the coronavirus and are similar to the objectives of other regions. [A Digital Finance Strategy](#) (Chart 34) has been announced to support and set the framework for competitiveness and innovation, while the [Retail Payment Strategy for the EU](#) aims to ensure modern and cost-effective payment flows. Furthermore, as the financial sector increasingly relies on information and communication technologies, the European Commission has also published a [proposal for a regulation on digital operational resilience for the financial sector](#) (DORA). Important issues in this draft, apart from the support of technological development and innovation, are the provision of cyber and data protection and the creation of a single regulatory framework throughout the financial institution sector.

The Digital Finance Package pays special attention to resolving regulatory and supervisory issues related to crypto assets and distributed ledger technologies. Although some crypto assets may be subject to the EU financial regulation (MiFID II² or the e-money directive³) (Chart 35), there is currently no single European – and in many cases global – solution for the comprehensive regulation of these assets. In addition, the current regulations and supervisory responsibilities are not clear for certain business models based on distributed ledger technology either. Therefore, the goal of the draft regulations on the [Markets in Crypto-assets \(MiCA\)](#) and on the [pilot regime for market infrastructures based on Distributed Ledger Technology](#) with the related rules is to support legal certainty, innovation and fair competition by ensuring consumer and investor protection as well as market integrity, whilst addressing financial stability and monetary policy risks. A single EU financial framework can substantially reduce regulatory uncertainty, although it is currently unclear whether the proposed regulation will be able to achieve the desired objectives. With the adoption of the regulations, the EU would become the largest and most significant regulated cryptocurrency area in the world.

² Directive 2004/39/EC of the European Parliament and of the Council of 21 April 2004 on markets in financial instruments amending Council Directives 85/611/EEC and 93/6/EEC and Directive 2000/12/EC of the European Parliament and of the Council and repealing Council Directive 93/22/EEC

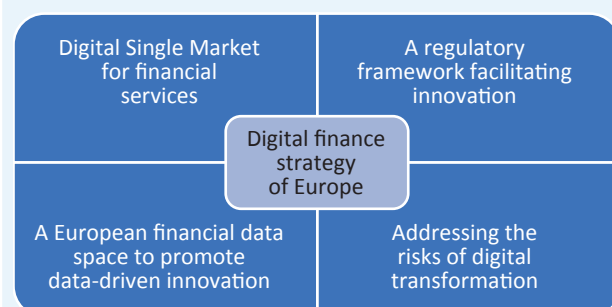
³ Directive 2009/110/EC of the European Parliament and of the Council of 16 September 2009 on the taking up, pursuit and prudential supervision of the business of electronic money institutions amending Directives 2005/60/EC and 2006/48/EC and repealing Directive 2000/46/EC 2005/60/EK

Chart 33
Usage of and need for supervisory type measures under COVID-19



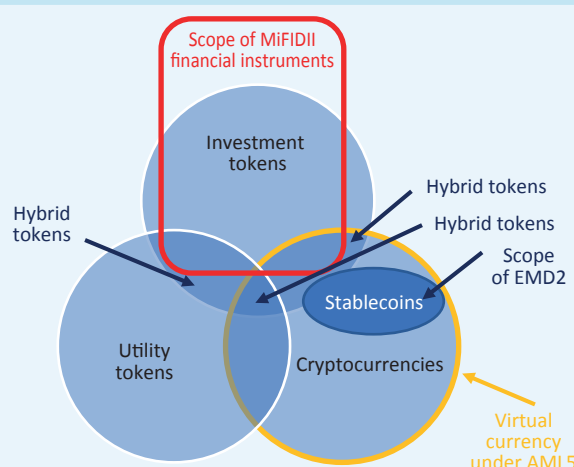
Source: World Bank Group (2020): *The Global COVID-19 FinTech Market Rapid Assessment Study*.

Chart 34
The 4 pillars of the digital financial services strategy



Source: European Commission (2020): *Digital Finance Strategy, Datasheet*.

Chart 35
Interactions between EU financial services legislation and the different types of tokens



Source: European Commission.

Support for digital banking investments is also becoming increasingly important on the part of EU authorities. The European Bank Authority (EBA) has decided to publish a [Regulatory Technical Standard \(RTS\)](#) that simplifies and harmonises the prudential management of software investments for European banks in terms of capital requirements and amortisation accounting. The EBA's aim with the amendment is to bring supervisory considerations more in line with the business value of software assets (e.g. useful life) and to clarify the rules to support forward-looking digital banking investments.

Thanks to the new EU regulations, dynamic development is expected in crowdfunding services in the short term.

Although progress was seen at EU level in a number of issues in 2020, the implementation of the strategies and the entry into force of the proposed regulations are expected to take longer. In the short term, innovation processes may be boosted by the fact that, from 10 November 2021, crowdfunding service providers will be able to operate under harmonised rules at EU level. The regulation that will enter into force will provide scope for the cross-border provision of online platform-based crowdfunding services and will seek to strengthen confidence in this form of financing through detailed and strict investor protection rules. In addition to PSD2, a new EU-level initiative can help spread and grow innovative FinTech ideas in Europe from an operational point of view as well as by creating a new funding channel to keep pace with other regions.

Box 1**Money in the digital age: the central bank digital currency developments have accelerated**

About 86 per cent of the world's central banks deal with central bank digital currency (CBDC)⁴, and in the case of nearly 60 per cent of them, the possible implementation of a pilot project has also arisen. In the context of the CBDC, the main goal is to create a widely available digital means of payment, which would basically be a payment instrument issued by the central bank, serving as the basis for increasingly online payment transactions, operating parallel to cash. In addition, in several countries, the promotion of financial inclusion is also an important motivation, i.e. the inclusion of disadvantaged groups in the modern digital financial ecosystem, who would typically be dependent on cash circulation without this.

The CBDC issued by central banks can guarantee the functionality of money, even in extreme conditions, which is necessary in the digital age. Although digital

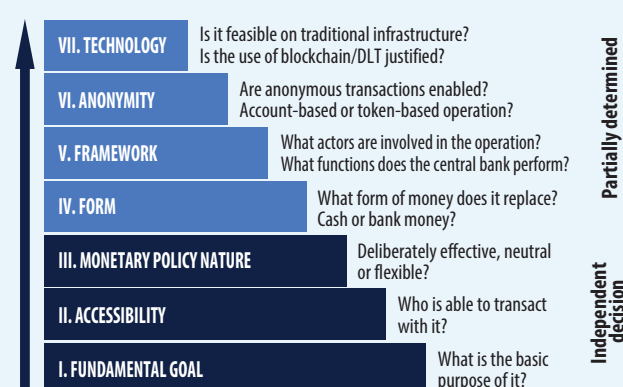
payment instruments provided by commercial banks and electronic money providers operate reliably, are very popular and are currently the basis for online payment solutions, further digitalisation may require a generally accepted digital payment instrument which guarantees the autonomy of the issuing country's monetary authority, and the operation of which is motivated not by profit considerations but by general availability. A CBDC is backed by the solvency of the issuing state which in the event of a possible financial turbulence is facilitated by a wide range of financial crisis management tools of the central bank and the state. An official digital payment instrument

issued in response to the digital age can be supported by a comprehensive infrastructure with the highest possible level of security mechanisms and protection of personal data.

The actual implementation of the CBDC is determined by the needs that motivate the issue. In developing the CBDC framework, the primary starting point may be the demand or market failure that gave rise to the development of the CBDC as a central payment solution. Thus, here we can distinguish the so-called wholesale CBDC used in the transactions of professional financial actors and the so-called retail CBDC, i.e. the one used by the citizen and companies. Even so, retail CBDC constructions can vary greatly based on their desired functionality. The vast majority of ongoing research focuses on providing a cash-substituting digital currency and a modern, uniform payment infrastructure (e.g. China, Canada), but improving universal access to financial services and financial inclusion is also emerging in many places (e.g. Cambodia, Bahamas, Mexico). During the pandemic, the need to create uniform digital citizen accounts arose as well (e.g. USA, India) through which fiscal actors can provide immediate, targeted financial transfers through digital means to those in need. In countries that have made significant progress in digitalisation, the CBDC can be the basis of what is called programmable money (e.g. South Korea), where smart contracts can be used to fulfil numerous contractual clauses or administrative steps at the same time as executing a payment transaction, speeding up and making the economy more efficient.

The CBDC is expected to operate as a complementary tool to commercial bank money and cash. With the introduction of the CBDC, central banks do not want to take over the role of the commercial banking sector in monetary transmission and in financing the economy and allocating risks, so they place particular emphasis on ensuring that their structures are not suitable for attracting a decisive part of the population's savings to flow from commercial banks to CBDC. It is envisaged that the central accounts would essentially comprise the money stocks

Chart 36
Decision "steps" in designing a CBDC system



Source: MNB.

⁴ <https://www.bis.org/publ/bppdf/bispap114.pdf>

required for payment transactions, while both commercial bank money and cash would remain in circulation based on customers' preference and demand for high-level of services provided by banks. In many cases, CBDC accounts would also be managed by banks or payment service providers, thereby maintaining direct customer relationships. However, the new frameworks are already being prepared for the future, so they must be able to support innovation and increasing efficiency as well⁵.

Modern technologies open up new possibilities for CBDC functionalities. The CBDC must be fast, secure, transparent, efficient and supportive of inclusion, i.e. from a technological point of view, the latest achievements must also be recruited in order for the system to function worthy of central bank credibility. More and more already existing models are attesting that this can be achieved after proper preparation. However, in terms of system architecture, there is also a strategic decision that largely determines the current and future functionality limitations of the system, that is, whether to run it on a centralised system or on Distributed Ledger Technology (DLT). In the case of the latter solution, in addition to the required capacities, the appropriate transaction speed may also be in question, but, despite this, more and more central banks are choosing it as an experimental direction, and the system already in live operation in Cambodia is also based on this. The great promise of DLT technology is the emergence of what is called programmable money which, by linking the payment transaction to other transactions, can open up an ample scope for further innovation.

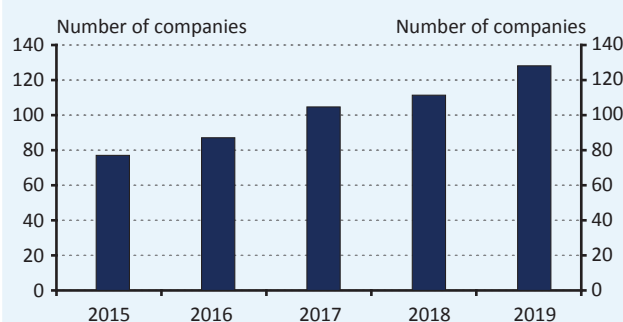
The pandemic has changed consumer habits, accelerating central bank efforts to create a central digital payment solution. Whereas in the past one of the main drivers of CBDC projects was the emergence of digital money offered by the private sector (mainly Bitcoin and Diem), now with the broadening of the potential user base, central banks primarily want to meet the real market needs of their economies by issuing a central digital currency. China's e-CNY is already available in the regions selected for testing, but major opinion-forming institutions such as the ECB, the Bank of Japan or the FED have also signed up – without an actual target date for the time being – among central banks that are seriously examining CBDC issuance opportunities. As digital central bank money can also address the currently time consuming and expensive processing of cross-border payments, the exploration of international coordination and interconnection opportunities has also begun.

⁵ <https://www.bis.org/publ/othp33.pdf>

2 The domestic FinTech sector

The Hungarian FinTech sector expanded further in 2019, currently there are about 130 FinTech companies operating in Hungary, mostly offering B2B services. The number of employees in the sector increased in 2019. Despite the economic downturn caused by the coronavirus pandemic, in 2020, FinTech companies now employ more than 6,000 people. Domestic FinTechs are typically the most active in the areas of financial software development and systems integration, data analysis and business intelligence as well as payment services. The domestic FinTech sector, which is still dominated by micro and small enterprises, was characterised by increasing sales revenue and improving profitability in 2019, which was also supported by the favourable economic environment. Launched in March 2018, the MNB Innovation Hub (Financial Innovation Platform), which serves as a platform for direct and flexible communication between financial innovators and the central bank has already received more than 110 inquiries from innovative market participants and assisted them with quick and professional guidance on financial innovation-related regulatory issues.

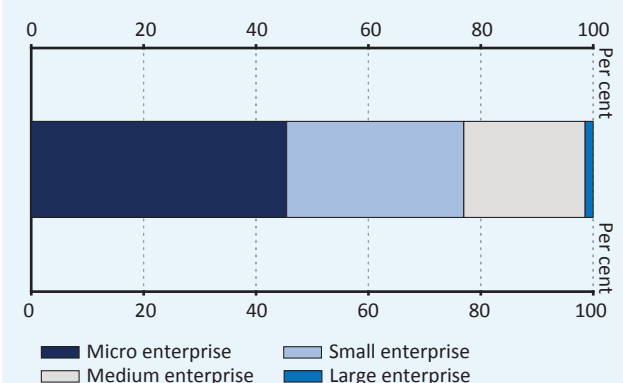
Chart 37
Number of domestic, operating companies involved in FinTech activities



Note: Companies that submitted annual reports to the National Tax and Customs Authority (NTCA) at least in 2019 are displayed.

Source: NTCA, MNB.

Chart 38
Distribution of FinTech companies by company size



Note: Company size was determined based on 2019 reports and yearend or yearly average staff number data.

Source: NTCA, MNB.

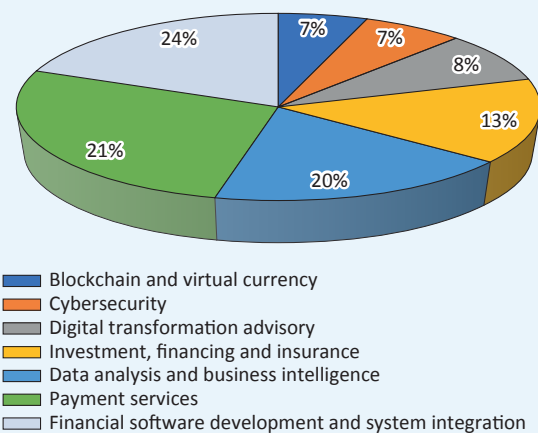
2.1 ANALYSIS OF THE DOMESTIC FINTECH SECTOR BY COMPANY SIZE AND NUMBER OF EMPLOYEES

In the recent period, the number of FinTech companies continued to grow, and in 2019 there were already 130 companies engaged in FinTech activities in Hungary. Companies engaged in FinTech activities were identified from a set of companies operating in 2020, filtered based on the scope of activities that corresponded to the definition used,⁶ after a web scraping of the websites and detailed examination of the potential companies. In our analysis, the Hungarian FinTech sector comprises only of companies with a Hungarian tax number, operating in a corporate form and active in 2020 (in their case, the latest available annual reports refer to 2019) (Chart 37). Mergers have been observed in several cases within the sector, but the number of FinTech companies has continued to grow. The majority of FinTech companies in Hungary have a B2B (business to business) business model, which shows that within the sector, FinTech companies are not primarily present as the challengers of the incumbents in the financial sector, but as their partners.

