FINTECH AND DIGITALISATION REPORT

2024

JULY

"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-1013 Budapest, Krisztina körút 55.

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 and environmental sustainability 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 Aniko 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 Credit Institutions Supervision, Insurance and Pension Funds Supervision Directorate, On-Site Supervision and Consumer Protection of Credit Institutions Directorate, IT Supervision and Digital Supervisory Innovation Directorate, Financial Infrastructures and Payments Directorate, Directorate Financial System Analysis and Capital Markets and Market 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 10 June 2024.

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Executive summary

The MNB publishes its FinTech and Digitalisation Report for the fifth time, focusing on Hungarian and international financial digitalisation trends. The digitalisation of finance is an accelerating process that is not only reforming the way in which traditional institutions – i.e. incumbent players – operate, but is also leading to the creation of new, innovative businesses at a significant rate. Besides the incumbent players, dominating the Hungarian financial market, more than 200 firms are registered in Hungary with a specific FinTech focus. The MNB attaches particular importance to closely monitoring these innovations, examining trends in the Hungarian and international markets, and supporting the sector's players to ensure that the domestic financial services sector remains competitive, efficient, and stable in the long term, creating value for its customers.

Renewed this year, the FinTech and Digitalisation Report focuses on six main areas. The first chapter provides an overview of international financial digitalisation processes and major global developments affecting the global FinTech sector. In the second part, we discuss new international regulatory developments emerging within the sector, which may also be relevant for Hungary. This is followed by a comprehensive analysis of the domestic FinTech sector based on publicly available data. In the fourth and fifth chapters of the report, we summarise the results of the digitalisation surveys recently conducted among Hungarian commercial banks and in the insurance sector. In the sixth and final part of the study we inspect the investment services sector for the first time this year and present the digitalisation performance of Hungarian capital market participants.

The growth rate of FinTech companies appears to be slowing down globally, but the number of innovative companies in the US and Europe has continued to grow. While the overall value of global FinTech investments has declined, interest in smaller investments and new technology solutions has remained strong. Within the sector, digital payment and lending solutions remain the most popular, although the high inflation environment has had a significant impact on the uptake of some business models. The increased cost of living and borrowing costs has boosted demand for alternative financing platforms, especially Buy-Now-Pay-Later (BNPL) solutions. In addition, digital investment options have become increasingly popular among savers. In 2023, cybersecurity challenges also increased: the number of fraud attempts, and the volume of data and the funds thus obtained increased, with technological advances playing a crucial role, notably through artificial intelligence solutions. As regards specific consumer groups, the particular life situation of generation Z requires a unique approach, which can be a valuable lesson for financial institutions in designing their products and services. Central banks are increasingly exploring the potential applications of digital banknotes and coins. In this area, a new era has begun with preparations commenced for the digital euro, which may change the EU market for digital payment services fundamentally.

2024 will be a significant year for the regulation of the tech and FinTech sector in the European Union, with a number of ground-breaking legislative initiatives launched this year or about to enter into force, in line with the rapid pace of innovation. A priority in this area will be the development of the world's first comprehensive Artificial Intelligence (AI) regulatory framework, which aims to harness the transformative power of AI in a responsible and safe manner. At the same time, legislators are not only focused on exploiting the potential of AI, but also consider and seek to regulate the impact of potential damage caused by AI systems on liability regimes. Technology giants, whose services have become practically inescapable in the digital world, will face stricter rules in the European Union from 2024. The rules are intended to preserve the competitive nature of digital markets and to maintain a safe, predictable, and trustworthy online environment by safeguarding the authenticity and security of content delivered by BigTech platforms to ensure fundamental rights are respected. The European Union's framework for the new, regulated crypto-asset market will apply from this year, and the MNB, as the Hungarian supervisory authority, will play a significant role in its supervision. In addition, a review of EU payment regulation and a new framework for access to financial data are being developed, supporting the development of open banking and the move towards open finance, thus ensuring EU citizens' access to modern financial services.

Thanks to its steady expansion in recent years, the FinTech sector in Hungary is becoming an increasingly extensive ecosystem. Based on corporate data, 212 Hungarian-based companies were operating in the sector in 2022 and the

majority of which are still micro and small enterprises with a B2B focus. In most FinTech service areas, the number of firms has increased compared to the previous year, especially in blockchain and virtual payments, data analytics and business intelligence. Total employment and turnover also increased significantly compared to 2021, although the increase in the number of employees was more moderate. On average, FinTech companies that have received venture capital have more employees and higher sales revenue than those that have not.

According to the results of the MNB's digitalisation survey of the Hungarian banking system, which covers more than 90 per cent of total balance sheet, the digital development of Hungarian banks improved significantly compared to the previous year. Although some institutions have moved away from the medium level, the banking sector as a whole remains at a medium level of digitalisation. With continuously increasing expectations of digitalisation, the average level of development increased in all 7 pillars under review, and there was significant progress in some areas. As in previous years, the overall result for the leadership engagement pillar continues to stand out, with an average score approaching the high digitalisation level. The outstanding result of the leadership pillar is due to the prioritisation of comprehensive digitalisation goals. There was also significant growth in the product, client, and partner pillars, demonstrating that the digital transformation of domestic banks is extensive. The range of products available to the general public continued to expand, with all of the domestic banks surveyed having developed their own online current account opening process. Among the solutions used, selfie-based account opening via mobile devices is becoming increasingly popular, with several institutions promoting it with targeted marketing campaigns during 2023. However, there is still room for improvement in the digitalisation of products and services. Customer information channels have expanded, and banks are present on most social media platforms. Extensive incentive schemes are in place to promote digital solutions, and attention is given to supporting digital channels and financial literacy at the branch level. Similarly, communication with external partners has become increasingly digital as indeed, banks have started to develop online contracting and digital document management processes to increase efficiency and reduce costs. There are significant differences between domestic banks in terms of the modernity of their core banking systems, with no significant improvement compared to recent years. However, it is a positive sign that the number of service outages due to incidents reported by banks has been steadily decreasing for three years.

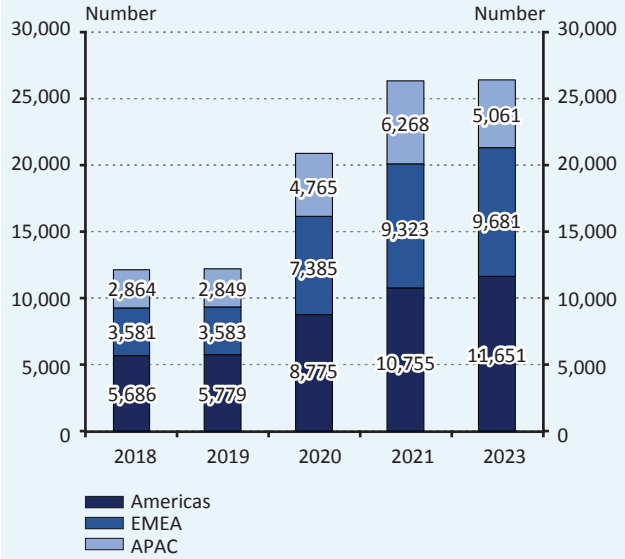
According to the results of the digitalisation survey conducted by the MNB, which covers 90 per cent of the sector based on gross premium income, the digitalisation level of domestic insurers has stagnated in the recent period, although some institutions have expanded the range of administrative functions available through digital channels. The digital availability of retail property insurance products improved, but the digitalisation of other product areas did not progress noticeably. Institutions are trying to support the transition to digitalisation by offering personalised pricing incentives. Although several institutions have prepared a digitalisation strategy and regularly review it, the dedicated senior management representation of digitalisation aspects has not become widespread yet. The emergence of innovative technologies may have a significant impact on the sector, but only a small number of institutions have introduced training including innovative subjects or created dedicated specialisations to prepare for the changes brought about by AI and other innovative technologies at institutional level. Workflow management and business process automation have been slow to develop in the sector. The institutions' internal systems and tools are currently considered adequate, but will need to be improved in the near future to meet ever-increasing customer expectations and to optimise IT processes.

The MNB's latest digitalisation survey covered the sector of investment services for the first time. According to the results of the digitalisation survey, which covers 85 per cent of domestic investment service providers based on client assets, the digital maturity of domestic retail investment service providers is at the medium level. The digital maturity of service providers is heterogeneous, with significant divergence observed between the institutions concerned. The digital maturity of the sector shows the most progress in customer communication, while the digitalisation of internal processes is less advanced. While all of the institutions surveyed have a customer portal and a mobile app, the range of products available fully online, without face-to-face administration, is still limited. The most popular form of communication with customers is through the mobile application. Digitalisation is a priority for the sector at management level, but not all institutions have a comprehensive digitalisation strategy. Domestic investment service providers generally consider their asset base to be up to date, although several participants see potential for growth. Overall, there is significant room for improvement in the digitalisation of the domestic investment services sector and for lagging institutions to catch up.

1 International developments

The growing trend observed in the number of global FinTech companies in the past few years is slowing, although the number of innovative firms in Europe and the Americas increased further in 2023. While the value of FinTech investments declined globally during the year, interest in small cap investments and technology solutions remained strong. Digital payment and lending services remain the most promising segments of the FinTech sector, but the high inflation environment of recent years has had a significant impact on the proliferation of certain FinTech business models. The high cost of living supported a boom in alternative financing platforms, including Buy-Now-Pay-Later solutions. On the savings side, some digital investment and capital market solutions have become more popular. However, cybersecurity challenges continue to grow steadily in terms of fraud methods, the number of incidents and the volume of data and the funds thus obtained, partly due to technological advances and the use of artificial intelligence solutions. The openness of generation Z to digital finance solutions is significant; in fact, financial market participants should pay more attention to this age group. Central banks are increasingly active globally with research into the diverse forms of the central bank digital currency. In the European arena, preparations for the digital euro are in full swing, which may reshape, as a technology-driven financial innovation, the EU market for digital payment services significantly.

Chart 1
Development of the number of FinTech companies globally



Note: Data for 2022 are not available, data for 2023 refer to May, and pre-2023 data were collected using a different method, which is the likely reason behind the decline in the APAC region.