Micro and small enterprises typically make the greater part of FinTech companies. In the case of both domestic and foreign-owned FinTech companies, micro and small enterprises are in vast majority, accounting for 77 per cent of the total sector (Chart 38). The data shows that the bigger the size of the company, there are fewer domestic FinTech companies: while micro companies represent about 51 per cent of domestic companies, the share of medium-sized companies is 20 per cent. Although the share of medium-

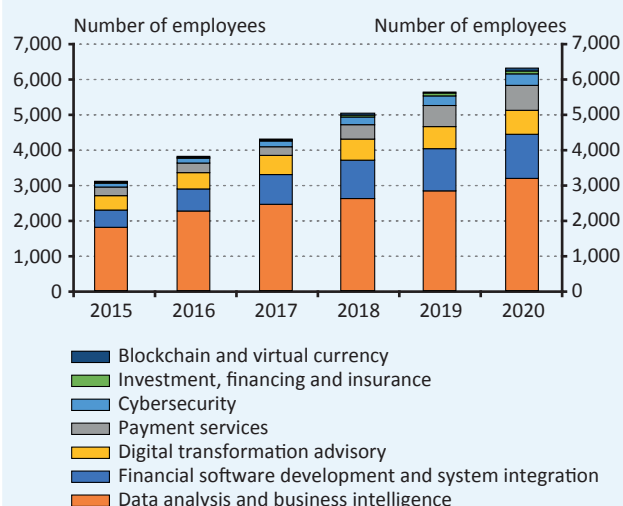
⁶ For details on the identification methodology, see the MNB FinTech and Digitalisation Report 2020, Box 3.

Chart 39
Distribution of FinTech companies by service scope (2019)



Source: NTCA, MNB.

Chart 40
Distribution of the number of employees by service scope at domestic FinTech companies



Source: NTCA, MNB.

sized companies among domestic enterprises increased by almost 10 percentage points from 2018 to 2019, the proportion of small and medium-sized size categories remains higher in the case of foreign-owned FinTech companies. About 39 per cent of foreign-owned companies are small companies and 24 per cent are medium-sized ones. The typically large size of foreign-owned companies is partly due to the fact that most of them were founded earlier and have expanded their previously existing scope of activities with FinTech services, while domestic companies are mostly new and providing FinTech service is their main focus.

Domestic FinTechs are typically the most active in the areas of financial software development and system integration, data analysis and business intelligence as well as payment services. Compared to 2018, there were smaller shifts in emphasis in the distribution of FinTech companies by main activity. The area of financial software development and systems integration showed increasing activity, indicating an increasing effort in digitalisation of incumbent institutions. The role of payment services has also increased slightly, on par with the international and domestic trends. Data analysis and business intelligence can still be considered prominent with a share of about 20 per cent (Chart 39), although the relative role of this area has slightly decreased compared to 2018. The share of FinTech companies operating in the B2C (business to customer) segment in the domestic market has typically been below 10 per cent in the last 5 years.

Based on the employment data already available for 2020, in the midst of the coronavirus pandemic, the number of employees in the domestic FinTech sector continued to increase, while the distribution of the number of employees in each service scope remained unchanged. The dynamic expansion of the sector is well illustrated by the fact that between 2015 and 2020 the number of employees has practically doubled (Chart 40). The dynamic increase in the number of employees was observed in basically all areas of activity, but it appeared most strongly in medium-sized and large companies. Between 2015 and 2020, the average annual growth rate of employment in the sector reached over 15 per cent. Although the development was relatively balanced for each service category, in percentage terms there was still a significant increase in the smallest categories (blockchain and virtual currency as well as investment/financing and insurance), both over a 5-year period and over the past year.

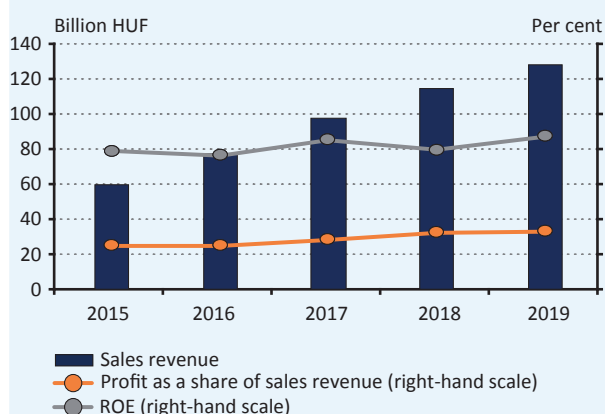
Box 2**In 2020, the Hungarian FinTech Association was formed**

At the beginning of April 2020, the independent representative organisation of the Hungarian FinTech community, the Hungarian FinTech Association (MAFISZ), was established. The organisation can be joined by those domestically affiliated FinTech companies that provide digital solutions related to financial services as well as other legal entities that support the development of the Hungarian FinTech ecosystem. MAFISZ was established with three main objectives: to strengthen the Hungarian FinTech ecosystem including increasing the sector's domestic and international competitiveness, to represent the interests of the members towards regulatory and other official actors and to support Budapest's goal in becoming a regional innovation and FinTech centre.

The pandemic situation drew attention to the importance of the development of digitalised financial services, where MAFISZ can be an important supporting player. The association can contribute to the growth of the Hungarian FinTech knowledge base by preparing analyses and background materials as well as by regularly publishing sector-specific educational materials and best practices. In addition, regular knowledge-sharing gatherings and member meetings can provide a platform for those interested in contributing to the deepening of cooperation and professional work between domestic and international FinTech players.

The establishment and activity of the innovative, high value-added FinTech sector's own representative body can be forward-looking also in terms of increasing the competitiveness of the domestic financial system and economic growth. The predominantly B2B focus on the side of Hungarian FinTech companies can not only show the way for domestic incumbents to develop, but also, in the form of collaborations, can directly help efficiency initiatives, which can increase the productivity and competitiveness of the financial sector. Acquiring international and digital know-how and best practice approaches can have a positive impact on both financial sector incumbents and the domestic corporate sector. Through domestic FinTechs with a high share of exports, the economy can join the international circulation in a new area and strengthen cooperation, while the establishment of MAFISZ can also help domestic FinTech companies to attract investor capital.

Chart 41
Profitability of FinTech sector



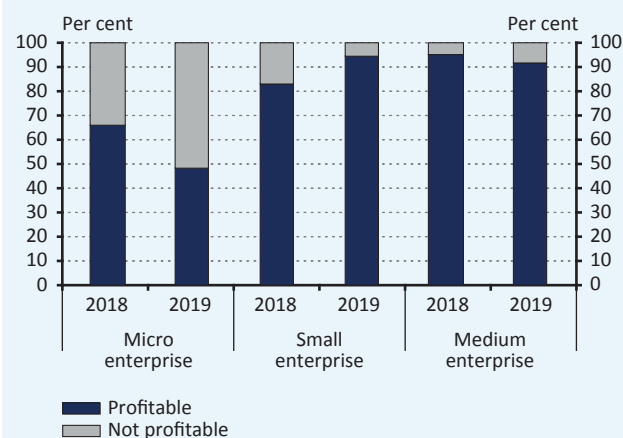
Source: NTCA, MNB.

2.2 TURNOVER, PROFITABILITY AND EXPORT ACTIVITY OF THE HUNGARIAN FINTECH SECTOR

The domestic FinTech sector was characterised by increasing sales revenue and improving profitability in 2019. The sales revenue of the sector already amounted to about HUF 130 billion in 2019. The strong growth was mainly due to the favourable economic environment of the given year, where the growth was driven by the expansion of the sector; the distribution of the companies generating the growing sales revenue did not change significantly⁷. The growing total sales revenue and ROE (return on equity) are also greatly influenced by foreign-owned, large companies, but with the exception of micro-enterprises, the profitability of small Hungarian FinTechs also increased: the average ROE of the sector increased from 20 per cent to 22 per cent. Profit after tax on sales revenue, which captures efficiency, did not improve significantly compared to 2018 – still around 8 per cent. Companies were presumably focused primarily on

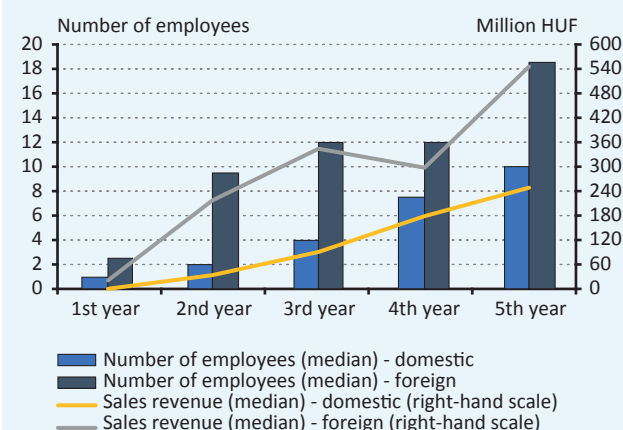
⁷ For companies that did not file an annual report for 2019, we estimated 2019 sales either using the “multiple imputation by chained equations” method or we based our calculations on companies with similar profiles and sizes.

Chart 42
Distribution of profitable and loss-making companies of the domestic FinTech sector by size



Source: NTCA, MNB.

Chart 43
Distribution of the number of employees by the age of FinTech, micro and small enterprises



Source: NTCA, MNB.

growth and market acquisition during this period, and were not forced to mobilise their efficiency reserves (Chart 41).

Except for micro-enterprises, the vast majority of Hungarian FinTech companies, were profitable in 2019. Among micro-enterprises, the share of profitable companies decreased from 2018 to 2019: from 65 per cent to about 49 per cent, but, in their case, fluctuating performance is partly the result of new companies entering the market. Among small and medium-sized companies, the proportion of profitable enterprises is significantly higher. In 2019 small companies achieved significant development, 94 per cent of them reported a positive result (Chart 42). The proportion of profitable medium-sized companies remained consistently above 90 per cent, while large companies were all profitable in 2019, as in previous years. The profitable operation of Hungarian FinTech companies, which is less typical in international comparison, is presumably due to the fact that they have a more moderate growth dynamics and are typically B2B-focused, which often means a more stable sales base. The sales-weighted export share of FinTech companies in the whole of the sector continued to be between 50 and 60 per cent in 2019 as well; the vast majority of exporting companies have a B2B focus. It can therefore be said that more than half of the turnover of these companies still comes from exports, as they have managed to keep their foreign markets.

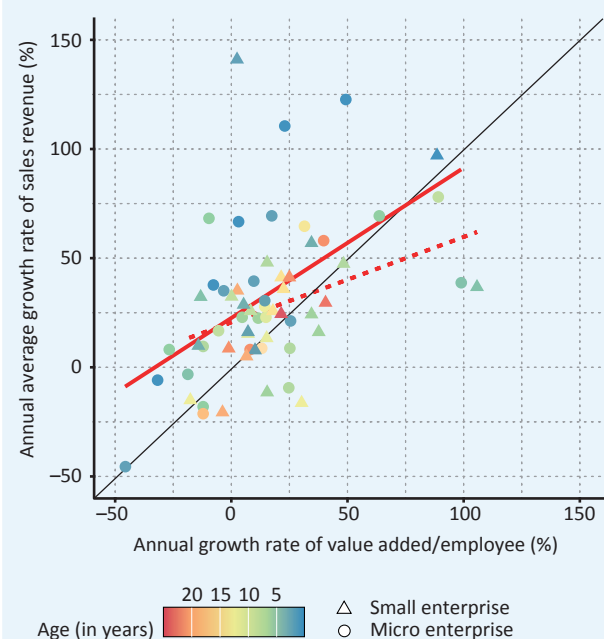
2.3 DEVELOPMENT OF DOMESTIC FINTECH STARTUPS

In the case of Hungarian FinTech start-ups founded in the recent period, adynamic growth was observed. We reviewed the development trajectories of about 60 FinTech micro and small companies founded between 2014 and 2019, following their management between the first and fifth years of their operation. With this approach, a comprehensive picture can be given of the early stages of the life cycle of domestic and foreign-owned micro and small companies operating in Hungary, and the similarities and differences of the operating conditions of foreign and domestic FinTech companies can be identified.⁸ In terms of numbers, companies established between 2015 and 2017 in the Hungarian FinTech sector account for more than two thirds of all companies surveyed. Domestic micro and small enterprises predominate among newly established enterprises between 2014 and 2019, but the share of foreign-owned enterprises aged 4-5 years is growing significantly.

⁸ The age of the companies is calculated on the basis of the year of foundation plus 1 minus the reference year of the submitted reports, i.e. if the first submitted report and the year of foundation are the same, this is the first year of the company. All companies can be observed almost completely, every year in the period between 2015-2019 based on the submitted reports. Towards the fifth year of operation, the number of observations decreases significantly, and it is important to pay attention to this when interpreting the factual data.

Chart 44

The growth rate of sales as a function of the growth rate of value added per employee

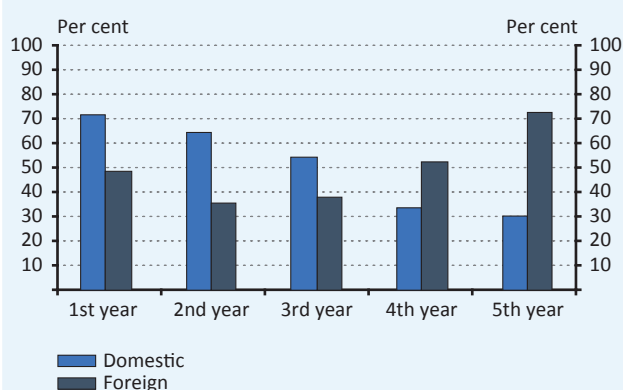


Note: The annual average growth rates refer to the period 2016-2019; where no 2016 data is available, the starting year is 2017. Value added is the sum of profit after tax, depreciation and personnel expenses. The age of the companies reflects the state of 2019. The continuous trend line was formed from the data of micro-enterprises and the dashed line from the data of small enterprises.

Source: NTCA, MNB.

Chart 45

Development of the equity ratio as a proportion of the balance sheet total in the case of a typical domestic and a foreign micro and small enterprise



Note: In the individual categories, the median values of the equity ratios as a proportion of the balance sheet total of the examined companies were included.

Source: NTCA, MNB.

In a typical domestic FinTech company, the number of employees grows dynamically in the first years, however, the growth rate is typically lower than that of foreign-owned companies. In the first year of its operation, a typical foreign-owned FinTech company employs two and a half times as many people as a domestically owned one. Although the number of employees of typical domestic companies dynamically grows in the first 5 years, in effect, they can start to catch up with foreign-owned companies in the 4th year. By this time, a typical domestic company employs 7.5 people, while a foreign company employs 12 people (Chart 43). The difference is basically to be found in the different maturity level of the companies. Foreign-owned companies in Hungary can rarely be called classic start-ups, as they are usually subsidiaries, or already adopt a proven business model with definite market development plans, while domestic micro and small enterprises ramp up both product and business development during this period, typically using the founders' funds or venture capital provided by the founders.

In the case of median sales revenue as well, significant dynamics can be observed at Hungarian FinTech start-ups, however, the growth rate differs, in this case, too, depending on the ownership background. The difference is mainly due to the different life stages, as Hungarian companies typically do not generate sales revenue in the first year of their operation. They mainly operate from the founders' capital, while foreign companies are typically able to achieve substantial sales revenue even in the first year of their domestic presence typically due to their more established market position. In the case of foreign-owned companies, sales growth will continue to be significant at the same time typically more volatile (Chart 43).

In the early stage of their development, successful FinTech start-ups in Hungary grow at a fairly high rate, in line with economic intuition. The sales revenue of FinTech micro-enterprises grows faster than their added value compared to small enterprises (Chart 44), which is justified in order to achieve economies of scale. At a later stage of these companies, as small companies, the increase in added value is more typical, mainly because of the further possible increase in profitability. In general, it can be stated that the younger a FinTech company operating in Hungary, the higher its sales dynamics.

On the liabilities side, the share of external capital in domestic-owned FinTech companies is gradually increasing, mainly due to the increase in short-term liabilities. At the beginning of their operation, the primary goal is growth, with commercial banks providing no or limited credit to FinTech start-ups. In parallel with the dynamic growth of sales revenue and the increase in the number of employees,

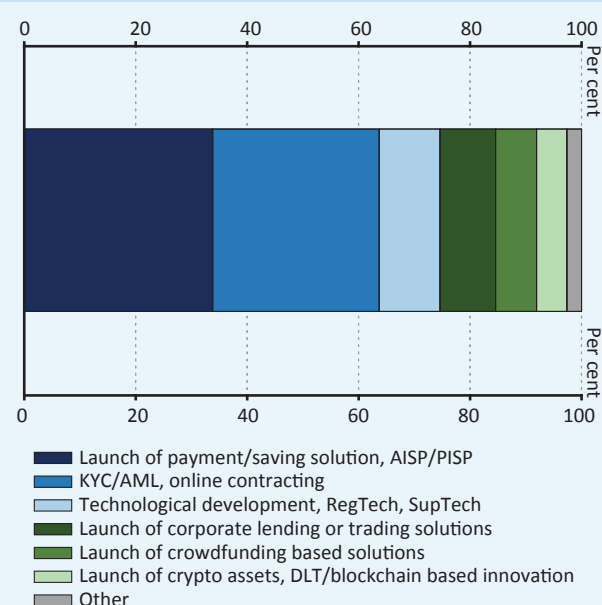
short-term liabilities also increase, but the realisation of the growth potential is basically financed from equity. Entering an income-generating and profitable stage, the growth of the share of external capital in domestic companies slows down. In this respect, foreign-owned FinTech companies will reach a turning point sooner, and from the third year onwards, the share of the equity begins to grow. This may be partly explained by the fact described earlier that foreign enterprises usually extend their established business model to other markets and are typically less considered to be start-ups in the classical sense (Chart 45).

Box 3

MNB initiatives to strengthen the FinTech ecosystem

The MNB not only encourages the FinTech-incumbent relations on a wide scale and the strengthening of the domestic FinTech ecosystem, but as a central bank also cooperates with the actors of this sector in order to promote digitalisation and international competitiveness. The MNB's framework of supporting financial innovation has been helping the development of the domestic market for three years. In March 2018, the MNB launched its financial innovation platform, the MNB Innovation Hub, which serves as a forum for direct and flexible communication with innovators. At the end of 2018, the Regulatory Sandbox was launched for testing new ideas within a regulated framework. Under the former initiative, the platform has been able to provide rapid and professional responses to various regulatory dilemmas related to financial innovations in more than 110 cases (Chart 46). The MNB Innovation Hub provides proactive guidance to innovative market participants in a one-stop shop form. As an active member of the international innovation ecosystem and the Global Financial Innovation Network (GFIN), the MNB is increasingly sought also by foreign-based companies through the MNB Innovation Hub.

Chart 46
Distribution of inquiries by topic directed to the MNB Innovation Hub



Note: Status as of 31 March 2021.

Source: MNB.

In cooperation with the world's largest FinTech event, the Singapore FinTech Festival, the MNB organised an online conference called the World FinTech Festival in Budapest in December 2020. The two-day event organised for the first time covered key topics such as modern financial infrastructures, instant payment, cybersecurity, financial inclusion as well as green and sustainable finance. As part of the event, the MNB and the Monetary Authority of Singapore (MAS) signed a cooperation agreement to strengthen professional coordination on FinTech innovations between the two countries.

To develop financial awareness and promote financial inclusion, the MNB created a mobile application for students in cooperation with a Hungarian FinTech company. The Digital Student Safe pilot project is a free mobile application aimed at 8-14-year-olds, and it allows them to learn the foundations of finances in a playful way via a smartphone. The central bank strives to deepen the domestic FinTech network with innovative market players in line with the

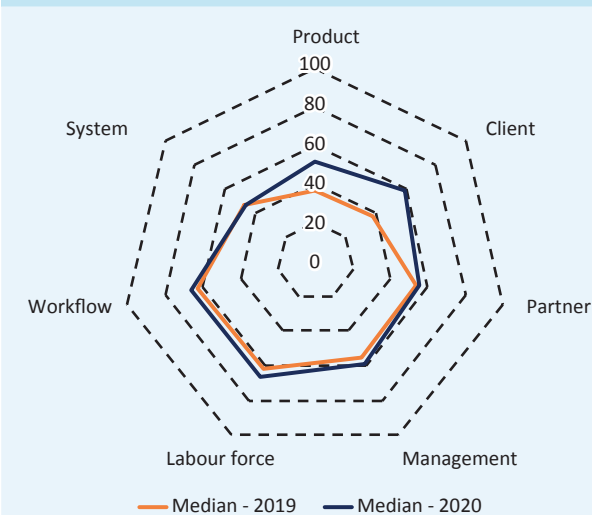
principles laid down in the FinTech strategy. In addition to the social goals it has achieved, the Digital Student Safe, which already has thousands of users, provided a good opportunity for the MNB to gain practical experience in designing and developing architecture with direct customer connections and mobile applications, which support the central bank's operations in many dimensions.

In December 2020, the MNB also launched its chatbot application. As a new central bank solution at European level, the MNB has introduced an application based on machine learning that enables interested parties to receive professional answers to their questions and request information on specific topics at any time of the day, all automatically and immediately. The Pallas Athene chatbot pilot project contributes to the innovation efforts in the field of artificial intelligence (AI) in Hungary – with the involvement of Hungarian FinTech actors. The MNB's chatbot pilot project provides an opportunity to learn about applications based on innovative technology and to use them safely and more widely in the long run. The chatbot is currently available in three specific topics (financial innovation, consumer protection and supervisory licencing), which the central bank will continuously expand in the future, taking into account consumer feedback.

3 Digitalisation level of the Hungarian banking sector

For 2020, the MNB assessed the level of digitalisation of domestic incumbent banking players again. According to the survey, compared to the 2019 data, the digitalisation of institutions showed a significant development. Although the level of digitalisation of the domestic banking system is still medium, significant catching-up was seen at several players. The digital development was primarily observed in previously very underdeveloped segments, i.e. in the digitalisation of liaising with external stakeholders, which could be seen in the digitalisation of products and customer relationships. The pandemic situation had a significant impact in 2020 on the prioritisation of developments related to external stakeholders, while less resources were allocated to developing the digitalisation of internal operations. In view of this, it is worthwhile for the domestic banking sector to give higher priority to developments affecting internal systems and processes in the future in order to exploit the opportunities of digital transformation and strengthen the competitiveness of the sector. In March 2021, the MNB issued a recommendation on the digital transformation of credit institutions, which is also a novelty at international level. The recommendation expects credit institutions to develop a comprehensive digital transformation strategy and timetable and to send it to the central bank by 31 October 2021. Thereafter, the MNB expects an annual report from the institutions on the progress and re-measurement of the fulfilment of commitments by 31 December each year, for the first time in 2022.

Chart 47
Digitalisation development index of the domestic banking system by subcomponents

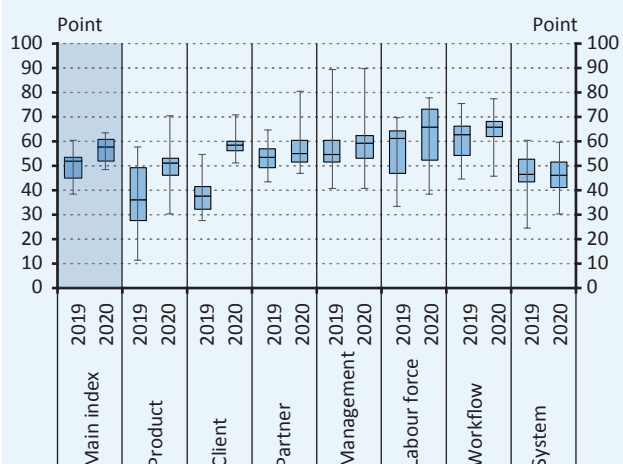


Source: MNB.

3.1 DIGITALISATION OF THE DOMESTIC BANKING SYSTEM

Based on the MNB's 2021 survey, a substantial improvement in the digitalisation level of the domestic banking system can be identified. For 2020, the MNB has again assessed the level of digital development of the domestic banking system – similarly to last year's survey for 2019. The survey covered 90 per cent of the domestic banking sector in the proportion of the balance sheet total and institutions had to answer a total of 270 questions in the form of a questionnaire. The main topics and specific questions of the survey have remained basically unchanged, but about 20 new questions have been added in order to provide a more accurate picture of the digitalisation level of the sector (See the related annex for changes in the survey and the index calculation. For comparability over time, the weighting of the survey was the same as in the previous year, i.e. the questions were included into the index with similar weights to last year). Regarding the 7 pillars examined in the survey, a substantial improvement in the digitalisation of the banking system can be identified during one year, especially in the pillars that have been lagging behind: in the areas describing the digitalisation of the relationship with external stakeholders (product, client), the sector has made significant progress, partly thanks to the developments made in the context of the pandemic situation (Chart 47).

Chart 48
Evolution of the scores by pillars and the total points of the digitalisation development index of the domestic banking system

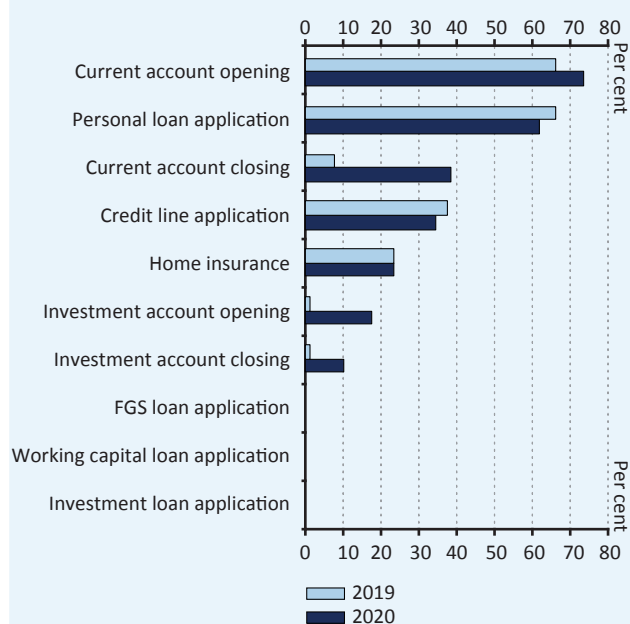


Note: The chart represents the minimum, the maximum, the lower and the upper quartiles, and the median values.

Source: MNB.

For many institutions, the spectacular development can be seen more of a catching-up, so the level of digitalisation of the domestic banking system continues to be medium. The median bank scored 53 in the composite index on a 0-100 normalised scale in 2019, rising to 58 in 2020. Similarly to international experience, the COVID-19 outbreak has accelerated the otherwise planned client-side developments in Hungary as well. The previously less digitalised institutions were forced to catch up at least with the banking system average, mainly through the digitalisation of the product range and customer relationships, so it was precisely in those areas where the MNB called for progress in its 2020 FinTech and Digitalisation Report. As a result of the catching-up process, the dispersion of the scores representing the level of digitalisation both in the pillars examined and in the institutions surveyed has decreased significantly, and the institutions have come closer together (Chart 48). In addition, at the level of individual banks, there is less variation between the different dimensions examined, and the digitalisation of institutions has become more evenly balanced along the different pillars.

Chart 49
Availability of digitally accessible products



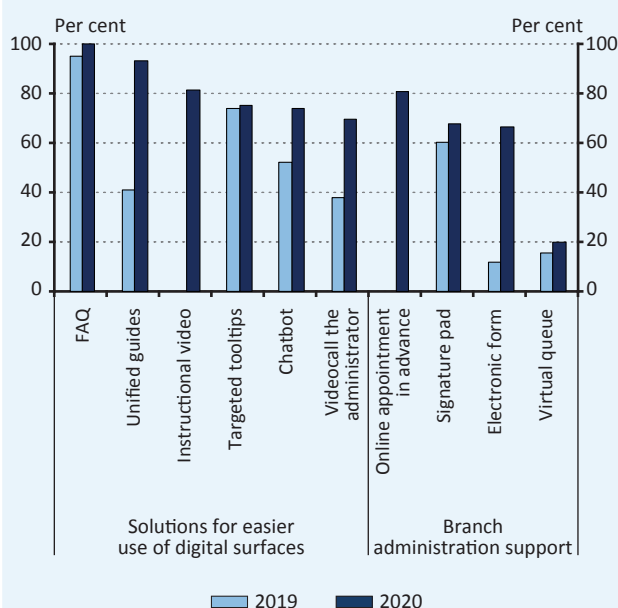
Note: The weighting was done in proportion to the total assets of the institutions surveyed. During the mean calculation those institutions which are not selling that particular product were not considered.