Source: Statista, BCG, CrunchBase (2024)

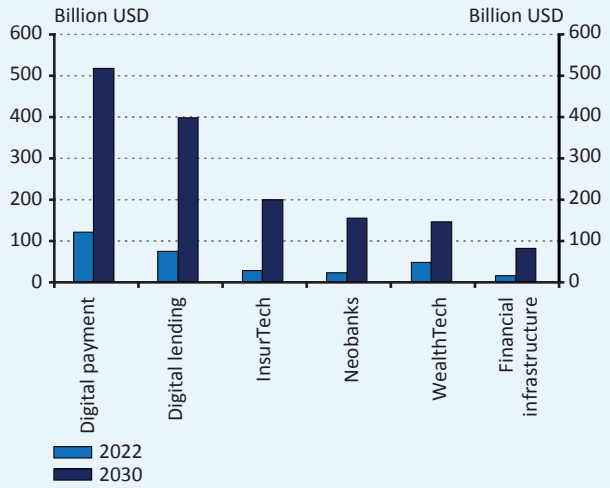
1.1 GLOBAL FINTECH SECTOR

The global number of FinTech companies stagnated in 2023 after a trend of growth in previous years. Although data for the global FinTech sector are not of the same quality as for the domestic FinTech sector (Chapter 3), the main trends can still be identified (Chart 1). Geographically, North and South America continue to have the largest number of FinTech companies, followed by Europe and the Asia-Pacific region. In 2023, a total of more than 26,000 firms were registered, which is just below the peak recorded in 2021. In 2023, there were 322 FinTech unicorns (i.e. companies with a value of at least USD 1 billion), most of which are located in North America[1].

The leading position of digital payment and lending services among the FinTech segments appears unshakable (Chart 2). There is still a long way to go in the field of payment services before the implementation – whether on a market basis or through the Central Bank Digital Currency (CBDC) project – of inclusive, instant, even cross-border, affordable transactions, which offer growth potential for the FinTech sector. In lending, investors believe in Buy-Now-Pay-Later (BNPL) financing, Artificial Intelligence (AI) and ecosystem building. As successful challengers, neobanks are able to penetrate incumbent sub-markets, often with an expanding product range, while keeping operating and client acquisition costs low and providing an exceptional user experience. Behind the growth potential of financial

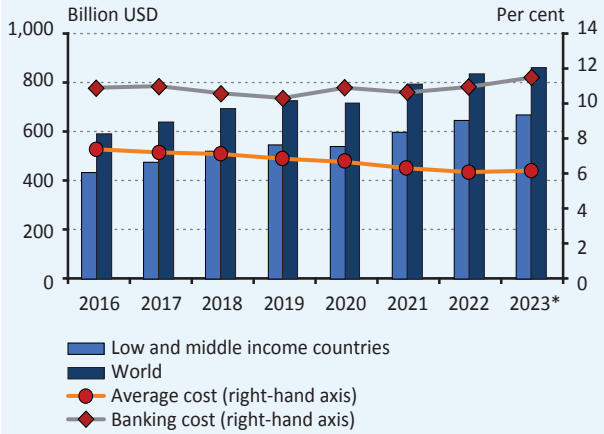
[1] CB Insights (2023): State of Venture

Chart 2
Estimated developments in the global sales revenue of the FinTech sector



Source: BCG (2023): The Second Wave Resilient, Inclusive, Exponential Fintechs

Chart 3
The volume of international credit transfers and the average costs of the service



*Note: *The value for 2023 is based on an estimate.*

Source: World Bank (2016–2023): Remittance Prices Worldwide

infrastructures lies the promise of DLT (Distributed Ledger Technology).

The growth of the InsurTech market is dynamic but challenging. In contrast to the banking market, the insurance market is clearly not an easy target for challengers, as it needs to offer better value propositions through technology in a similarly regulated environment with lower profitability and less client interaction. 2023 was also all about AI in the InsurTech segment, while challengers saw more potential in accident, home or travel insurance with shorter maturities and more cross-selling potential. In addition, partnerships are being built in the B2B2X service model.

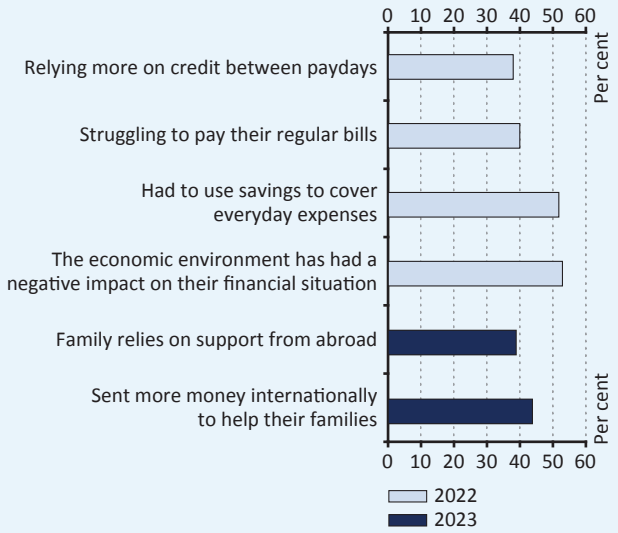
The asset management segment is poised for high growth potential through the accumulation of assets in the Asian region, but investors are taking a wait-and-see approach due to macroeconomic uncertainties. Traditionally, the asset management market has been created to serve the specific needs of the high – net – worth classes, who dispose over more than 50 per cent of global wealth. FinTech can only get close to this very narrow customer segment as a technology supplier to incumbents that have a stable trust advantage. The so-called affluent investor base, i.e. a larger number of investors with USD 0.5–3 million in client assets, can already be reached through a range of targeted solutions, robo-advisory, thematic investment offers or new opportunities offered by tokenised (real) assets. Finally, it is the less affluent but still investment-ready client base where the use of Generative AI may become truly dominant, not only in the provision of offers, but also in many other areas of personalised client service.

1.2 INTERNATIONAL PAYMENT TRENDS

FinTech solutions related to digital payments have a key role to play in reducing the cost of cross-border payments. In addition to the cost of services, the total value of the remittances of workers working abroad is also on the rise, especially in low- to middle-income countries (Chart 3). Traditional bank transfers are the most common and the costliest method of credit transfer, and although other providers offer cheaper solutions than banks, they are significantly lower in volume than bank transfers [2].

[2] World Bank Group (2023): Leveraging Diaspora Finances for Private Capital Mobilization

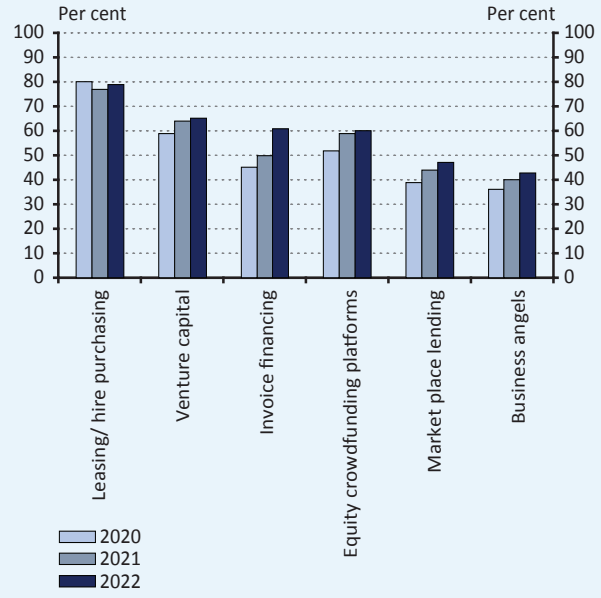
Chart 4
Macroeconomic outlook for workers living abroad and their close relatives



Note: The survey covered 7627 adults who were involved in cross-border payments or transfer sin the past 12 months.

Source: Mastercard (2023): Borderless Payments Report

Chart 5
Awareness of alternative funding options at SME level in the UK



Note: The survey was conducted in 2022 with the participation of 2213 SMEs in the United Kingdom.

Source: British Business Bank (2023): SME Finance Survey

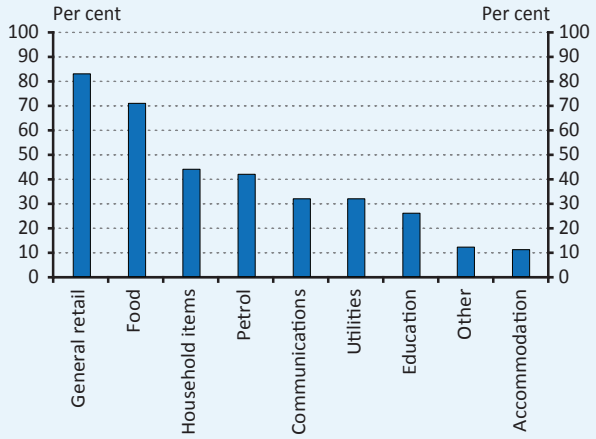
A significant share of companies have a pessimistic outlook in the current macroeconomic environment. The most affected regions among emerging countries are India, Brazil and South Africa. Globally, remittances are increasing both in number and value of transactions, with 41 per cent of senders and 48 per cent of receivers expecting higher value transactions in the next 12 months (Chart 4). With the rise in international payments, the FinTech sector has the opportunity to improve global remittance processes. By leveraging technology, these platforms may reduce transaction costs and transfer times, and increase efficiency, as well as overall financial inclusion and awareness.

1.3 THE IMPACT OF INFLATION IN THE FINTECH SECTOR

The difficulties of bank financing have drawn attention to the possibilities of alternative financing. In many regions of the world, including the UK, inflation has challenged SMEs seeking affordable finance from traditional institutions due to rising interest rates. FinTech platforms offer innovative solutions through tailor-made solutions (Chart 5). By leveraging technology, they can use alternative data sources to assess creditworthiness, which can provide faster access to funds and mitigate the impact of the higher cost of funds. These platforms diversify financing options, reducing dependence on traditional banking structures. In the British Business Bank's 2023 survey[3], 41 per cent of the companies did not apply for the government's Recovery Loan Scheme because of the high interest costs and administrative burdens, and more are choosing to obtain funding from more than one source.