Source: MNB.

There has been little progress in the digitalisation of internal operations over the past year, with the banks mostly increasing digitalisation of external stakeholders. Due to the pandemic situation, digitalisation development related to external stakeholders was given higher priority in 2020, while less resources were allocated to the digitalisation development of internal operations. Although the COVID-19 pandemic had a direct impact on where and how work is done, and thus on internal systems and processes (teleworking, modified processes, etc.), institutions have typically made less progress in the latter areas. The catching-up of banks with an originally lower degree of digitalisation was significantly lower – compared to the digitalisation of external relations –, here the development can be identified mainly in connection with the digital readiness of the workforce and the digitalisation of work processes. After the pandemic situation has subsided, the development of internal operational areas and segments may come to the fore again, as their lower digitalisation may even pose a barrier to the overall digital transformation of individual institutions in the medium term. Accordingly, the domestic banking sector should give higher priority to improvements in internal systems and processes in the short term⁹, given that some institutions rated the modernity of their systems worse than a year earlier.

⁹ As in the previous year, the MNB's main focus of supervision in 2021 will be to identify problems related to outdated systems.

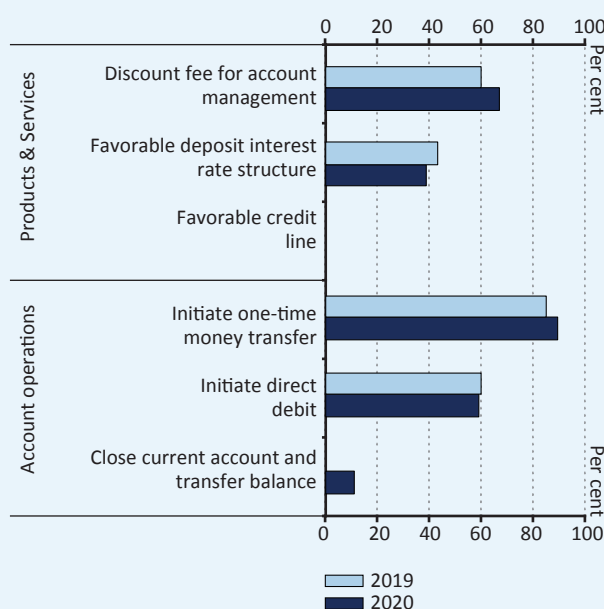
Chart 50
Prevalence of solutions in digital interfaces



Note: The 2019 survey did not ask questions about the issues marked with an asterisk, so 2019 data are not available. The weighting was done in proportion to the total assets of the institutions surveyed.

Source: MNB.

Chart 51
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.

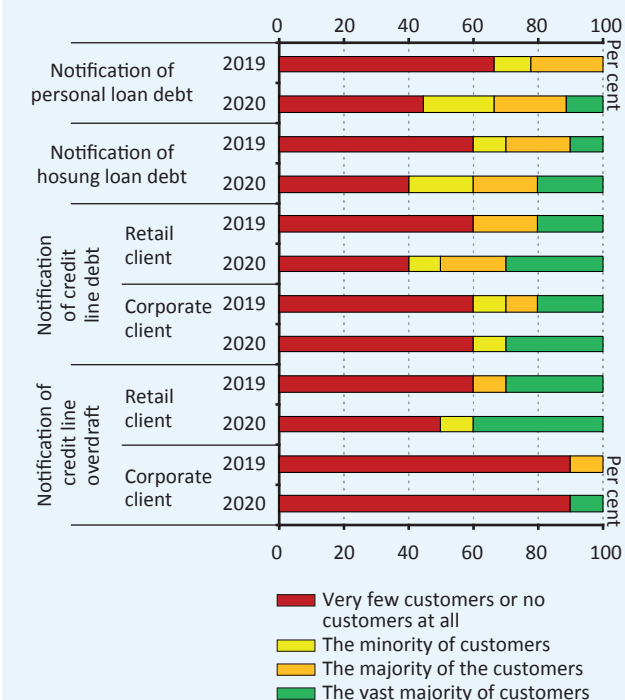
3.2 DIGITALISATION OF INTERACTIONS WITH EXTERNAL STAKEHOLDERS

The COVID-19 pandemic has been a catalyst for digitalisation developments, especially for the digitalisation of external stakeholders. The banks have further broadened the range of products that can be fully accessed digitally, covering also areas that were previously less prioritised. The most widespread end-to-end digital products remain current account opening and personal loan applications (with 70 and 60 per cent digital market penetration in the proportion of the balance sheet total), but the utilisation of online sales opportunities for these products can be further improved and encouraged. Although the market penetration of online applications for personal loans and overdraft facilities in the proportion of the balance sheet total decreased slightly, this was mainly caused by a technical factor, the change in market shares based on the balance sheet total. At institutional levels, these online products are gradually becoming more dominant: In 2020, retail current accounts opened online accounted for 5 per cent of all annual retail current account openings at banks that allow online account opening. In addition, online account closure, previously available only at a few institutions, has become increasingly common, both for investment accounts and current accounts. Before 2020, transferring the money left in an account typically required the physical presence of the customer, but this is now increasingly resolved by digital means (Chart 49).

There is significant room for improvement in the digitalisation of services for companies. Online loan application at corporate level is less developed yet, largely due to the complexity of assessing and deciding on collateral requirements and the low prevalence of digital contracting and signing. There is also a case for improving corporate lending practices in the context of the Funding for Growth Scheme (FGS), for example in the case of FGS Go!, where the framework is flexible enough to allow for the acceptance of several documents even if they are created electronically.

Digital interfaces and solutions to improve customer experience that support banking in general are becoming more common. As a result of the banks' developments to support the online orientation of customers, the range of channels and tools available to them has expanded. As a result of these processes, a significant proportion of customers can now navigate online based on their own preferences, making it easier for them to find their way in the online space regarding banking services. The strongest growth was seen last year in the solutions

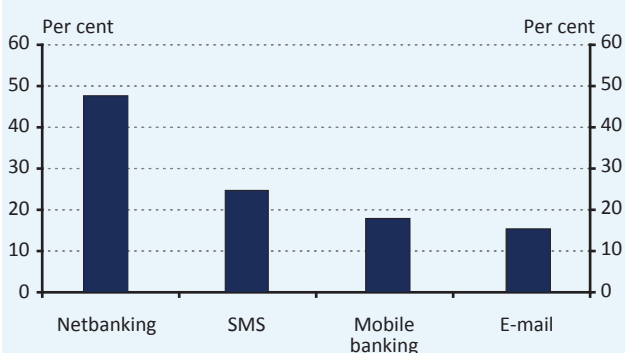
Chart 52
How typical it is at particular banks that clients receive digital notifications about their loan product



Note: In the proportion of respondents. During the calculation those institutions which are not selling that particular product were not considered.

Source: MNB.

Chart 53
Channels through which digital notifications typically arrive



Note: Based on the aggregation of the 5 product groups examined (credit line debt and overdraft, personal and housing loan debt, bank account statements). The weighting was done in proportion to the total assets of the institutions surveyed. During the calculation those institutions which are not selling that particular product were not considered.

Source: MNB.

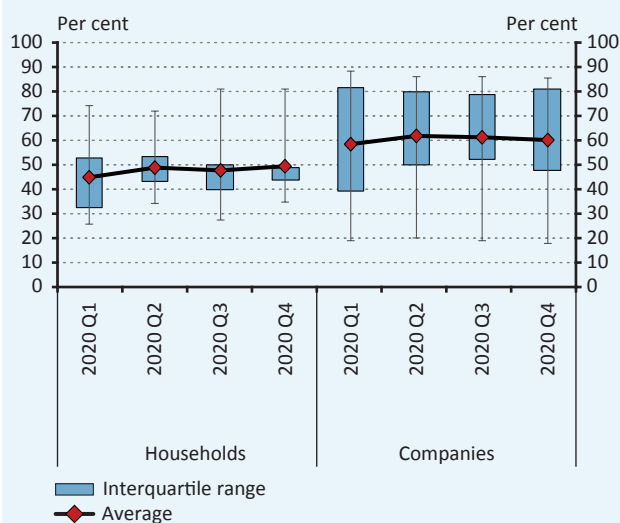
that were the least used in 2019, with the use of unified guides, the possibility of video calls to the administrator and the use of chatbots becoming much more common in the sector (Chart 50). Significant improvement can be achieved in terms of customer experience and awareness through the fact that quasi real-time tracking of personal loan application assessments is now available in 44 per cent of the sector, compared to 11 per cent previously (based on the balance sheet total), while Personal Finance Management (PFM) services are available in three quarters of the sector. Digital solutions increasingly appear in connection with administration in branches as well, both in terms of scheduling a visit to the branch and in terms of simplifying administration and eliminating paperwork.

The use of pricing incentives for digital recourse of products increased slightly in the sector during 2020. Pricing incentives are already being used by most of the banks to favour applications through digital channels, most often for opening a current account and related account management. In contrast, there were no significant changes in pricing incentives for digital services over the past year. There were some small decreases in some cases, but mainly due to changes in market shares in the proportion of balance sheet total (Chart 51). Some banks are also using pricing incentives to make digital account closure, which was newly made available, more attractive.

Digital customer information is still mainly linked to digital bank account statements, but progress is already seen in the case of certain credit products as well. Bank account statements detailing the transactions made are sent digitally to the majority of customers. In the past year, progress was seen mainly in the retail customer segment, with nearly 70 per cent of bank customers now receiving their statements digitally, an improvement of around 5 percentage points year-on-year. Around 60 per cent of corporate customers take advantage of this option. Progress can also be seen in the area of credit products, with the digitalisation of notifications being particularly pronounced regarding retail products over the past year: the number of digitally notified personal loan customers doubled, while an increase of around 50 per cent was observed in housing loans. Despite the strong growth, there is still a lag in credit notifications at sector level, with around 20 per cent of borrowers receiving digital notifications altogether, and little attention is paid by institutions to the digitalisation of overdraft notifications, especially in the corporate segment (Chart 52).

The primary channel for digital notifications is the banks' netbanking interface, but mobile banking is also becoming increasingly popular. The delivery of electronic bank account statements via netbank is available at all

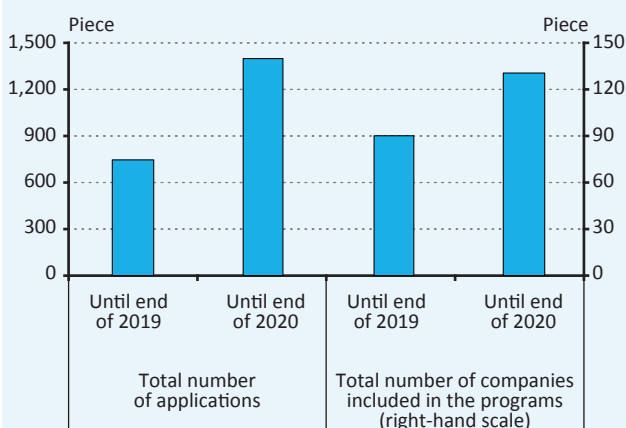
Chart 54
Changes in the share of digitally used accounts in domestic banks for households and companies



Note: By bank and by type of client as a proportion of total bank accounts, based on gross value at the end of the period. The chart represents the minimum, the maximum, the lower and the upper quartiles and the mean values.

Source: MNB.

Chart 55
Development of applicants to domestic banking incubation programmes



Note: The period begins in 2016, when the first incubation programme was launched.

Source: MNB.

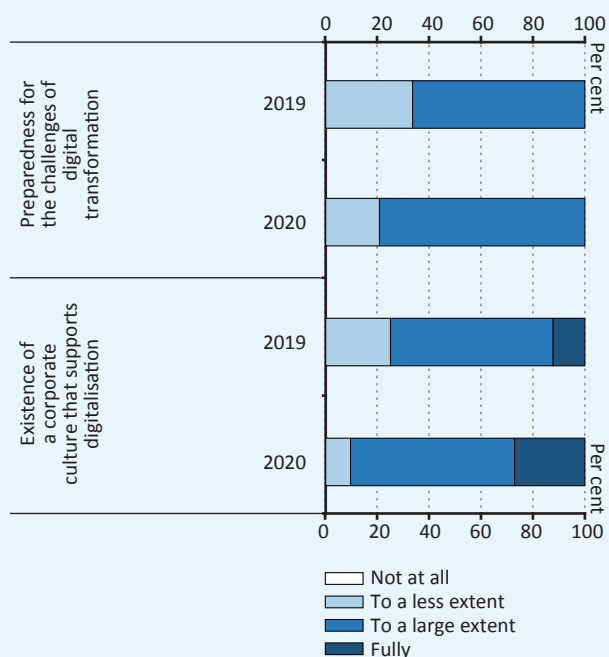
institutions and is typically the most widely used digital format regarding these documents. For credit products, although notifications via netbanks also appear, the delivery of debt notifications to customers via SMS will continue to be an important channel (Chart 53). Notifications via mobile banks are on the rise, with one or more institutions already enabling this form of digital notification for all product types examined (statements and credit notifications). In the future, a forward-looking direction is the development of mobile banking notifications, first of all by replacing SMS.

At sector level, almost one in two retail customers can now be considered digitally active. Developments in banking mean that online and mobile banking platforms offer an ever wider range of banking options, with greater simplicity of use. At the same time, digital channels and online interfaces are becoming more and more important for customers in terms of individual bank account operations and transactions, a trend that has been reinforced by the pandemic situation. Accordingly, the share of digitally used accounts among the population is gradually increasing, with almost one in two accounts considered digitally active. Although the corporate customer base is slightly ahead with a digitally active proportion of accounts around 60 per cent, there is still room for improvement for both customer bases in international comparison. With regard to digitally active account usage, it was generally observed that while there was a noticeable increase after the introduction of the restrictions, a certain degree of reversal was observed when the restrictions were eased (Chart 54).

Banks encourage the use of digital solutions in their interactions with internal and external partners, with a slightly higher degree of automation. Although frameworks to support internal developments and digital communication have been in place for some time, in the last year progress was made in terms of incentives, with three quarters of the players in the proportion of balance sheet total, internal rules encourage employees' digital communication. In addition, digital or automated communication with suppliers has also improved slightly, with the share of institutions renewing existing contracts automatically increasing from 11 to 22 per cent based on the balance sheet total. However, there is still a significant backlog in several institutions in these areas.

Commitment to cooperate with FinTech companies has increased, but the rate of adaptation is only slowly improving. In 2020, mainly due to the COVID-19 pandemic, domestic banks became more active in seeking opportunities for cooperation with FinTech companies, but acceptance and openness are generally increasing. Despite this, the number of FinTech solutions adapted into

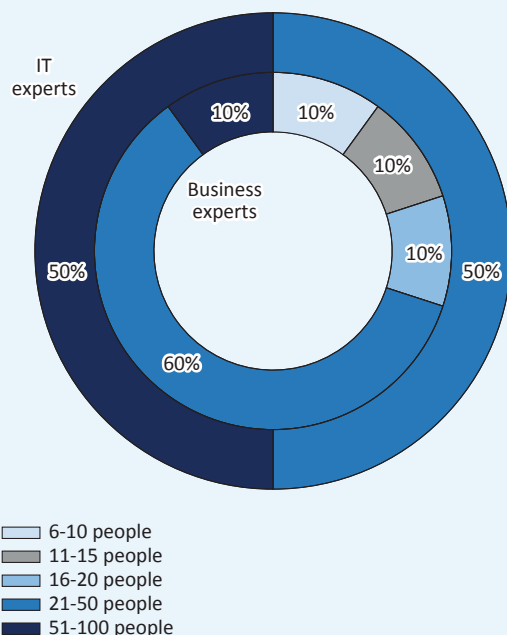
Chart 56
Preparedness and commitment towards digital transformation



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

Source: MNB.

Chart 57
Distribution of employment of IT and business experts in banking digitalisation areas



Note: The distribution of IT experts in the digitalisation field is marked on the outer arc, while the distribution of business experts in the digitalisation field on the inner arc. In proportion to the number of institutions surveyed.

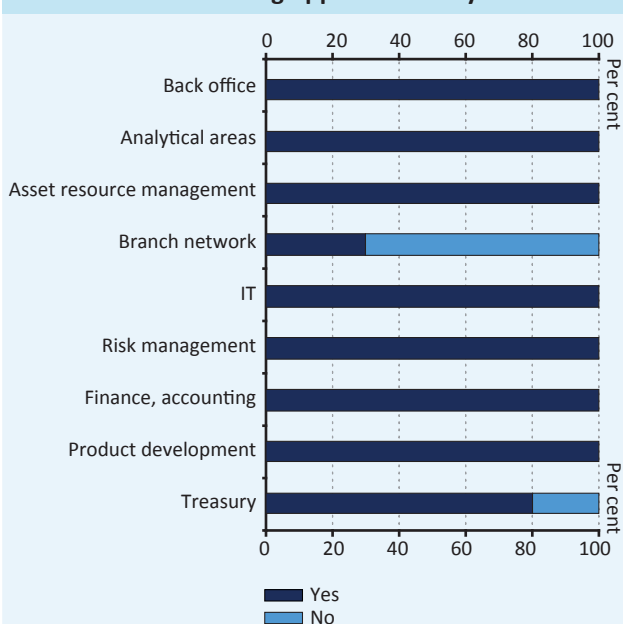
Source: MNB.

operation is growing less, and there is still considerable room for improvement in this respect if institutions consider these partnerships to be truly of strategic importance. Based on the number of collaborations already established, the existence of incubation laboratories better supports the development of these partnerships, as innovative companies can gain greater visibility in the incumbents' professional fields. So far, about 1,400 companies – both domestic and foreign – have applied to the 3 incubation programmes with banking background operating in the sector, of which 130 have been admitted to the given program (Chart 55). Although no new institution launched any incubation program in the past year, it can be seen that the need to implement such programs appears in the short- and medium-term plans of banks. In addition to FinTech collaborations, banks become increasingly open to new collaborations with platform providers too, which could take the development of the external relationship system to a new level in the long run.

The active use of social media platforms is now almost universal in the banking sector. In addition to marketing purposes, more and more institutions are also considering social media platforms as important information-sharing platforms, while also using them for Corporate Social Responsibility (CSR) purposes. Activity varies by institution and platform too, with several platforms being used daily by the sector, while there are less preferred platforms (e.g. Instagram, Twitter) with monthly frequency of use. Despite the increase in usage, the number of dedicated social media teams in banks remains at a maximum of 5 people and the share of digital marketing expenses within the total marketing cost per sector is 30 per cent of the total marketing cost, similarly to 2019.

3.3 PREPAREDNESS OF MANAGEMENT AND EMPLOYEES

In principle, bank managers already recognised the importance of digitalisation earlier on, but the 2020 pandemic accelerated its general acceptance at institutional level. Digital transformation is a key strategic objective for the entire banking sector: a positive picture of preparedness was already emerging in the sector before the outbreak of the coronavirus (Chart 56), but by the end of the first year of the pandemic, digital objectives and their achievement became even more important for institutional management. There is a significant shift in the main direction of the digitalisation strategy too, with nearly four fifths of the sector now focusing on comprehensive, institution-wide digitalisation, in contrast to a narrower, product- or process-specific digitalisation. This is also helped by a change in corporate culture, with more than 90 per

Chart 58**Provision of teleworking opportunities by area**

Note: In the proportion of responding institutions.

Source: MNB.

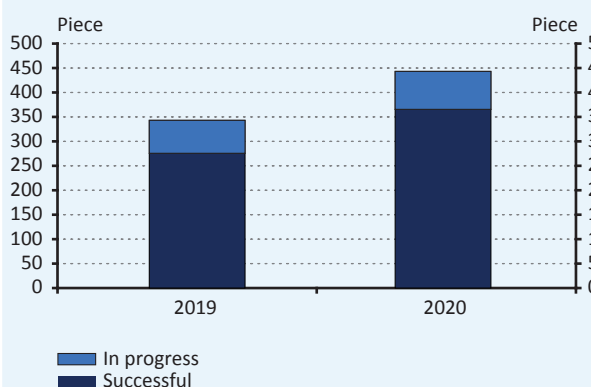
cent of institutions, according to their self-declaration, having a strong or even full support for digitalisation by the end of 2020.

The banks provide increasingly serious expert resources in the areas of digitalisation. The institutions surveyed rely on both internal developments and cooperation with external actors. Related to the above, beyond the previously established areas specifically responsible for banking digitalisation, other dedicated teams within the institution (e.g. UX/UI, customer journey, process optimisation, data asset analysis) are now actively contributing to the achievement of goals. Banks are also more supportive of digitalisation from the resource side, and the institutions can build on a growing pool of experts regarding both IT and business (Chart 57). The digitalisation field is currently dominated by IT experts, but the number of business experts is also growing.

In contrast to the period before the pandemic, domestic institutions now provide remote working opportunities for employees in almost all jobs. Exceptions are the treasury areas involved in day-to-day liquidity management and bank branches dealing with personal customer service. In the case of the former, there was a significant change in the wake of the coronavirus pandemic since there remained only a few banks where teleworking was not solved. There has, of course, been less change in the branch network, but in almost one third of the banks, depending on the job, some teleworking opportunities are provided even to branch employees (Chart 58). Furthermore, while the widespread use of teleworking became explicitly accepted in less than a year, the prevalence of teleworking is approached quite differently by the actors of the sector. According to the survey results, 30 per cent of the banks currently offer a full home office for their employees, while 70 per cent allow 2-3 days a week in general.

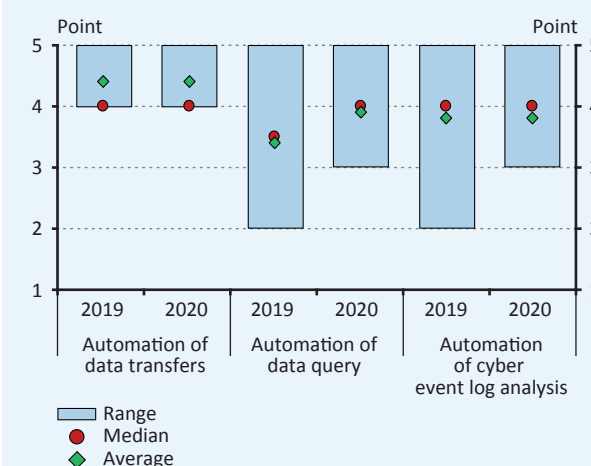
In 2020, the introduction or expansion of teleworking did not lead to significant cost reductions for domestic banks. Institutions in the domestic banking sector have typically realised no or only minimal cost reductions – below 10 per cent – from the new working practices. Only one fifth of the institutions reported higher cost savings of between 10 and 20 per cent. That said, teleworking is also important in other respects, such as recruitment and retention, as the sector is becoming increasingly competitive in attracting and retaining digital talent. For this reason, in addition to traditional recruitment solutions (e.g. job portals, social media advertisements), several banks have already turned to innovative and even more targeted solutions (e.g. market competitions, hackathons).

Chart 59
Evolution and status of the number of enterprise IT software implementation processes launched by banks since 2016



Source: MNB.

Chart 60
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.

In addition to providing working competencies and conditions in line with the digital age, their continuous development is becoming more and more important in domestic banks. Targeted training becomes more common both when a new colleague arrives and when new software is introduced. There is also an improvement in the field of internal knowledge transfer forums: when a new colleague arrives, almost all institutions hold courses with senior colleagues, and most of them, additionally, at least once a year. However, there are still institutions that have not yet assessed the digital skills of their staff at all, so identifying areas for improvement can run into problems.

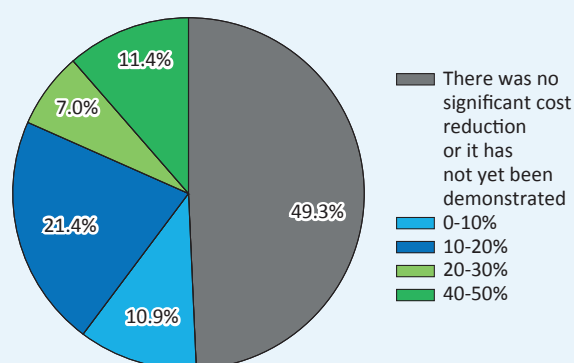
3.4 DIGITALISATION OF INTERNAL OPERATIONS

The pandemic situation has led to a significant increase in the number of projects aimed at implementing new enterprise software in the banking sector. The number of software implementation projects tailored to business needs and supporting business processes and/or value chains has increased by nearly 30 per cent compared to the end of 2019, bringing the total number of projects launched since 2016 to nearly 450 (Chart 59). The significant variation in the number of projects between institutions has narrowed, but there are still noticeable differences regarding the implementation of enterprise software, not only in terms of number but also in terms of speed. Over the past year, however, the development plans and their timing remained typically unchanged on the part of the institutions, with lead times similar to previous years. These projects cover a range of areas, from systems supporting HR work in the bank through customer access interfaces and internal improvements related to lending products.

The sector has significantly improved the level of automation of internal communication related to core banking processes. The majority of institutions are already using digitalised management approvals and signatures, thanks in part to remote working. In addition, there have been improvements in the automation of data transfer to the general ledger or analytics, with a concomitant increase in the efficiency of information flows between areas (Chart 60). However, with a high level of automation, paper-based documentation and document management remained significant. Furthermore, the development and optimisation of the process structure may be held back by the lack of significant progress in several areas relevant for 2019 (e.g., conscious use of data assets, complaint reporting processes, frequent use of paper-based information channels).

At present, the conscious use of data assets mainly appears in relation to targeted customer offers. Although institutions

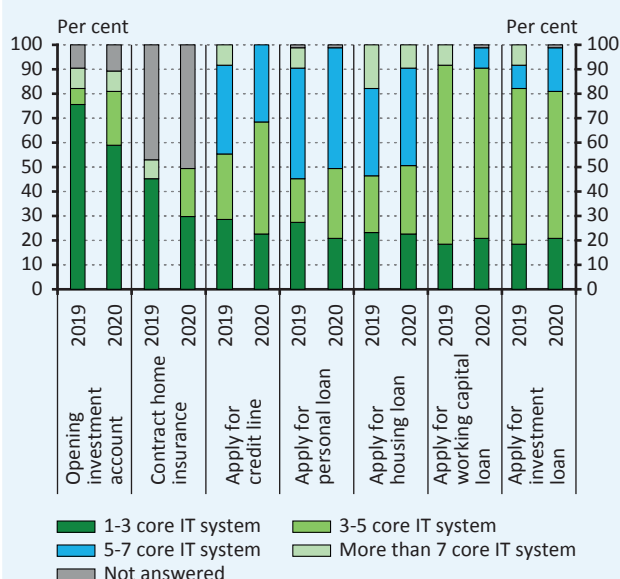
Chart 61
How much cost reduction have you achieved in relation to digitalisation over the last 3 years?



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

Source: MNB.

Chart 62
Within the various value chains, how many core IT systems are affected by a given process in each year



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

Source: MNB.

have not expanded the types of customer data they collect digitally, most of them already approach their customers with targeted, personalised offers. Complaints reporting has not improved significantly compared to the pre-pandemic situation, with the majority of contacts still being made by case managers and the feedback and complaint handling process being manual and often time-consuming, so there is room for improvement in this area too.

Agile working method, which improves the efficiency of work and projects, becomes more widely used in the sector. In addition, its spread among the areas within institutions also increased during 2020. In addition to the IT and product development areas, where it have already become commonplace, some institutions are also applying this working and organisational method in other areas (e.g. marketing). In the IT area, the majority of institutions use the DevOps¹⁰ approach to development, and almost the entire sector uses ITIL¹¹ processes.

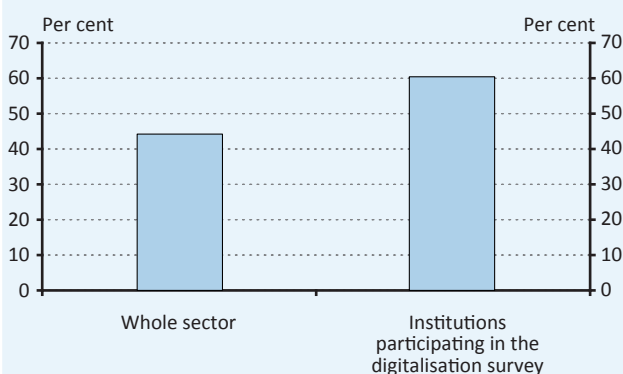
There were no significant changes in the maturity of internal banking systems during the past year, but the majority of banks believe that the cost-cutting impact of digitalisation is already visible (Chart 61). Despite a varied past year full of challenges, opportunities for improvement and needs, the institutions' perception of their own systems in terms of modernity has not changed: the banks' assessment of the modernity of their hardware and software assets is similar to that for 2019. The modernity of hardware equipment was rated as relatively up-to-date on a scale of 1 to 5, averaging 4, while that of software equipment was rated somewhat lower, at 3.5. It is important to mention that there were institutions that rated their own systems in both categories already as more obsolete compared to last year. The sector is mostly uniform regarding the structure of systems too: in terms of data transfer speed between the branch and the front-office areas and the front-backend stratification, a decisive direction and level of preparedness can be seen. However, the cost-cutting impact of digitalisation can already be identified in half of the banking sector. Some institutions believe that this impact is significant, while others think that it is not yet detectable.