[3] British Business Bank (2023): SME Finance Survey

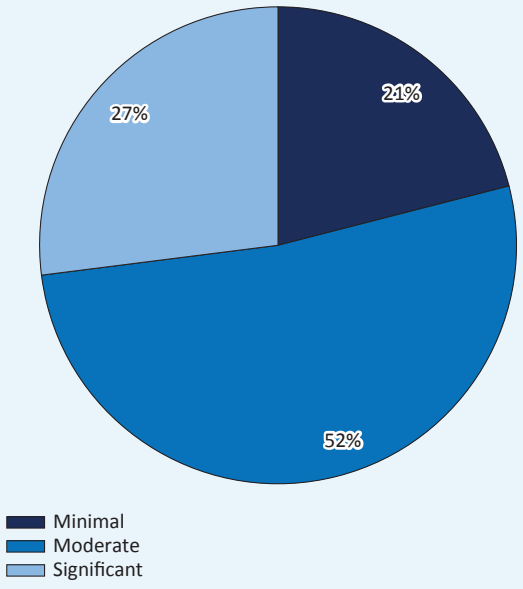
Chart 6
Frequency of using the BNPL payment option by product category in Australia



Note: The survey was conducted in 2023 with the involvement of 503 financial advisors.

Source: Financial Counselling Australia (2023): Small Loans Big Problems (BNPL)

Chart 7
Engagement of financial institutions in building the digital ecosystem



Note: BCG's own assessment based on the data and strategies of the 100 banks with the largest market capitalisation.

Source: Capital IQ; BCG (2023)

The growing popularity of BNPL may lead to an increase in household debt burdens. Inflation and the cost of living have led consumers to turn to BNPL services to meet their basic needs in a more balanced manner (Chart 6). However, reliance on these services carries risks in terms of the accumulation of debt, especially in lower-income classes. In Australia, where the use of BNPL is widespread, concerns about consumer indebtedness are growing exponentially, exacerbated by the trend to use the service for essential purchases. These trends point to the need to improve financial awareness and the regulatory framework to mitigate risks, especially in times of economic uncertainty.

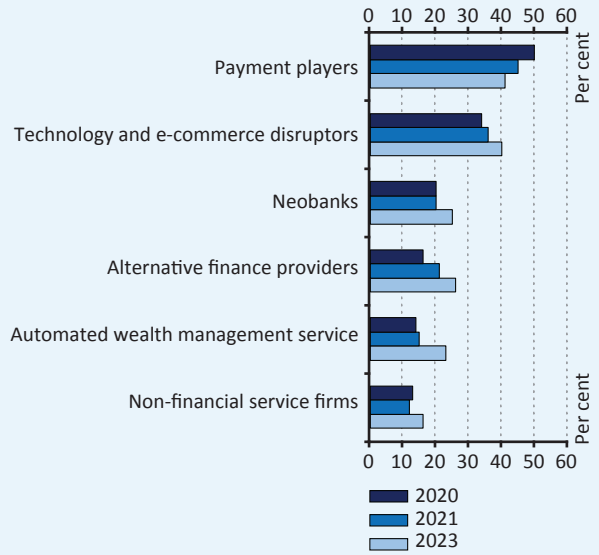
1.4 TRENDS IN DIGITAL ECOSYSTEM BUILDING

With the slowdown in the FinTech sector, banks may be gaining ground to build their digital ecosystems. With rapid digitalisation and changing user habits, the pandemic has created opportunities for a number of innovative FinTech companies to join traditional banking players, supported by the general abundance of resources available. From 2022, however, raising funds became more difficult, which may provide an opportunity for well-capitalised incumbents to strengthen their relative position by taking advantage of new market trends. However, competition in building the digital ecosystem is also becoming cross-sectoral, with BigTech and other non-financial companies claiming a share of this market.

By building digital ecosystems, banks have a vested interest in covering as much of the overall customer journey as possible. Thanks to platform-based ecosystems, the distribution of financial products and services can be successful in partnership with other companies, opening up new markets and acquiring new clients. More than half of the world's leading banks are "moderately" engaged in building a digital ecosystem (Chart 7). However, banks that make a "significant" effort to do so may be more valuable on a number of financial metrics than those that make only a "minimal" effort. According to BCG's survey[4], the annualised shareholder returns for platform-building banks stood at 8.2 per cent between 2016 and 2021, compared to 4.2 per cent for minimally active banks, clearly indicating the direction of progress that markets are rewarding.

[4] BCG (2023): Financial Institutions Must Get Serious about Digital Ecosystems

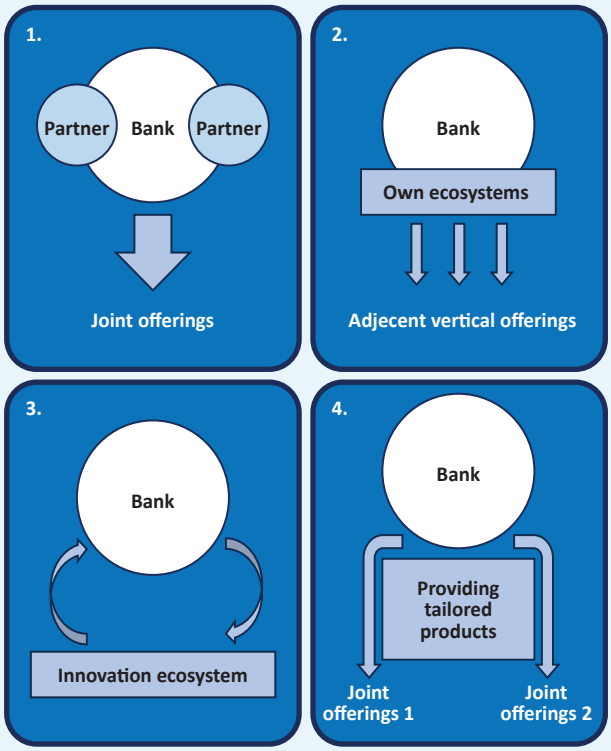
Chart 8
Which non-traditional financial players will be the biggest competitors to banks?



Note: The survey was conducted by interviewing 300 financial institution managers.

Source: Economist Impact (2023): Byte-sized banking: Can banks create a true ecosystem with embedded finance?

Chart 9
Banking ecosystem building methods



Source: BCG (2023): Financial Institutions Must Get Serious about Digital Ecosystems, MNB editing

Despite their different levels of preparedness, banks recognise the trends and new challenges in this area. Evidently, while payment service providers used to be the largest competitors as projected over the next five years, this is now increasingly shifting towards technology, BigTech and e-commerce players (Chart 8). At the same time, on the banks' side, the challenger position of alternative finance providers and neobanks has also strengthened.

There are several approaches institutions may take to build a digital ecosystem. Two approaches can be distinguished in the strict context of core banking activities and two in the looser context (Chart 9). Under the first, banks organise complementary services around their core business and serve customers jointly with partners. In the second version, they build their digital ecosystem vertically, with a specialised focus on one sector. In the third version, the digital ecosystem is used as a learning process and for testing and experimenting with certain new products. Finally, in the fourth approach, banks do not build their own digital ecosystem, but embed their products in the ecosystem of other companies.

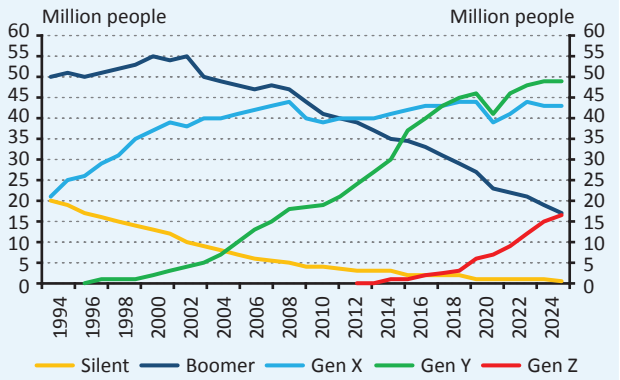
1.5 GENERATION Z'S OPENNESS TO DIGITAL FINANCE SOLUTIONS

Generation Z – in other words, those born between the second half of the 1990s and the first half of the 2010s – is the first generation for whom the internet is the primary and natural medium for learning and socialising. This age group should be given special attention, as their labour market participation and earning potential will, in the near future, exceed that of the "baby boomers" or simply, "boomers" born in the mid-1940s and first half of the 1960s (Chart 10)[5]and is therefore an increasingly important client group for financial market participants. This generation earns the average wage and has a high level of labour market advocacy, yet 80 per cent of them believe that due to the high housing prices they have to make significant financial sacrifices to secure housing or acquire real estate. Half of generation Z say they live paycheck to paycheck.

They expect financial services that are available to them digitally 24 hours a day. 72 per cent of generation Z prefer to use an innovative financial service provider as their primary current account manager, while their data security expectations are higher towards traditional financial service providers than global technology providers (BigTech).[6]

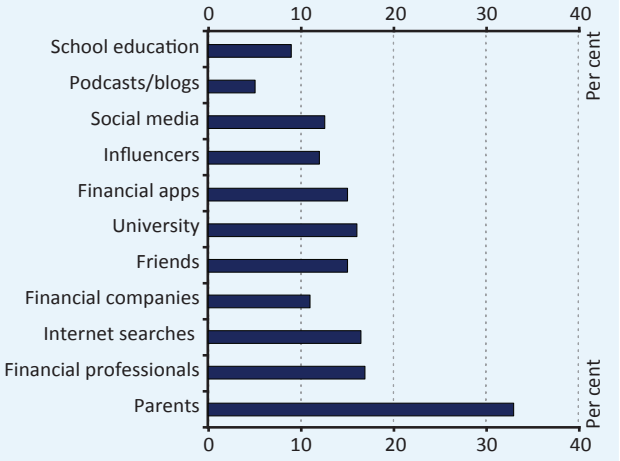
[5] https://www.economist.com/finance-and-economics/2024/04/16/generation-z-is-unprecedentedly-rich
[6] https://www.weforum.org/agenda/2023/11/gen-z-banking-finance-money-trends/

Chart 10
Share of full-time workers in the United States, by generation



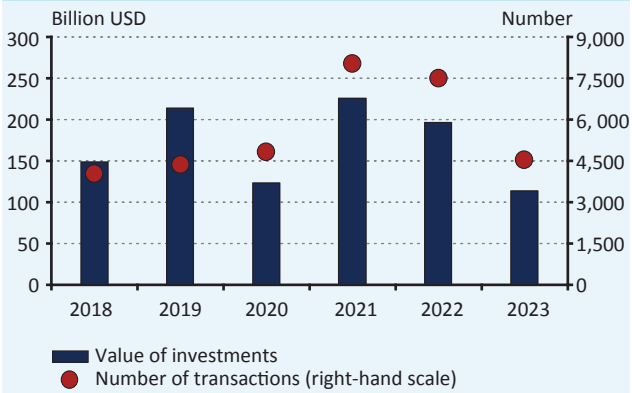
Source: The Economist (2024): Generation Z is unprecedentedly rich

Chart 11
Distribution of Generation Z's primary financial/ investment information channels



Source: Finra: GenZ and Investing: Social media, crypto, FOMO and family (2023)

Chart 12
Global investments in FinTech companies (2018–2023)



*Note: *Based on data as at 31 December 2023.*
Source: KPMG (2023): Pulse of FinTech

In 2023, the number of generation Z part-timers increased further, while the time for them to buy a property and start a family has been postponed. They consider the continued rise in the cost of living, unemployment and climate change risk factors.