There is a certain convergence in the structure and evolution of system architectures at sector level. There is still little progress in achieving a completely paperless process and the full digitalisation of the value chains in the individual product applications – being at around 10 per cent

¹⁰ Development & Operation, where development and operation processes are implemented together to shorten the system development cycle.

¹¹ ITIL: Information Technology Infrastructure Library, a detailed practice for managing IT services, focusing on the alignment of IT services and business needs.

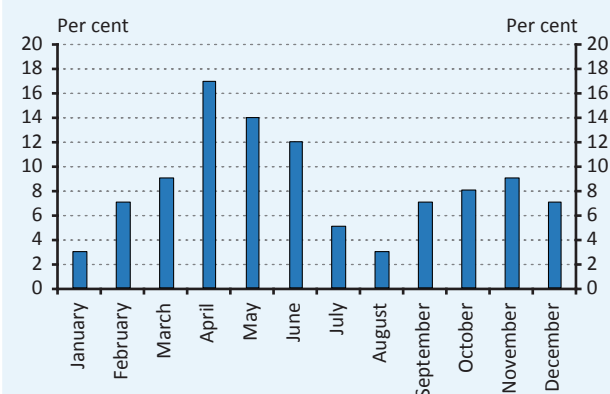
Chart 63
Proportion of institutions using cloud services in the domestic banking sector



Note: In the proportion of respondents.

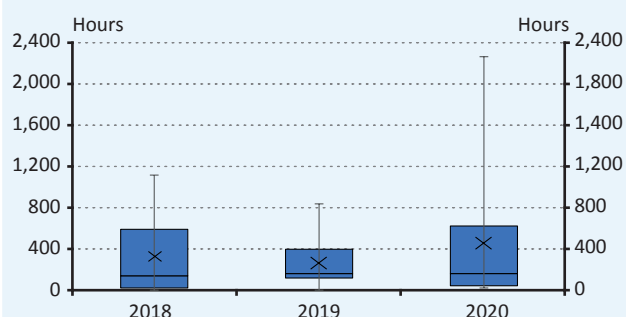
Source: MNB.

Chart 64
Financial sector incidents distribution in time (2020)



Source: National Cyber Security Center.

Chart 65
Evolution of aggregate 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.

at sector level. Although in the examined product groups all institutions have solved the process digitalisation in some way, even in the most digitalised banks, it is possible to complete the processes without paper, end-to-end digitally, in the case of only 2-3 products. At the same time, partial or complete modernisation is planned for most of the systems in the domestic institutions, whether related to the value chain or to archiving. Nevertheless, the development and optimisation of systems is in progress on a smaller scale, while there is convergence between institutions in this respect. Banks are increasingly avoiding to have too few or too many systems for a single process or value chain. This typically results in the involvement of 3 to 7 core IT systems in each value chain (Chart 62). In addition to this, the use of cloud-based solutions in the domestic banking sector is also becoming more widespread, which is a much more flexible solution than traditional infrastructures. In this respect, the larger institutions surveyed are ahead of the sector, with 60 per cent in number, and 72 per cent in the proportion of balance sheet total already using cloud services (Chart 63).

With the rise of digitalisation, banks also need to develop stronger protection mechanisms against cyber incidents. In line with the cyber-attack trends of previous years, phishing for information continues to be a considerable activity today. Nearly 70 per cent of the incidents handled by the National Cyber Security Center (NCSC) of the Special Service for National Security (SSNS) for the financial sector were reports of phishing targeting customers via unsolicited mail in 2020, an increase of more than 10 percentage points compared to 2019. The presence of cyber-attacks in the financial sector is continuous, but the lockdowns and therefore a stronger online presence could have a significant impact on the time distribution of incidents in 2020 (Chart 64). Although the majority of incidents directly target customers, the development of attacks, their potential negative effects and the spread of DDoS attacks (see Box 4) have led to operational problems on the part of banks as well, which is a priority to address and prevent.

As the digital presence has grown, the frequency and duration of service outages has also increased for many institutions. According to MNB data, the number and duration of incidents in 2020 partly reversed the previously improving trend for large domestic banks. Although the typical service downtime (median) was similar to previous years, some institutions experienced several days of continuous downtime for some online services, which significantly increased the average downtime (some of these were due to the longer-than-planned live start of digitalisation and PSD2 compliance improvements). In 2020, business continuity incidents at domestic large banks caused an average of 447 hours of downtime (Chart 65).

Box 4**Denial-of-Service cyber attacks on financial institutions**

Distributed Denial of Service (DDoS) attacks aim to completely or partially disable IT service(s) – website or Internet banking. In such a case, a perpetrator tries to disable access to the application, system, or even the entire network, and to prevent access to information. A Denial-of-Service attack typically floods the target with traffic and requests, while real traffic (e.g. online banking logins) is partially or completely paralysed, and the system becomes very slow, unavailable, or even collapses. A Denial-of-Service attack may also exploit known vulnerabilities in an application or operating system to achieve an overload.

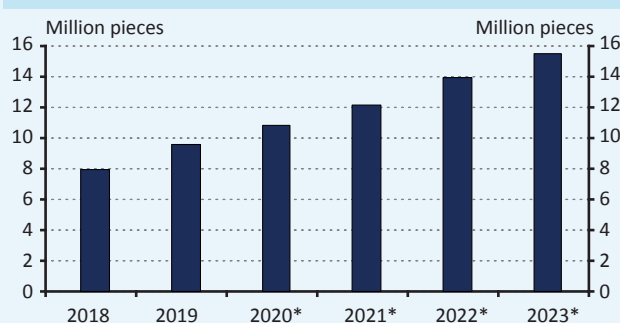
Such attacks can be motivated by a variety of reasons: it is often money-making, but can be also the weakening of competitors, revenge or political motives. When the attackers want to make money, they usually follow the scenario of launching a small attack against the target – or against an entity of a larger target (such as a banking group) – and demanding a ransom (usually in Bitcoin) in a ransom note in exchange for not repeating the attack with a larger load. However, there are also cases where the target receives a ransom note, but the threat indicated in the note, the subsequent attack, does not take place even if the target does not pay the ransom. In such cases, it can be assumed that the real motive was not the ransom, but for example stock market movements (short selling). Occasionally, cyber attackers also use DDoS attacks as a distraction to divert the attention of the security professionals of the attacked company, while other attacks (data theft, financial transactions) are carried out in the background. It is also worth noting that the result when a website is simply accessed by too many legitimate users at the same time can often be similar to a DDoS attack, so it is not always obvious from the outset whether it is a cyber attack or the infrastructure serving the website is undersized for the increased load.

DDoS attacks may also have collateral damages, i.e. not only the actual target, but also other companies using the connected infrastructure or the same telecommunications provider may experience service outages as a result of a DDoS attack. For example, the company website may be targeted by attackers, but the VPN gateway used by employees for teleworking may also become inaccessible due to increased load on external IP addresses.

In recent years, there has been a marked upward trend in the number and intensity of DDoS attacks globally (Chart 66). During the year 2020, several cases of DDoS attacks were reported in the world press. In February, Amazon Web Services (AWS) suffered one of the largest DDoS attacks ever, reaching a load of 2.3 terabytes per second at its peak. In August and September, criminals attacked several targets in New Zealand – including the New Zealand Stock Exchange (NZX) which was rendered inaccessible for days. The escalation of the COVID-19 pandemic situation has been accompanied by an increasing intensity of cyber-attacks – not only DDoS, but also other types – against hospitals, healthcare and educational institutions.

The DDoS attack on 24 September 2020, which affected several Hungarian banks and compromised the services of T-Systems, was a very serious attack compared to recent years in Hungary. All in all, Hungarian banks and their telecom providers have so far successfully defended themselves against DDoS attacks and are technically prepared to deal with this type of problems, but attacking techniques are constantly evolving, so the defenders can never sit on their hands.

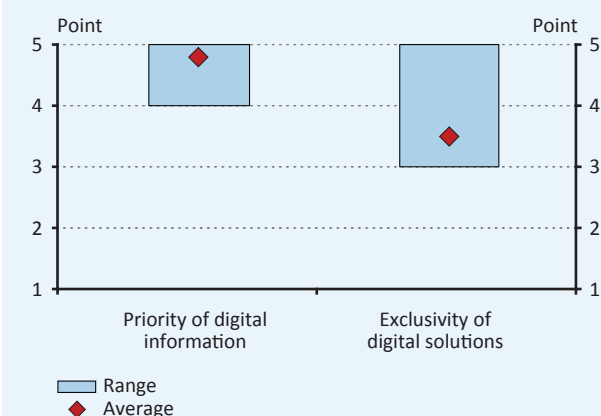
Chart 66
Number of DDoS attacks globally



Note: The values of years marked with an asterisk are based on a forecast.

Source: Cisco (2020): Annual Internet Report.

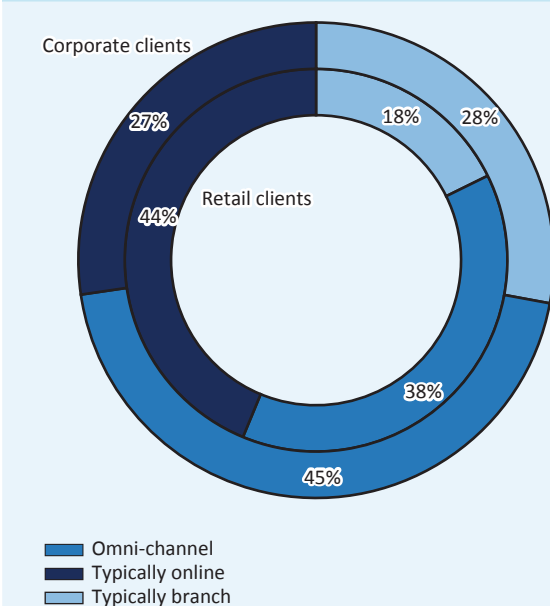
Chart 67
The importance of digitalisation for customer relationships (2020)



Note: On a scale of 1 to 5, where a score of 1 meant that the given question had no priority at all, and a score of 5 meant that the question had full priority.

Source: MNB.

Chart 68
Distribution of retail and corporate customers by channel usage among the surveyed institutions (2020)



Note: Based on the banks' self-declaration, in proportion to the total number of customers. Banks tend to interpret the definition of online account usage more broadly than other statistics also examined by the MNB.

Source: MNB.

3.5 THE IMPACT OF THE COVID-19 SITUATION ON THE DIGITALISATION OF THE DOMESTIC BANKING SECTOR

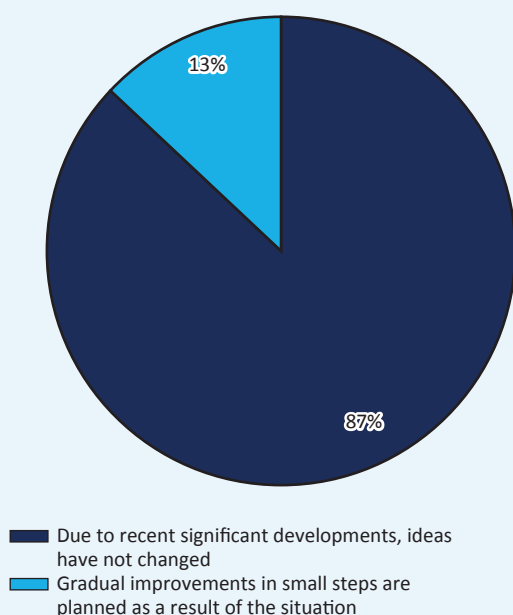
The Bank Digitalisation Survey 2020 also looked at the impact of the COVID-19 pandemic in respect of the 7 pillars examined. This year, a series of questions specific for COVID-19 was added to our bank survey to measure the considerable changes due to the coronavirus. Through these additional questions, it is possible to further explore the impacts affecting both the external and internal operations and assess their permanence.

Digital channels have become dominant in the pandemic and will remain relevant in the long term. Before the COVID-19, there were considerable differences between the digital interfaces of individual banks and their rate of utilisation. Accordingly, there are wide variations among the banks in the proportion of customer relationships that have been shifted to online channels because of the pandemic. However, in general, the move to the online space led to greater customer activity, including for customers who previously only had face-to-face contact with their bank. Increasing openness on the customer side has made the digitalisation of customer interactions a long-term priority for banks, especially in order to improve the efficiency of information (Chart 67).

On the customer side, branch-only banking is less preferred, while the transition of customers to digital channels may be permanent in several segments. Currently, nearly half of retail customers and around one quarter of corporate customers typically do their banking online, according to feedback from the institutions. Together with omni-channel customers, who use multiple channels, the proportion of customers who typically manage their finances in a bank branch is therefore lower in both segments (Chart 68). In addition, for all types of customers, several institutions believe that the digital switchover could be permanent, and even for retail customers over 65 years of age, the majority consider the switchover to be at least partially permanent. Although demand for digital solutions has increased substantially in the wake of the pandemic, the development of new products is typically a priority for banks, regardless of the changes in demand. By introducing innovative solutions, domestic institutions also plan to encourage the use of the Instant Payment System, among others.

Banks have become more committed to digital transformation and greater modernisation of operations. In 60 per cent of the institutions, the pandemic situation has accelerated the implementation timetable of the digital

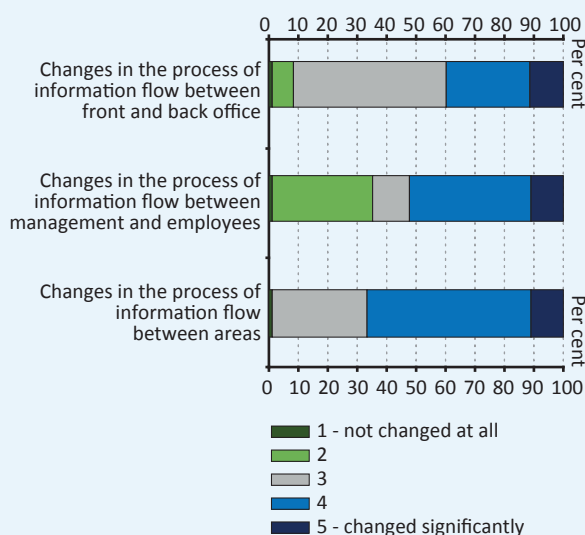
Chart 69
Impact of the pandemic situation on legacy IT development plans



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

Source: MNB.

Chart 70
The extent to which each process type has changed in response to the pandemic situation, based on the banks' self-assessment



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

Source: MNB.

transformation strategy. Although institutions differ in their thinking about which digital transformation steps need to be taken in the short and medium term, the vast majority of the sector puts the transformation in focus, despite the somewhat tighter budgets due to the pandemic. The digital transformation and modernisation is not only visible in product development, but also on the employee side, institutions are increasingly turning to working from home (but to a lesser extent than during the pandemic in the long term). In order to ensure the sustainability of remote working, the sector considers its existing equipment to be basically adequate, but several banks have indicated that minor system upgrades as well as new hardware and software developments and purchases are needed.

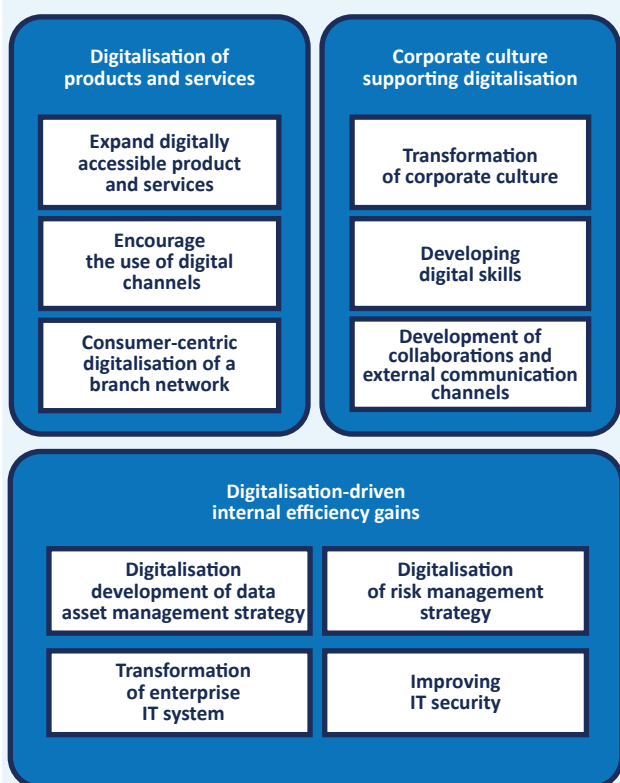
The COVID-19 outbreak had a moderate impact on internal banking systems, but a significant impact on internal processes. Considering that the development of legacy IT systems has been on the agenda for varying periods of time according to the banks' self-assessment, or that even significant improvements have already been made, few institutions think that their ideas on system development have changed (Chart 69), and none of the banks indicated that a need for a complex system replacement was triggered by the pandemic situation. The fact that banks have seen system-level IT workloads increase only moderately, despite the increase in data traffic due to COVID-19 and lockdowns, is also an argument for maintaining the previously set development plans. However, there are more significant changes in the internal process structure and communication between areas. The way and process of information flows changed significantly in some institutions during the lockdown period (Chart 70). Although opinions are still divided regarding the permanence of these changes, the banks increasingly plan to make management approvals within business processes in digital form. 67 per cent of the sector, based on the balance sheet total, plans the majority (at least 50 per cent) of these approvals to be digital in the near future. For these process elements, the solutions already in place are mostly adequate, with typically minor improvements considered sufficient by the institutions.

3.6 THE MNB'S RECOMMENDATION ON DIGITALISATION IN BANKING

In March 2021, the MNB issued an internationally novel recommendation¹² to strengthen the digitalisation of the domestic banking system. The pandemic situation highlighted the importance of digitalisation also in the case of financial services. Although the domestic banking system

¹² Recommendation No 4/2021. (III. 30.) of the Magyar Nemzeti Bank on the digital transformation of credit institutions

Chart 71
Focal areas of the MNB's recommendation on digitalisation in banking



Source: MNB.

has recently been increasingly active in the field of digital solutions, there is still a need for a major mindset change and, along this line, for significant and comprehensive developments, which the central bank can encourage by issuing a recommendation setting a common minimum level of digitalisation in the banking sector, as already stated in the MNB's FinTech strategy. Prior to the development of the recommendation, the MNB's digitalisation area conducted an extensive survey of the level of digitalisation of the domestic banking system in 2019. Taking into account the results of the survey and international best practices, the central bank experts prepared a draft recommendation, which was then discussed with market participants and the Hungarian Banking Association. The aim of the recommendation is to implement the digital transformation of domestic credit institutions in line with the MNB's guidelines, and to strengthen the competitiveness and stability of the domestic banking system, taking into account the aspects of customer orientation and consumer protection. Together, these objectives can also contribute to supporting the country's competitiveness.

The recommendation expects credit institutions to develop a comprehensive digital transformation strategy and timetable and to send it to the central bank by 31 October 2021. With regard to the strategy to be developed, the central bank expects it to cover all important segments that are essential for the implementation of the digitalisation developments of the institutions, from the expansion of the digital product range to the development of external partnerships and the transformation of the corporate IT system, while ensuring a higher level of organisational commitment to digitalisation (Chart 71). Thereafter, the MNB expects an annual report from the institutions on the progress and re-measurement of the fulfilment of commitments by 31 December each year, for the first time in 2022.

Box 5

The Instant Payment System has been successfully launched

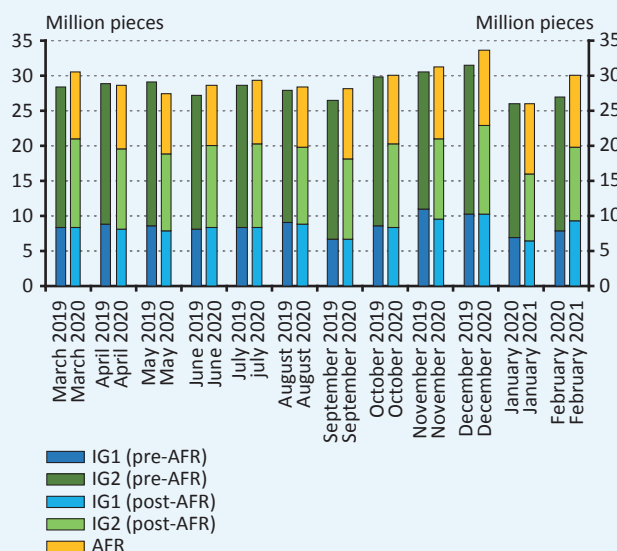
On 2 March 2020, with the successful launch of the instant payment service, a new era began in the domestic payment system. Consumers now have access to an electronic payment method that can offer a relevant alternative to cash in all payment situations (person-to-person transfers, payment of invoices, physical and online purchases), with its continuous availability throughout the year and its extremely fast processing time of 5 seconds. Nothing illustrates the potential of the system better than the fact that, thanks to this set of rules that put cash flows on a new footing, more than 40 per cent of remittance flows have been shifted from the intraday to the spot settlement platform of the Interbank Clearing System from day one. In the first year of the system, by 28 February 2021, 114 million transactions were processed in the central infrastructure in a total value of HUF 17 thousand billion (Chart 72).

2 March 2020 is an important milestone, but it marks only the beginning of a long journey of development. For instant payment to fulfil its promise, innovative end-user services based on the

core infrastructure (e.g. mobile payment solutions based on QR code) need to be widely deployed. The MNB and GIRO Zrt., which operates the central system, will provide all the support market participants need to take advantage of these opportunities. Among other things, a secondary account identification database has been created, allowing customers to initiate transactions based on mobile phone numbers, email addresses or tax IDs rather than on account numbers that are long and difficult to remember. The central system also supports the processing of payment requests, that is, standardised messages from payees to payers, which can be used to easily and conveniently initiate instant transfer transactions. A guide on the payment and data entry processes to be used in the instant payment system¹³ and a standard for QR code data entry¹⁴ have also been developed. In addition to this, on 1 September 2020, we successfully entered the second phase of development, when it became possible to submit transactions not subject to immediate processing (e.g. value-date and regularly-recurring transfers, corporate batch transactions) to the central system.

In the Payment System Report¹⁵ to be published in July 2021, the MNB will provide a dedicated chapter on the experiences of the implementation of the Instant Payment System and the expected future developments.

Chart 72
Evolution of the number of transactions processed on the night (IG1), intraday (IG2) and spot (AFR) settlement platforms of the Interbank Clearing System



Source: MNB.

¹³ www.mnb.hu/letoltes/fizetesi-folyamatok-utmutato-20190712-en.pdf

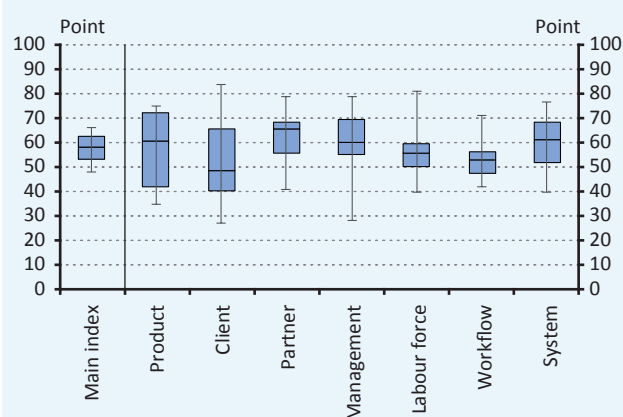
¹⁴ www.mnb.hu/letoltes/qr-kod-utmutato-20190712-en.pdf

¹⁵ www.mnb.hu/en/publications/reports/payment-systems-report

4 Digitalisation level of the Hungarian insurance companies

In the framework of a questionnaire survey covering more than 90 per cent of the domestic insurance sector based on gross premium income, the MNB conducted an analysis of the level of digitalisation of domestic insurers. In the case of domestic insurers, online access to products and related administration are mostly digitalised, and the back-office systems supporting their operations can be considered advanced. However, more progress is needed in the digitalisation and automation of internal processes, with a stronger focus on the preparedness of the management and the employees as well as on the strengthening of a more supportive organisational culture for the digital transformation.

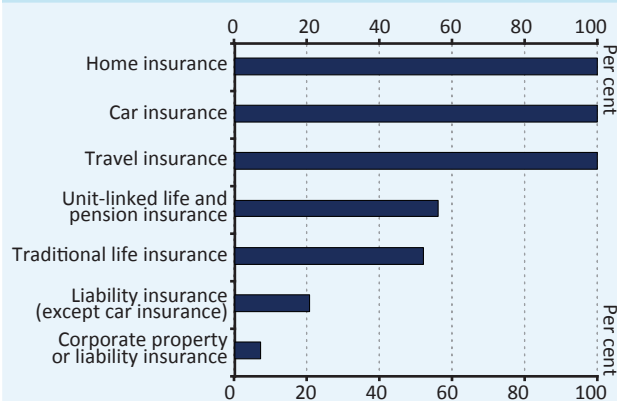
Chart 73
Range of the points by pillars and the total points of the digitalisation development index of the domestic insurance sector (2020)



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

Source: MNB.

Chart 74
Availability of digitally accessible insurance products (weighted average)



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

Source: MNB.

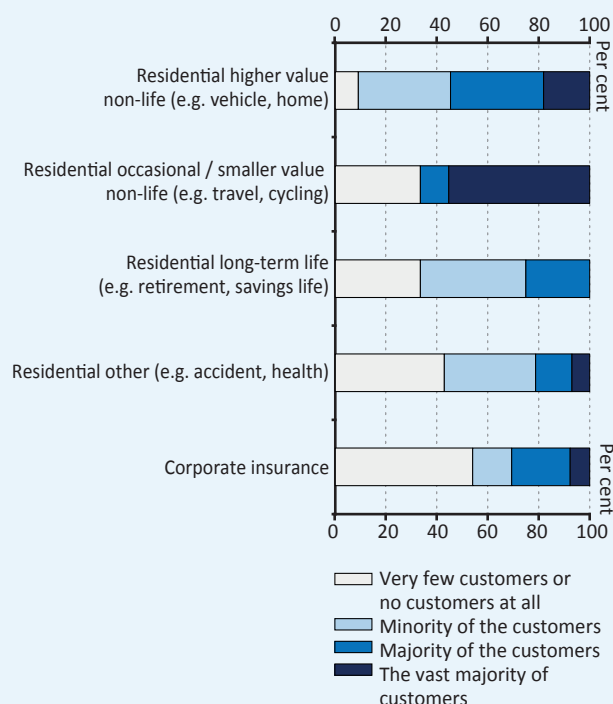
4.1 DIGITALISATION OF DOMESTIC INSURANCE COMPANIES

The MNB also assessed the level of digitalisation of domestic insurers for 2020. The questionnaire focused on digitalisation, consisting of 7 pillars with around 250 questions, covered external relations, product portfolio and customer access as well as organisational preparedness and the level of digitalisation of internal systems and processes. The survey covered more than 90 per cent of the domestic insurance market based on gross premium income.

Overall, the level of digitalisation of domestic insurers is medium, while there is little variation in the level of development of institutions. The typical degree of digitalisation of domestic insurers is 58 on the 0–100 standardised scale (Chart 73). Domestic insurers take very different approaches to digital transformation, so the level of development within each pillar is varied. Despite the diversity of focus and orientation, the overall picture is similar across the sector, with slight variations in the level of digitalisation across organisations as a whole.

Insurance products and back-office systems supporting the operations are mostly digital, but the internal processes need to be improved. Although there are substantial and relevant differences between market players in terms of the type and number of products and services available, the online availability of products can be considered good for both life and non-life products. At the same time, there is room for improvement in promoting digital administration and interaction across all types of institutions. The operational systems provide a good basis for the digital transformation of insurers, but more progress is needed in the digitalisation and automation of internal processes, where more emphasis on the preparedness of managers and employees can be a way forward.