The age group gets acquires information primarily from social media, but relies heavily on family advice when making financial decisions (Chart 11). What makes planning for the future much more difficult for this age group, who are also known as digital natives, is that social media also encourages them to buy things that they cannot afford and are therefore prone to overspending. The resulting uncertainty affects their investments and risk-taking.[7]

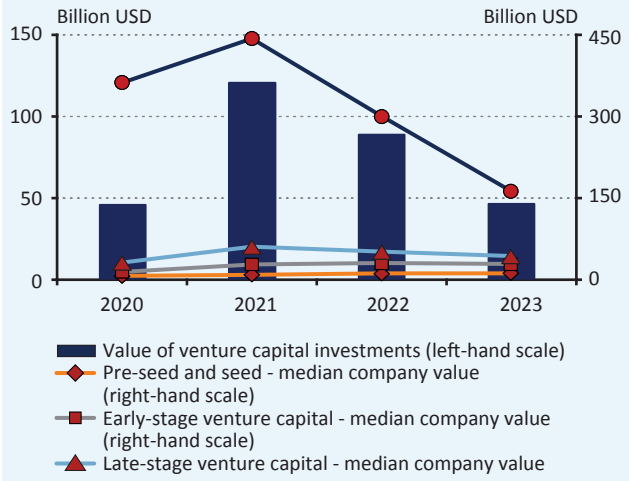
As regards borrowing, saving and investing, generation Z is more open and has a higher risk appetite, while one in two young persons in this generation have some kind of long-term investment. When it comes to the choice of investment products, they tend to favour high-risk products, with cryptocurrencies (49 per cent) being their most popular investment product group, followed by equity investments (35 per cent) and investment funds (34 per cent). An average member of generation Z starts saving for retirement at age 22, 15 years earlier than the baby boomers. This propensity to start saving early for retirement age is consistent with generation Z's desire for greater financial independence and early retirement.

1.6 FINANCING OF FINTECH FIRMS

The lowest FinTech investment appetite in 6 years was recorded in 2023. The amount and number of FinTech investments in international markets also continued to decline (Chart 12): the main concern for investors was profitability and avoiding ups and downs. The number of investments fell less in proportion to the amount invested, reflecting investors' reluctance to enter into high-value deals due to stubbornly high interest rates, the war in Ukraine and the Middle East, falling FinTech valuations and concerns about dwindling exit opportunities. In the second half of the year, an upward trend was observed within the year – although the growth was fairly small, it was still positive –, which gives reason for hope for 2024: this year, with the expected stabilisation of the interest rate environment, investor sentiment may also smooth out and regain strength. In general, it was true for all regions that FinTechs tended to focus on B2B solutions in 2023, in collaboration with incumbent institutions. AI has been a very strong catchphrase for investors in the FinTech market, with many companies looking for ways to

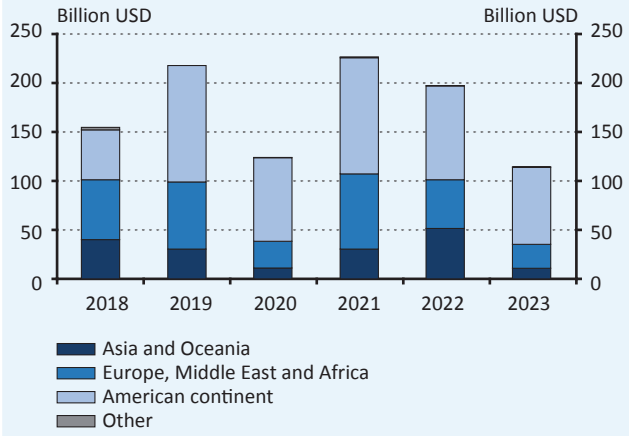
[7] Deloitte Gen Z and Millennial Survey, 2023

Chart 13
Venture capital investments in FinTech companies and median enterprise values at each maturity stage globally (2020–2023)



Source: KPMG (2023): Pulse of FinTech

Chart 14
Global FinTech investments by region (2018–2023)



Source: KPMG (2023): Pulse of FinTech

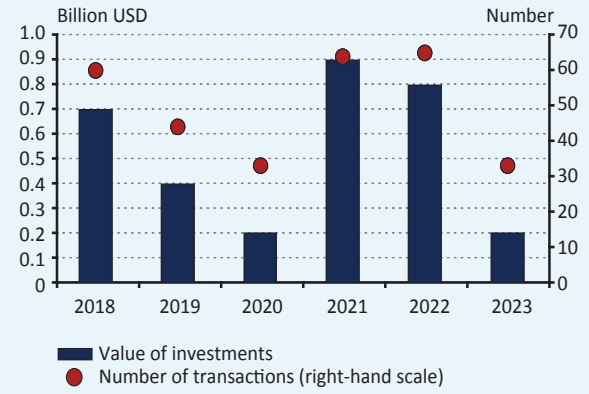
embed AI into their existing product and service offerings, particularly in the area of cybersecurity. During the year, artificial intelligence focused FinTech companies attracted USD 12.1 billion in investment[8]. Besides global investments, company values have not grown at the same pace as in previous years either: in 2023, there were only 11 new companies among the USD 1 billion companies, bringing the number of FinTech unicorns to 322[9].

The decline in the value of venture capital investments has been a trend, but the number of deals did not followed suit – investors typically fragmented the funds and mainly backed seed and early-stage solutions. A downturn has been observed in the global venture capital market since 2021, and macroeconomic uncertainties in recent years have led to a shift towards smaller – and therefore partly lower-risk – investments. In addition, doubts about the future are also reflected in the company valuations of the present, with start-ups in the growth phase being hit the hardest (Chart 13).

Asia and the EMEA region, including Europe, suffered the steepest decline in 2023. Although the amount of FinTech investment in the EMEA region in the second half of the year was double the amount recorded at the beginning of the year, a significant decline was observed on a year-on-year basis: the USD 24.5 billion of capital is the lowest FinTech investment in the region in the last 7 years (Chart 14). However, the strength of the region is demonstrated by the fact that the seven largest transactions took place in five different regions (UK, Sweden, Netherlands, Italy, UAE, Finland and Spain) and were not concentrated as is the case in the Americas. The Americas showed greater resilience, with less than a 20 per cent drop compared to 2022 – the USA attracted 94 per cent of the region's investment. In addition, Brazil's FinTech investments performed exceptionally well in 2023, with the country attracting the second largest amount of investor capital ever (USD 2.6 billion). The greatest surprise was caused by Asia, where investments fell below USD 11 billion; however, this amount was relatively well distributed across the region. In China, the FinTech sector is no longer seen as a truly emerging technology industry, as numerous mature FinTech companies – for example, in the area of BNPL services – are now being seen as part of the country's core financial services ecosystem rather than as "traditional" start-ups. As FinTech companies have matured, many of which have developed sustainable cash flows, the need for large capital injections in China has declined significantly.

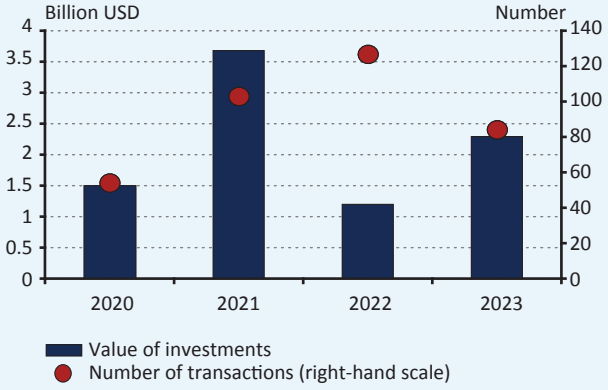
[8] KPMG (2023): Pulse of FinTech
[9] CB Insights (2023): State of FinTech

Chart 15
Investment in the WealthTech sector and number of transactions (2020–2023)



Source: KPMG (2023): Pulse of FinTech

Chart 16
Investments in the ESG/GreenTech sector and number of transactions (2020–2023)



Source: KPMG (2023): Pulse of FinTech

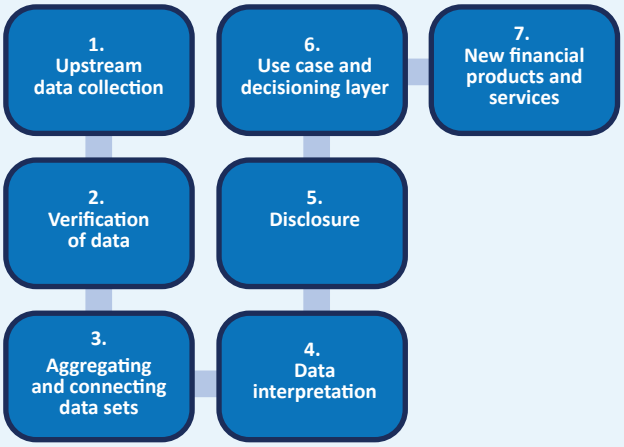
Among the FinTech sectors, payment services remain by far the most attractive for investors, but even this segment exhibited a 65 per cent decline in 2023 compared to the previous year. The cybersecurity, InsurTech and ESG sectors were able to grow.

After two stable years, WealthTech investments plummeted in 2023. The sector has also fallen back to 2020 levels in terms of investment volume and number of transactions (Chart 15). The range of services was dominated by robo-advisory, with the automated provision of advice to clients with smaller investment portfolios being the main "trend". Investors have shown particular interest in AI and machine learning applications in data analytics and other resource-intensive tasks. For WealthTech investments, the Middle East is an increasingly popular destination, including global hubs with a high concentration of wealth and strong government support for FinTech innovation (e.g. Abu Dhabi).

The ESG and GreenTech sectors recorded a significant increase in the average value of a transaction, resulting in an overall upward trend in the amount of capital inflows (Chart 16). The United States attracted the vast majority of ESG-focused FinTech investments in 2023, likely driven by investment trends in the broader FinTech sector, rather than a significant decline in investor interest in the EMEA and ASPAC regions. ESG-focused compliance and risk management requirements, which are increasingly becoming a legal requirement, attracted additional investor interest in 2023. During 2024, a number of sustainability regulations on disclosure and reporting are coming into force[10], requiring companies to report on their direct and indirect emissions, as well as their climate change-related risks[11]. With this in mind, the monitoring of emissions and the AI-driven automation of reporting on potential risks was a key area of interest in 2023.

[10] International Sustainability Standards Board (ISSB): European Sustainability Reporting Standards (ESRS); Corporate Sustainability Reporting Directive (CSRD); US Securities and Exchange Commission (SEC): Climate disclosure rule
[11] KPMG (2022): Enabling tomorrow: The emergent ESG FinTech ecosystem

Chart 17
FinTech solutions in the ESG data continuum



Source: KPMG (2022): Enabling tomorrow: The emergent ESG FinTech ecosystem

Over the next few years, we can expect significant technological innovation among ESG-oriented FinTech firms. Providing reliable data is essential to achieve ESG goals. The services of FinTech firms are emphasised throughout the data lifecycle, and solutions for data collection, processing and interpretation are a priority for the majority of the ESG segment (Chart 17). AI, machine learning and blockchain-based technologies have already emerged in the segment, but the development of customised ESG solutions is expected to accelerate even further. Much of the innovation is expected to be fuelled by incumbents' internal innovations and new RegTech platforms, but technology companies in other sectors will also be able to expand their services[12].

1.7 CYBERSECURITY CHALLENGES

The number of cybercrime incidents continues to grow, with one in five of these incidents now affecting the financial sector. Several factors contribute to the increase in the frequency and severity of cybercrime incidents. The growing digital presence, accelerated by the COVID-19 pandemic and the increasing dependence on technology, exacerbates cybersecurity risks. In addition, geopolitical tensions in many parts of the world are the second main motivation for carrying out cyberattacks. Losses from cyberattacks between 2020 and 2022 may amount to 1 to 10 per cent of GDP[13]. The emergence of artificial intelligence has simplified the design of cyberattacks and opened the door to sophisticated methods such as malware and the generation of fake invoices.

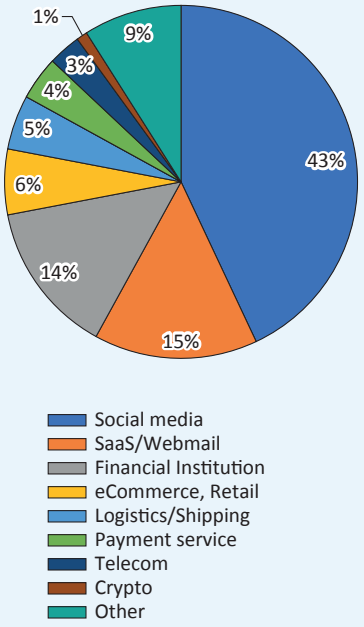
[12] KPMG (2022): Enabling tomorrow: The emergent ESG FinTech ecosystem
[13] Source: IMF (2024): Global Financial Stability Report

Chart 18
Total loss rate caused by data leaks

Note: The figures indicate the total amount of direct financial loss globally at the base dollar rate of 2022, expressed in USD billions.

Source: IMF (2024): Global Financial Stability Report chapter 3 – cyber risk: a growing concern for macrofinancial stability

Chart 19
Industries most targeted by phishing attacks (2023 Q4)



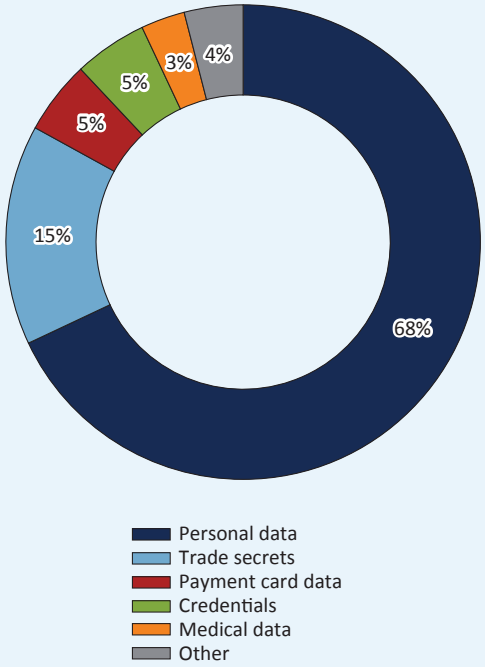
Source: APWG (2023): Phishing activity trends report 2023 Q4

Within the financial sector, attacks primarily target banks, insurance companies and asset managers. Although the median loss value reported at the institution level over the past decade was USD 0.4 million, and three-quarters of the reported losses did not exceed USD 2.8 million, the likelihood of extreme losses is increasing. Financial losses are not only related to ransoms paid to prevent data leakage and the recovery of infrastructure after ransomware attacks, but also include direct financial losses (loss of assets) (Chart 18).

The number of cybercrime incidents in the financial sector increases when there is high market concentration, when members of the sector make significant use of services from the same third-party IT suppliers, or when there is strong interconnectedness between them. According to the IMF's assessment, individual institutional vulnerabilities, if not coupled with adequate defences, may often lead to liquidity, solvency or even systemic crises through a crisis of confidence in institutions. This risk is particularly high when financial infrastructures are also involved in the attack.

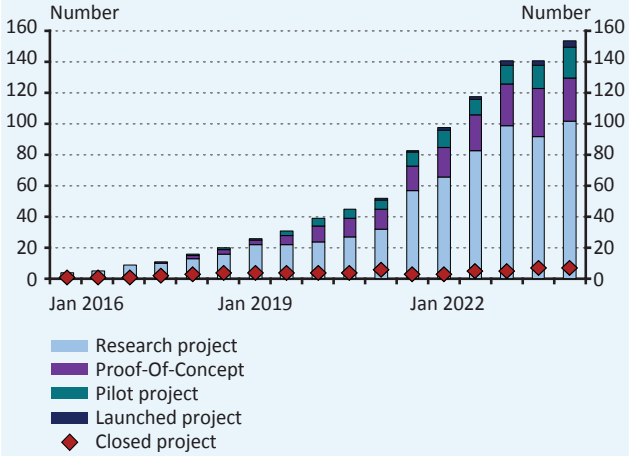
In 2023, the financial sector remained a top target for phishing attacks (Chart 19). Phishing attacks require minimal resources to plan and execute, and target a customer base that can be deceived by social engineering methods; in other words, the least prepared bank customers. Increasingly, the illegal proceeds from successful data leaks, financial fraud or the sale of stolen credentials are now being realised in cryptocurrencies.

Chart 20
Types of data stolen in successful attacks on financial institutions (2023 Q1–Q3)



Source: Positive technology (2023) Cyberthreats to the financial industry: interim results for 2023

Chart 21
Development of the number of CBDC projects



Source: CBDC Tracker (2024)

The majority of the attacks on financial institutions involve the personal data of customers and commercial information associated with organisations. Data leaks can pose a significant financial risk; moreover, data leaked from insurance companies often contain sensitive medical information (Chart 20).

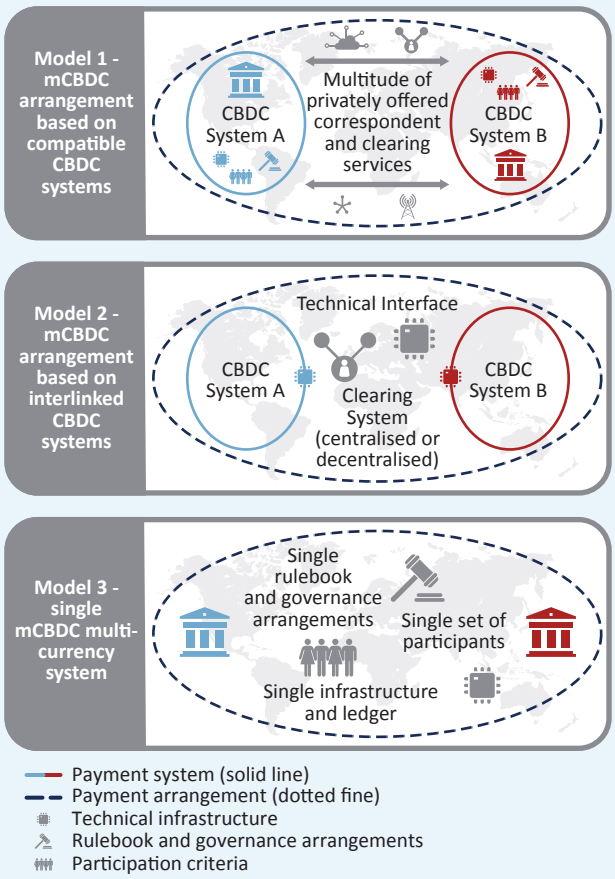
Investors in crypto-assets are increasingly becoming the target of cyberattacks. These attacks often target crypto-exchanges, platforms and so-called hot wallets[14]. Transaction validation phishing scams are on the rise, with at least USD 374 million worth of cryptocurrency stolen in 2023.

1.8 CENTRAL BANK DIGITAL CURRENCY (CBDC)

More and more central banks are moving away from research into retail CBDC towards testing. Work on retail CBDC is more advanced, with almost a third of central banks exploring a test project, while 12 per cent of central banks indicated that they were likely to issue retail CBDC in the near future[15] (Chart 21). Once again in 2023, four countries have widely issued retail central bank digital currencies: the Bahamas, Jamaica and Nigeria, along with the Eastern Caribbean Union. Among the major emerging economic powerhouses, India and Russia have recently launched experiments involving real users, as has been the case in China for years. Developed countries remain more cautious, but important developments include the launch of a digital pound sterling design project in the UK, the start of a technical pilot project in Japan and the continuation of advanced trials in Norway and Sweden. As regards the major geopolitical regions, the digital euro project took a step forward to implementation in 2023, with the European Commission's legislative proposal and the launch of the legislative procedure. Accordingly, the digital euro is discussed in more detail in subs-chapter 1.9. From a Hungarian perspective, it should be stressed that the MNB was the first in the European Union to launch a central bank digital currency pilot project for retail customers within the framework of the Student Safe Initiative[16].