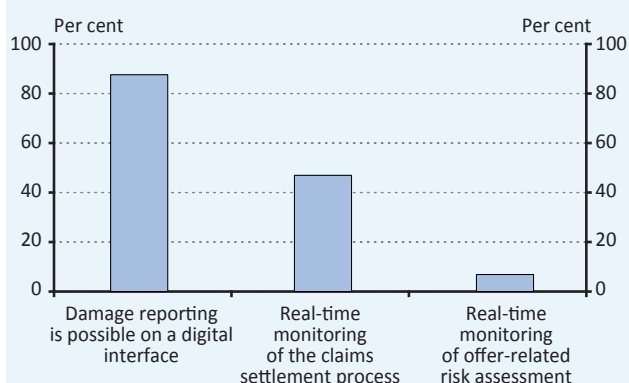
Chart 75
Form of regular customer notification of the premium due (non-life) or the current balance (life)



Note: In the proportion of respondents. During the mean calculation those institutions which are not selling that particular product were not considered.

Source: MNB.

Chart 76
Digital interfaces provided by institutions for the declaration of loss and for monitoring certain processes



Note: In the proportion of respondents.

Source: MNB.

4.2 DIGITALISATION OF INTERACTIONS WITH EXTERNAL STAKEHOLDERS

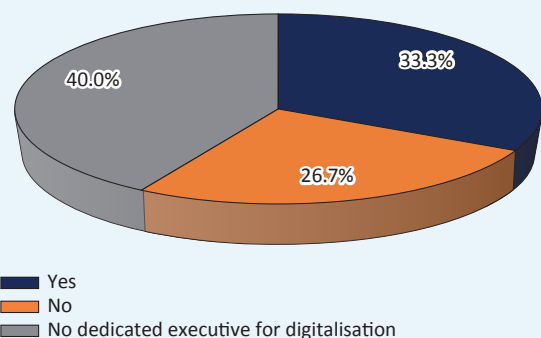
In our country, the most popular residential property insurance products can be requested online, while there is room for substantial development in corporate services. Insurers with a broad range of products covering a large and complex range of activities place great emphasis on digitalising their products, so digital access to non-life products is high, in many cases 100 per cent (Chart 74). Due to the nature of life products, there are institutions that place less emphasis on their digital availability, but even for this product group, the majority of the sector – around 60 per cent on a gross premium basis – have already developed digital application interfaces. For business customers, however, online application of products is less accessible yet. However, several insurers also use pricing incentives to promote digital usage in general: while discounted premiums are becoming more common in the sector, they are mostly in the form of one-off, non-permanent discounts. However, only in a few institutions can we see positive incentives to favour electronic communication and administration.

Customer notifications have been digitalised in particular in the area of retail property insurance. Regarding non-life products, the majority of insurers send information on the due date of premium payment to the majority of their retail customers in digital format (Chart 75), while for more occasional products, on a gross premium basis, 55 per cent of the insurance sector considers digital as the primary option covering almost all customers. However, for the insurance products under review, the digitalisation of general customer information and contact is slightly lower than for regular notifications (non-life: premium payment, life: balance statement). In addition, there is also a need for greater emphasis on the digitalisation of notifications for corporate products, with 69 per cent of insurers sending digital notifications to less than half of their corporate customer base.

Declaration of loss via digital channels can now be considered as almost universal. In addition to the digital availability of products, the development of a number of solutions to enhance the customer experience and help them find their way around in terms of product application and administration may be reasonable. The reporting of claims is already digital for 87 per cent of the sector's operators, while the tracking of the claim settlement process is digital for almost 50 per cent of the sector, but there is still room for improvement in the provision

Chart 77

Is the area representative responsible for the insurer's digitalisation member of your Board of Directors?

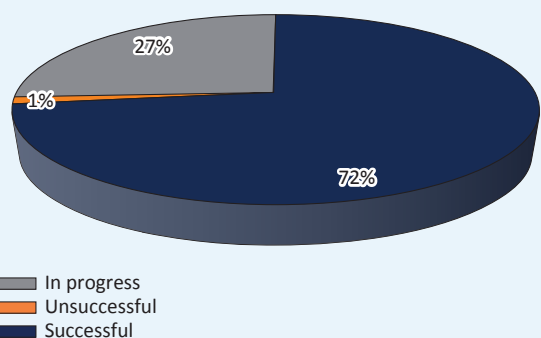


Note: In the proportion of respondents.

Source: MNB.

Chart 78

Distribution of enterprise softwares implemented since January 2016



Source: MNB.

of information on the individual steps of the assessment process (Chart 76).

The digitalisation of relations with external and business partners should be developed in the insurance sector.

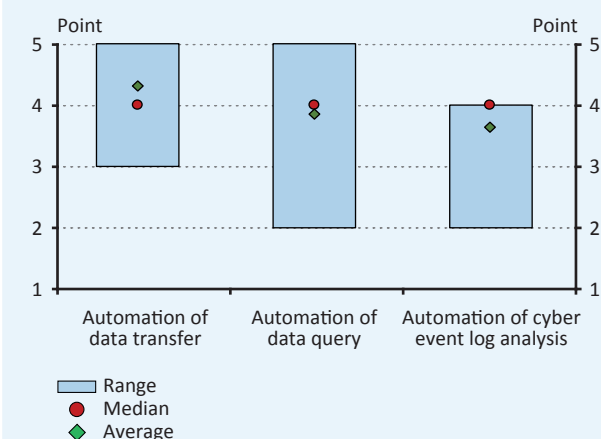
Overall, domestic insurers are doing well in terms of incentives to support internal improvements and internal frameworks to promote development and digital communication in general, with three quarters of them also promoting digital communication for employees through internal rules. The need for a higher degree of digitalisation can be identified mainly in the case of external contacts, both ad hoc contacts and regular collaborations, while openness to innovative actors is hardly noticeable: there are currently no dedicated incubation programmes and none of the institutions surveyed plans to develop such a platform in the medium term. While domestic incumbents see a number of useful innovations that are also forward-looking for the insurance market – primarily globally, but increasingly in the domestic market as well – only less than a quarter of the surveyed institutions have established collaboration with FinTech and/or InsurTech companies. Each of those that have already formed partnerships work with up to 4 or 5 innovators.

4.3 PREPAREDNESS OF MANAGEMENT AND EMPLOYEES

The insurance sector is aware of the importance of digitalisation, but this is not universally expressed at strategic and management level. The vast majority of the sector focuses on both digital transformation and improving the cost-effectiveness of the IT system. However, in more than one third of the institutions, digital transformation does not appear as a separate, dedicated senior management area (Chart 77). However, according to the MNB survey, 87 per cent of the sector feel fully or very well prepared for the digital transformation and have accelerated the implementation of their digital transformation strategy over the past year.

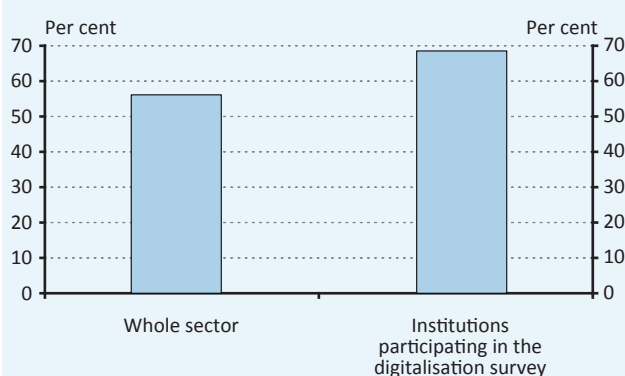
The practice of domestic insurers in providing telework is heterogeneous. The institutions' attitudes cover the whole spectrum, with some offering full home working in all areas, but 20 per cent of them offering no teleworking at all or a maximum of 1 working day per week. Much of the sector will provide more home working opportunities than it did before the pandemic, but will not maintain the current level.

Chart 79
Evaluation of the automation of the insurance processes, 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.

Chart 80
Proportion of institutions using cloud services in the domestic insurance sector



Source: MNB.

4.4 DIGITALISATION OF INTERNAL OPERATIONS

In total, 102 enterprise software implementation projects have been launched in the insurance sector since 2016. The majority of projects are concentrated on a few insurers, with nearly three quarters of these projects successfully completed and only 1 per cent considered unsuccessful by the institutions (Chart 78).

It would be important to further improve the level of digitalisation of the insurers' internal processes. Nearly 75 per cent of the institutions already used a unified archiving system before the pandemic and digitalised management approvals and signatures have been in use since long. In addition, the flow of information between areas is reported to be good, based on self-declaration of institutions, but there are still a considerable number of manual processes, such as communication with the general ledger or analytics system, or analysis of the cyber event log (Chart 79).

Agile working method is not yet widespread among insurers. Only half of the institutions use cross-functional teams for process optimisation. However, the institutions that take this approach typically involve few areas overall (mainly IT and product development). In addition, however, the use of ITIL processes is widespread at sector level.

The sector considers the development of internal systems to be good as a whole, both at hardware and software level. In the last three years, various digitalisation improvements have led to a cost reduction of almost 20 per cent for insurers. In recent years, the IT systems in the sector have experienced an increase in workload, but only to a slight extent, which has not caused any problems in their operation. Several insurers also take an innovative approach to systems development and increasingly use cloud-based services in their operations: 55 per cent of the institutions in the insurance sector as a whole and 67 per cent of the surveyed institutions use cloud services (Chart 80).

The majority of value chains within product processes are already digitalised. Only a small number of product processes are not fully digitalised within the value chain, and developments are planned for most of them. At sector level, paperless administration is well developed. In addition, for the few products that currently still require paper documentation, several institutions have indicated their intention to improve. Nearly 90 per cent of existing documents are digitalised and 80 per cent of archiving is also done digitally.

Annex

CHANGES TO THE BANKING AND INSURANCE DIGITALISATION SURVEY AND INDEX METHODOLOGY

Based on the 2020 Bank Digitalisation Survey Questionnaire, two composite indices were produced. The first index will be used to track the annual change between 2019 and 2020, while minor improvements to the questionnaire survey and the index calculation have also allowed for the production of a new index.

First, based on the 2020 questionnaire on the digital maturity of banks, we produced composite indices per pillar based on a set of consistent variables, using a methodology practically identical to the one of the digitalisation survey conducted in 2019, and aggregated them to produce the aggregate digitalisation index. The purpose of this procedure is to make the two surveys comparable and to track the evolution of digitalisation maturity over time (see Chapter 3 for details). This requires repeating the methodology used for the 2019 data collection on the 2020 data, for which the 2020 data have to be aggregated using the 2019 weighting scheme. A detailed description of the methodology can be found in Box 5 of the FinTech and Digitalisation Report April 2020.

At the same time, the 2020 Banking Digitalisation Questionnaire includes 20 new questions compared to the previous survey – i.e. a total of around 270 questions asked of the institutions – which seek to capture the aspects of digitalisation in more detail across different areas of banking operations. On the one hand, this extended list of questions justified a new index calculation, and on the other hand, the renewal of the questionnaire also involved further fine-tuning, as the composite index calculation in the 2019 survey had difficulties in handling several questions with mainly text-based response options, where the answers given could not be properly standardised. In the new survey, taking previous experience into account, the text response options for these questions have been standardised by making them multiple-choice options, so that they can now be included in the indices. The content of the set of variables underlying the new index was largely the same as the information base of the questions originally asked, thanks to the standardisation of the questions.

Simultaneously with the inclusion of new variables and questions in the new methodology, we have made an even greater effort to design the variables so that the relatively small number of observations as a given condition does not cause problems in terms of measurability, and thus does not require the omission of variables for this reason. Because of this, we aggregated a number of closely related and combinable (sub)questions – in most cases assuming equal weights. Thanks also to this principle, there were no omitted variables due to the lack of dispersion. This resulted in an increase in the information base by about 15-20 per cent compared to 2019, of which about two thirds came from the inclusion of variables omitted in the earlier round due to the lack of standardisation, while the remaining part of the increase came from new questions. The generation of ranking and category variables, imputation of missing data, normalisation of individual responses, dimension reduction and conversion of qualitative variables into numerical variables were carried out in a similar way as before (FinTech and Digitalisation Report April 2020, Box 5). Because of these changes, the new index gave slightly different results along each pillar (Chart 81).

Chart 81
Changes in the value of the 2020 banking digitalisation development index per pillar through the renewal of the methodology



Source: MNB.

The new methodology was also used to evaluate the results of the insurance digitalisation questionnaire. However, given the slightly different nature of the questions – due to the business models based on specialised product areas (e.g. separation of life and non-life) – and the number of the questions, the mergers and the formation of category variables followed a slightly different logic. The use of this different approach was necessary to ensure that the calculated index is balanced and provides an appropriate assessment of the level of digitalisation of insurers, taking into account the differences in business models.

John von Neumann

(28 December 1903 – 8 February 1957)

Mathematician, mathematician physicist, founding figure of computing, the brilliant researcher of set theory, game theory, operational research, quantum mechanics, atomic energy, and digital computer design. Former professor at the Institute for Advanced Study in Princeton, member of countless universities and academies of sciences, former president of the United States Atomic Energy Commission. Streets, schools, a university and even a crater at the Moon are named after him.

Neumann showed signs of genius in many areas even as a child, then he gained several awards as a student of the Budapest-Fasori Lutheran Secondary School. After graduation he was already considered a well-qualified mathematician, he enrolled in the mathematics major of the Budapest Science University, while also pursuing his studies at universities in Berlin and Zurich. After earning his doctorate, he gave lectures both in Europe and America, then he eventually settled down in the United States. He was involved in the research and the military use of atomic energy, then also in managing the development of peaceful energy production.

Between 1945 and 1957 he was the leader of the Electronic Computer Project in Princeton. He was working on the development of machines based on the functioning of the human brain and nervous system. In 1944, he took a key role in building the first fully electronic, digital computer, the ENIAC (Electronic Numerical Integrator and Computer) at the University of Pennsylvania.

In 1945, the first electronic, stored-program computer, the EDSAC (Electronic Delay Storage Automatic Calculator), was built at the University of Cambridge using the “von Neumann architecture”. Neumann based the operation of the computer on biology: he developed the algorithm similarly to the pattern of problem-solving mechanism of the human brain and used it to perform calculations in the computer. In recognition of his merits, the President of the United States of America appointed him to the Commissioner of the American Atomic Energy Commission.

Neumann is one of the greatest scientists of the 20th century, who applied mathematics not in a self-serving way, but by reacting to the needs of the era, for the purpose of usability, while achieving incredible scientific results. We can be grateful for him for the most important principles of electronic computers, like the use of binary number system, the memory, the program storage, the use of algorithm, or the development of an instruction system.

FINTECH AND DIGITALISATION REPORT

May 2021

Print: Prospektus Kft.

H-8200 Veszprém, Tartu u. 6.

mnb.hu

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H-1054 BUDAPEST, SZABADSÁG SQUARE 9.