[14] A crypto-wallet where the private key is stored on a software device.
[15] Di Iorio, A., Kosse, A. & Mattei, I (2024): Embracing diversity, advancing together – results of the 2023 BIS survey on central bank digital currencies and crypto. BIS Papers No 147. Download link: https://www.bis.org/publ/bppdf/bispap147.htm
[16] More details on the CBDC pilot project are available in the 2023 FinTech and Digitalisation Report: "The first retail central bank digital currency pilot project in the EU: the MNB Student Safe Initiative". Download link: https://www.mnb.hu/letoltes/final-hu-FinTech-e-s-digitaliza-cio-s-jelente-s-2023.pdf

Chart 22
Cross-border CBDC systems: three conceptual approaches



Source: Auer et al. (2021)[17]

Developments related to wholesale CBDC are intensifying, with a shift observed from the previous prototype development trend to implementation. In 2023, the number of wholesale pilot projects in developed economies tripled compared to the previous year. International cooperation on the central bank digital currency focuses on improving the efficiency of cross-border transactions through wholesale CBDC, i.e. the CBDC available to financial actors. Today, cross-border transactions are slow, costly and complex, and a number of projects have been launched to create an efficient wholesale CBDC infrastructure for these operations, through which financial institutions can conduct direct transactions using CBDC (Chart 22). The BIS is a key player in the area of wholesale central bank digital currency – the BIS Innovation Hub offices serve as platforms for connecting, sharing knowledge and coordinating projects, but many central banks, including the ECB, are also increasingly focusing on this area. The ECB has also announced three pilot projects for 2024, where interest from capital market participants is sought to test the possible interconnection of the ECB's existing RTGS systems and shared ledger platforms in the context of pilot wholesale CBDC projects[18]. The development of common wholesale central bank digital currency platforms will continue to face the challenge of ensuring compliance with regulatory policies in different jurisdictions, setting the exchange rate between currencies and optimising the governance of the platform (e.g. universal policies and rules while ensuring the autonomy of participants). The MNB is also active in the field of wholesale central bank digital currency and has been involved in several projects coordinated by the BIS, which are discussed in more detail in Box 1.

Box 1
The MNB's international activities related to the wholesale central bank digital currency

In addition to research on retail CBDC in Hungary, the MNB is also active on the international stage and has joined several initiatives. Today, cross-border transactions are slow, costly and complex, and a number of projects have been launched to create an efficient wholesale CBDC infrastructure for these operations, through which financial institutions can conduct direct transactions using CBDC. Most of the wholesale central bank digital currency projects are implemented through the BIS Innovation Hubs, and the MNB has joined several of them.

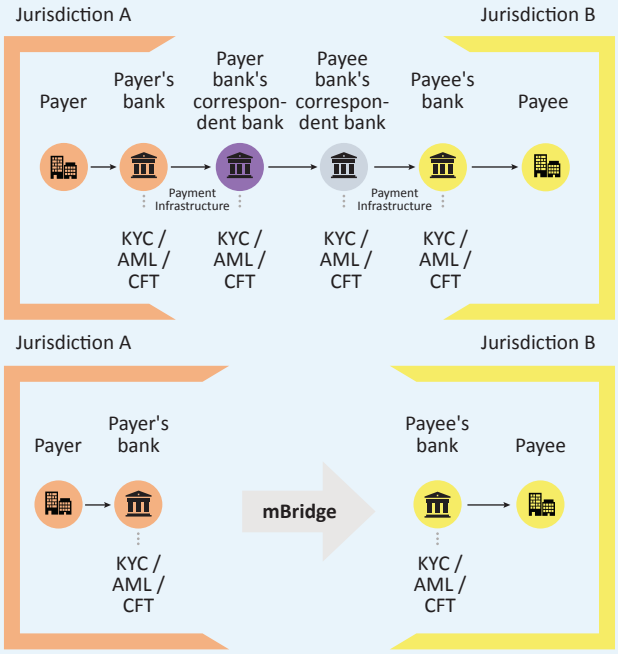
The now completed Dunbar project was one of the first international wholesale CBDC initiatives to develop and test the use of individual national central bank digital currency for cross-border international settlements in a multi-stakeholder collaboration. The project aimed to create an efficient infrastructure for cross-border transactions. To this end, a common blockchain-based multi-digital CBDC platform was developed, which enabled financial institutions to transact directly with each other in CBDC issued by the central banks participating in the pilot

[17] Auer, R., Haene, P., & Holden, H. (2021). Multi-CBDC arrangements and the future of cross-border payments. BIS Papers, no. 115, 2021. https://www.bis.org/publ/bppdf/bispap115.pdf
[18] Call for expression of interest: exploring new technologies for wholesale central bank money settlement: https://www.ecb.europa.eu/press/intro/news/html/ecb.mipnews231213.en.html

project (Singapore, Australia, South Africa, Malaysia). The MNB participated as an observer in a project coordinated by the BIS Innovation Hub in Singapore, gaining valuable experience on the potential of wholesale CBDC and coordinating a complex, multi-stakeholder international project.

The MNB is also currently participating as an observer in one of the world's leading international wholesale CBDC projects focusing on cross-border transactions. The mBridge wholesale CBDC project is a joint initiative of the BIS Innovation Hub in Hong Kong and the central banks of China (PBoC), Thailand (BoT), Hong Kong (HKMA) and the United Arab Emirates (CBUAE), with nearly 30 observer members including the MNB and the ECB. The mBridge project, like the Dunbar project, aims to develop a new cross-border infrastructure that may make cross-border credit transfers cheaper, faster and more efficient (Chart 23). As an observer, the MNB has access to certain phases of the project and may also gain access to the mBridge platform testbed (mBridge Sandbox); however, it will not be involved in the operational design and development of the platform for the time being.

Chart 23
Structure of the platform of the mBridge project relative to traditional correspondent banking



Source: BIS Innovation Hub (2023)

In early 2023, the MNB – in partnership with the Budapest University of Technology and Economics (BME) – also participated with two teams in the Project Rosalind international innovation competition, a joint initiative of the BIS Innovation Hub in London and the Bank of England. Project Rosalind is intended to investigate cases of the use of retail CBDC that stimulate competition and create added value for users through private sector and central bank collaboration. To this end, an open TechSprint was announced in February 2023, inviting innovative business solutions mainly from international technology companies, which are connected on the payments side to the digital CBDC infrastructure prototype developed in the previous phase of the project. Within the framework of the BME–MNB cooperation, the blockchain experts of BME and the MNB's digitalisation department entered the competition with two joint teams. One of the BME–MNB teams developed a real-time, blockchain-based, hypothetical energy price subsidy and consumption reduction incentive system, the other team developed a blockchain-based, hypothetical vehicle-leasing solution. In both solutions, individual payment solutions were implemented through the issuance of wholesale central bank digital currency. After a preliminary screening of the entries, both teams' solutions made it to the semi-finals with 22 participants. Subsequently, the BME–MNB team, which submitted a solution for an energy price subsidy system, succeeded in qualifying for the 12-team final, among big international tech giants such as Amazon, Thales, Revolut and Vayana Network.

Chart 24
Main features of the digital euro

- in the euro area, people and businesses would be able to pay with digital euros anytime, anywhere, and offline payments would also be available
- the digital euro could be accessed through financial service providers, but at the same time it would be considered a direct liabilities of the central bank
- basic services (e.g. account opening and closing, simple payment transactions) would be free
- online transactions would provide the same level of data protection as existing digital payment instruments, offline payments would have features similar to cash payments
- the digital euro would not bear interest
- in order to maintain financial stability and to mitigate disintermediation risk, holding limits would be applied

Source: MNB based on the proposal for the creation of the digital euro

Chart 25
Key milestones of the digital euro project

Note: Illustrative figure, not proportional in time.

Source: MNB editing based on the European Central Bank and the European Commission

1.9 KEY DEVELOPMENTS IN THE DIGITAL EURO PROJECT

The European Commission is working closely with the ECB to develop the legal conditions for the introduction of the digital euro. The primary motivations for the introduction of the digital euro are to preserve the role of the central bank currency in the financial system in the digital age, to safeguard monetary sovereignty, to strengthen the international role of the euro and to stimulate innovation in the payments market. In October 2021, the ECB launched a 2-year research phase to explore policy and technological issues related to the central bank digital currency. At the end of the research phase, the Governing Council of the ECB decided to move the project to the next phase, the preparation for the introduction of the digital euro. The preparatory phase started on 1 November 2023 and is expected to last two years. During this phase, the ECB will lay the technological and conceptual foundations for a potential digital euro, including the selection of service providers to develop the platform and infrastructure.

The European Commission's legislative proposal lays down the framework for the introduction of the digital euro as a legal tender to complement cash (Chart 24). In parallel with the ECB's preparatory work, the European Commission presented three draft regulations in June 2023. The goal is to ensure that European citizens and businesses can use central bank currency for digital payments by establishing a legal framework for the introduction of the digital euro. At the same time, they also ensure that access to cash and cash payments are seamless. The adoption of the legislative proposal could be delayed for a longer period owing to the EU Parliament elections held in 2024. The legislative process, which is expected to be completed around 2025–2026, will be followed by an ECB decision on the actual introduction of the digital euro, including final functionalities and timing, which is estimated to take another 3 to 4 years to complete (Chart 25).

As a non-euro area Member State of the European Union, Hungary is in a special position with regard to the digital euro. The proposal makes access to and use of the digital euro in a non-euro area EU Member State and its citizens conditional on entering the euro area (Table 1). On the basis of the proposals presented by the European Commission, the EU's tripartite legislative process has started, now in the conciliation phase led by the European Council. The negotiations will continue under the Hungarian Presidency

Table 1
Conditions for access to the digital euro in an EU Member State outside the euro area

(1) a non-euro area Member State submits such a request and commits itself to certain conditions (e.g. compliance with ECB regulations, disclosure obligations, existence of the necessary national legislation)
(2) the European Central Bank and the central bank outside the euro area conclude an agreement specifying the measures to be taken

Source: MNB based on the proposal for the creation of the digital euro

between 1 July and 31 December 2024. Although Hungary is not a member of the euro area, it is important to clarify the legal framework of the digital euro from a domestic perspective, the procedures and restrictions for visitors to the euro area from outside the European Union, the access of the digital euro outside the euro area, and the details of the agreement between the ECB and the central bank. In addition, it is of major importance to examine the impact of the digital euro on financial stability and the financial intermediation system, in particular, with regard to monetary sovereignty and unintended euroisation, as well as the anti-money laundering aspects of the proposal.

2 International regulation of digital finance, its development, regulatory efforts

In line with the pace of innovation, 2024 is also a very busy year for EU technology and FinTech regulation in terms of legislation, with a number of pioneering initiatives. The responsible and safe use of the transformative power of artificial intelligence (AI) is the focus of the world's first comprehensive AI regulatory framework; however, the continuous legislative responsiveness to innovation does not ignore the harmful impact of AI on liability regimes either. The services of technology giants have become almost indispensable in our rapidly digitalising lives, and in order to maintain the competitive nature of digital markets and the credibility and security of the content delivered by BigTech platforms, they will face strict obligations in Europe from this spring. 2024 will also bring the launch of a new regulated market for crypto-assets in the European Union, with the Magyar Nemzeti Bank as the supervisory authority playing a key role. The forthcoming improvements to the EU payment regulation and the planned new framework for access to financial data will take EU citizens on a journey from open banking to open finance.

Table 2
EU definition of an artificial intelligence system

An artificial intelligence system is a **machine-based** system that is designed to operate **with varying levels of autonomy** and **that may exhibit adaptiveness** after deployment, and that, **for explicit or implicit objectives, infers, from the input it receives,** how to generate **outputs** such as predictions, content, recommendations, or decisions that **can influence physical or virtual environments**.

Source: MNB based on the AI Act.

2.1 THE EUROPEAN UNION'S ARTIFICIAL INTELLIGENCE REGULATION

After more than two years of legislative process, the EU's Artificial Intelligence Regulation (AI Act) enters into force on 1 August 2024[19]. The new legislation will be the first in the world to comprehensively regulate the use of AI systems and the obligations of providers, installers, importers, distributors and manufacturers of AI solutions in the EU market. The EU's goal is to ensure that AI systems operating in the common market are safe and reliable, respect fundamental rights and EU values, and that the competitive advantage of pioneering regulation creates global leadership for the EU, stimulating responsible innovation in the market further.

Professional discussions on the definition of artificial intelligence are in progress worldwide, and the EU has taken a step forward towards a single set of rules in this area. The Regulation aligns the definition of an AI system with the approach developed by the OECD in order to provide clear criteria for distinguishing between AI and simpler software systems (Table 2). The European Commission will develop further guidelines on the practical application of the definition.

[19] Regulation (EU) No 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139, (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828

Chart 26
Risk classification of AI systems

Source: MNB based on the AI Act.

Table 3
Main prohibited AI practices

solutions that manipulate user behaviour in a deceptive way, or manipulate or subconsciously influence user behaviour
solutions that exploit the vulnerability of a person or group related to age, disability or specific socio-economic circumstances
social scoring systems
predictive policing applications (with specific exceptions) assessing the risk of an individual committing criminal offenses solely based on profiling or personality traits
systems that create or enhance facial recognition databases by untargeted scraping of facial images from the Internet or CCTV footage
systems capable of inferring emotions in workplaces or educational institutions (with specific exceptions)
systems that categorise individuals on the basis of their biometric data and infer their race, political opinion, trade union membership, religious or philosophical beliefs or sexual orientation (with certain exceptions)
systems that enable real-time, remote biometric identification in publicly accessible spaces for law enforcement purposes (with specific exceptions)

Source: MNB based on the AI Act.

The EU classification of AI systems ranges from risk-free solutions to prohibited AI practices, and the Regulation regulates each risk level by imposing proportionate obligations (Chart 26). AI practices that pose an unacceptable risk to fundamental EU values or rights will be banned in the EU (Table 3). Low-risk AI solutions at the other end of the spectrum, on the other hand, will be essentially exempt from obligations, but the legislator will expect providers at all risk levels to ensure that the staff operating and using them are "AI literate", i.e. adequately trained and prepared. And in order to make it clear when customers interact directly with an AI system or that the content they are viewing has been created by an AI system, for certain limited risk solutions (e.g. chatbots, generative AI systems capable of generating and manipulating synthetic content, emotion recognition systems), the Regulation will require clear information (designation) and awareness-raising by providers to enhance customer trust.

Table 4
Main categories of high-risk AI systems

certain AI systems (e.g. toys, medical devices, elevators) covered by harmonisation legislation or used as safety components of such products
remote biometric identification, categorisation and emotion recognition systems
systems related to the operation of critical infrastructure
systems affecting access to education and vocational training
employment-related systems (e.g. recruitment, hiring and performance review)
systems that affect access to essential private and public services (e.g. credit scoring, emergency dispatch)
law enforcement systems
systems for migration, asylum and border control management (e.g. AI-based polygraph)
systems related to justice and democratic processes (e.g. systems that influence voter behaviour)

Note: The obligations for high-risk AI systems also apply to open source solutions identified as such.

Source: MNB based on the AI Act.

High-risk AI systems (Table 4) **will have to comply with a wide range of strict standards.** These include well-documented risk assessment and risk management processes throughout the lifecycle, effective quality management, data governance and high data quality, appropriate technical documentation, event logging, operational transparency, human oversight, and accurate and robust operations that are resilient to cyberthreats. Providers must have an internal or third-party conformity assessment of their high-risk systems carried out and these systemsare to be registered in the Commission's database before they are placed on the market or put into service.

The explosion of ChatGPT has intensified the debate between Member States on the regulation of general-purpose AI systems and the so-called foundation models, and as a result, the Regulation will also cover these models. General-purpose AI models[20] trained on large datasets are characterised by their ability to perform a wide range of tasks in a highly competent way, and can thus be easily integrated into other systems or applications. The Regulation will bring these models under direct EU supervision and impose additional targeted copyright, model and teaching data documentation and information obligations, ensuring transparency and protection of intellectual property along the entire value chain. And among high-performance general-purpose AI models, those with significant capabilities according to specific criteria, such as the computational capacity and estimated energy consumption used to teach them, the number of parameters, the quality and quantity of the teaching data, or the number of end-users reached, and consequently may pose risks at the EU level, will be considered by the Commission as a general-purpose model with systemic risk, which will lead to new obligations for providers, in particular, with regard to risk assessment, risk management and cybersecurity.

The Regulation does not regulate all cases of the use of AI. Thus, the AI Act does not cover the use of AI specifically for scientific research and development purposes, nor does it cover pre-commercial or pre-commissioning development activities, except for real-world testing, nor does it cover uses for purely personal purposes, or military defence or national security uses. Free, open-source AI systems are by default not subject to the rules of the Regulation, in order to promote the uptake, transparency and community control of AI solutions.

[20] These include the GPT-3.5, GPT-4 and GPT-4o models on which ChatGPT is based.

All European organisations using AI, including financial institutions, need to carefully assess the risk level and compliance of their existing and planned AI solutions. In the financial sector, AI is already present at multiple points in the value chain, with a range of machine-based solutions supporting institutional operations and the delivery of financial services, from robotic process automation (RPA), risk assessment and portfolio management to credit assessment. However, while some use cases, such as fraud prevention AI solutions, may be considered risk-free under the Regulation, others, such as systems used in credit scoring, fall explicitly into the high-risk category due to the potential limitation of access to financial services, and may therefore not only entail an additional administrative burden, but also significant additional development and compliance costs. Thus, financial participants should pay special attention to other EU regulatory developments related to AI in the coming period, such as the initiatives of the Commission and the European Supervisory Authorities[21], and even actively engage in the regulatory process through sectoral dialogues and consultations[22]. In addition to the EU's preparation, it should not be overlooked that the scarcity of resources (e.g. chips, GPUs) necessary for the development and teaching of AI systems means that the third-party AI solutions market is dominated by a few large providers – most of them technology giants – the concentration and oligopolistic market nature of which may even induce global systemic risks for the financial system. (For more on the regulation of technology giants and its first EU legislative results, see Box 2.)

The European Union will encourage compliance with AI solutions through strict financial sanctions. The Regulation applies a tiered approach according to the gravity of the breach, with fines of up to EUR 35 million or 7 per cent of the preceding financial year's worldwide annual turnover for the most serious infringements, such as prohibited AI practices. Given their importance, a separate penalty regime will apply to general purpose AI providers if they fail to ensure that their systems are legally compliant by the deadline.

[21] In this respect, we should take note of the guidelines issued by ESMA for investment service providers, in particular, in relation to MiFID II compliance: https://www.esma.europa.eu/document/public-statement-ai-and-investment-services.

[22] To better understand the existing and future financial use cases and the potential sectoral impacts, challenges and risks of AI, the European Commission is seeking the views of financial sector stakeholders in a targeted consultation open until September 2024. The consultation is available at https://finance.ec.europa.eu/regulation-and-supervision/consultations-0/targeted-consultation-artificial-intelligence-financial-sector_en.

Table 5
Organisations and bodies involved in implementing the Regulation

National competent authorities	EU organisations and bodies
market surveillance authorities under Regulation (EU) 2019/1020	European Commission (European Artificial Intelligence Office)
notifying authorit(y/ies) (setting up a conformity assessment certification system)	European Artificial Intelligence Board (and its sub-groups)
	Advisory forum
	Scientific panel of independent experts
	European Data Protection Supervisor (monitoring the use of AI by EU organisations)

Source: MNB based on the AI Act.

In addition to national authorities, newly established EU bodies will play a key role in enforcing the legislation and developing good practices on AI in Europe (Table 5). Established within the Commission on 21 February 2024, the *European Artificial Intelligence Office* will form the basis of a single European AI governance system as the EU's centre of AI expertise, and will provide oversight of general-purpose AI models, develop guidelines, methodologies and standards, support regulatory test environments for AI, and foster international cooperation to ensure the uniform application of the Regulation and the development of trusted AI solutions. The Commission will be assisted in the implementation of the Regulation by the *European Artificial Intelligence Board* and its sub-groups of Member State representatives, which will coordinate Member State authorities, develop recommendations and written opinions, disseminate regulatory good practice and raise awareness of AI in general, and will be supported by an advisory forum involving industry and academia and a scientific panel of independent experts on scientific and technical issues.

The rules of the AI Regulation will go live in several stages. Some of the obligations will be imposed on providers two years after entry into force, from 2 August 2026, but the prohibitions on unacceptable practices will apply after 6 months, while the rules on general purpose AI models will apply for the first time after 12 months. The Regulation also takes into account the existing AI systems on the market, providing additional compliance time for their providers. At the same time, the Commission also wishes encourage rapid market development and readiness, and will promote the development of reliable AI technologies in line with EU values through a broad set of measures focused on start-ups and SMEs[23] and has launched the AI Pact initiative[24], which provides a support and exchange forum for industry players from Europe and outside the EU who voluntarily join to prepare ahead of the deadline for the Regulation's requirements.

[23] https://ec.europa.eu/commission/presscorner/detail/hu/ip_24_383
[24] https://digital-strategy.ec.europa.eu/hu/policies/ai-pact

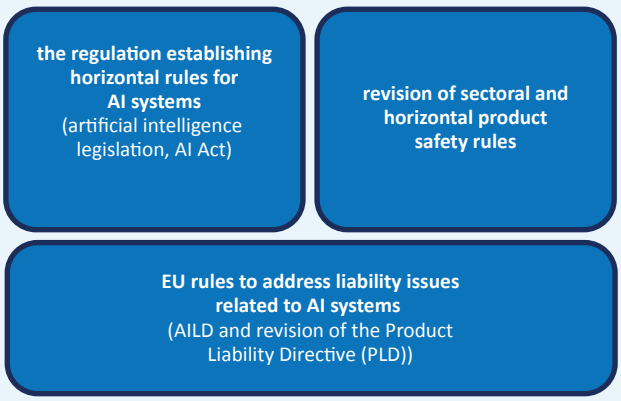
2.2 DRAFT DIRECTIVE ON LIABILITY IN RELATION TO ARTIFICIAL INTELLIGENCE

The European Union has recognised not only the potential competitive advantages of the early regulation of AI, but also that the harm caused by AI systems may break the traditional national liability models and that the lack of a harmonized liability regime may slow down the gaining ground of AI across the EU.

The White Paper on Artificial Intelligence[25] sets the goal of promoting the proliferation of AI and managing the risks associated with the technology in the European Union. The paper identifies challenges to the existing liability rules and notes that emerging digital technologies such as artificial intelligence, IoT[26] and robotics may challenge some of the components of the liability framework and reduce its effectiveness. In national liability systems based on fault, it is the injured party claiming damages who has to prove the damage, the act or negligence (fault) of the person who caused the damage and the causal link between them. This burden of proof may make it difficult and costly – and sometimes even impossible – for victims to enforce their claims, due to the characteristics of the technology (complexity, autonomy, "black box effect").

The regulator also intends to reduce the risks associated with AI by providing a coherent approach at EU level on liability issues. Legislative work is ongoing in this respect, with a proposed Directive on the adaptation of the rules on non-contractual civil liability to AI[27] (AI Liability Directive, AILD), which aims to apply uniform requirements for damages caused by AI, preventing fragmentation and increasing legal certainty in the Member States (Chart 27).

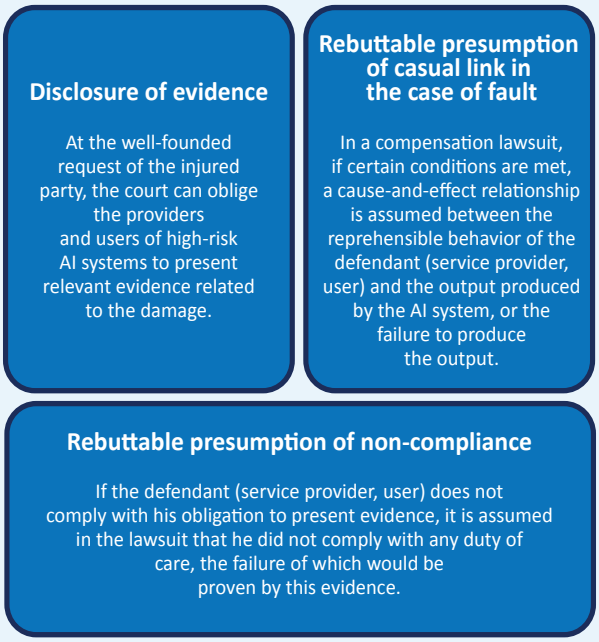
Chart 27
The European Union's Artificial Intelligence package of measures



Source: MNB based on the AILD.

[25] White Paper on Artificial Intelligence: a European approach to excellence and trust COM/2020/65 final/2
[26] Internet of Things
[27] Directive of the European Parliament and of the Council on adapting non-contractual civil liability rules to artificial intelligence (AI Liability Directive) (proposal)

Chart 28
Provisions in the proposed directive to ease the burden of proof



Source: MNB based on the AILD.

The primary objective of the proposal is to ensure that victims of non-contractual damage caused by AI systems receive the same level of protection as those who claim compensation for damage caused without the intervention of such systems, through minimum harmonisation measures in existing civil liability regimes. The Directive thus aims to make it easier for victims to prove their case by applying a disclosure obligation in relation to high-risk AI systems and two rebuttable presumptions (Chart 28). This is particularly important because effective liability rules at EU level can boost confidence in AI, thereby facilitating the widespread gaining ground of the technology and acting as an economic incentive, thus improving the functioning of the internal market and providing a competitive advantage for the EU.

Although the proposal is not sector-specific, it is also relevant for the financial sector, where AI-based solutions, even high-risk solutions, may play an increasingly important role. Accordingly, the draft may also provide guidance to financial operators to minimise the risks arising from the use of AI systems and to calculate the liabilities arising from a potential claim.

Box 2
The new EU rules of play for tech giants: the Digital Markets Act (DMA) and Digital Services Act (DSA)

The products and services of technology giants now permeate almost every aspect of our digital lives. These firms are characterised by the fact that their customer base of hundreds of millions accumulated via their core businesses (e.g. social media, software and hardware development, e-commerce), the sophisticated data analytics and AI-based exploitation and intra-group sharing of vast amounts of user data, as well as the exploitation of the extreme economies of scale and network effects of their closed ecosystems enable them to enter new markets and build dominant positions extremely dynamically. BigTech companies have thus not only become practically indispensable in technology segments but are also able to enter and become significant in highly regulated areas such as the financial market, where they can provide their services either in partnership with a financial institution, directly or as technology suppliers (e.g. by providing cloud services or other infrastructure).[28]

Platforms run by technology giants are playing an increasingly important role in the economy, as they enable businesses to reach end users, facilitate cross-border trade and may also lead to the emergence of new business models. However, the operational specificities described above, combined with the significant economic power of BigTech companies, their potentially unfair practices and the arbitrary control of their platforms, may undermine the competitive nature of digital services significantly, and, given the high barriers of entry, create imbalances and an uneven playing field, which may ultimately lead to a deceleration in the pace of innovation and a significant reduction of choice for business and end-users. To address the full spectrum of these negative effects, previous EU frameworks, in particular, competition law, was not adequate on its own, and new, complementary rules for digital

[28] For more information on the emergence of technology giants in the financial services market, the risks they pose, their potential systemic importance and possible future directions for their comprehensive regulation, see: Roland Bódi, Péter Fáykiss, Ádám Nyikes: The Systemic Risks and Regulation of BigTech: "Too Big(Tech) To Fail?", available at https://hitelintezetiszemle.mnb.hu/letoltes/hsz-22-1-je1-bodi-faykiss-nyikes.pdf.

markets were needed. Consequently, in November 2022 the **Digital Markets Act (DMA)**[29] came into force, with rules to ensure a level playing field and more open digital markets for *gatekeeper* operators, becoming applicable on 7 March 2024.

Gatekeepers are companies that provide so-called *core platform services* – such as search engine, social networking service, video sharing platform, operating system, web browser or cloud services – as an important channel for business users to reach end users, are active in several Member States, enjoy an entrenched and durable position during their operation based on their financial indicators and the size of their user base, and have a significant impact on the EU market. The Commission may, at their request or following a market investigation, designate as gatekeepers service providers that meet the above criteria. By the end of this report, 7 gatekeepers and 24 core platform services have been identified and new businesses are also expected to be designated (Chart 29).

The DMA will help competitive digital markets by imposing new obligations and prohibitions on gatekeepers. Some of the new rules are designed to open up the hitherto relatively closed very large online platforms to business competitors and users by imposing interoperability and data access and portability obligations. In addition, prohibiting the preference for additional products and services other than your own core platform service, allowing users to choose the default software, allowing users to install third-party software stores, or limiting the linking of personal data from core platform services, will counter unfair practices and offer users freedom of choice.

Some digital services, however, are not only decisive in terms of market competition, but can also carry significant social risks, such as the potential to disseminate illegal content or disinformation and amplify other malicious or harmful effects. **The Digital Services Act (DSA)**[30] therefore aims to create a safe, predictable, transparent and trustworthy online space that promotes innovation and growth of smaller platforms, SMEs and start-ups, and to protect consumers, while managing these risks and protecting the fundamental rights of European users. Some of the provisions of the legislation apply from August 2023, and from February 2024 it is applied to all service providers. The DSA covers intermediary services, ranging from the simplest form of information transfer (e.g. DNS services, domain

Chart 29
Gatekeeper businesses and their core platform services

Source: European Commission.

[29] Regulation (EU) 2022/1925 of the European Parliament and of the Council of 14 September 2022 on contestable and fair markets in the digital sector and amending Directives (EU) 2019/1937 and (EU) 2020/1828

[30] Regulation (EU) No 2022/2065 of the European Parliament and of the Council of 19 October 2022 on a single market for digital services and amending Directive 2000/31/EC

name registrars), hosting services (e.g. cloud and web hosting) and online platforms (e.g. online marketplaces, app stores, social media platforms) to very large online platforms and the very large online search engines. The obligations of operators depend on their role in the online space, their size and the impact of their activities; accordingly, stricter compliance conditions apply to platforms or search engines that are classified as *very large online platforms (VLOPs*) or *very large online search engines (VLOSEs*) with more than 45 million users per month in the EU. The DSA sets out due diligence obligations to ensure, among other things, the effective management of illegal content, the establishment of reporting and action mechanisms, strict protection of minors, transparency of content and advertising, traceability of traders, risk assessment, greater accountability, and access to redress, complaints and dispute resolution.

Table 6
Types of crypto-assets

	Type	Description
Stablecoin	**electronic money token** (e-money token)	a crypto-asset that purports to maintain a stable value by referencing the value of **one** official currency
	asset-referenced token (asset-referenced token)	a crypto-asset that purports to maintain a stable value by referencing another value or right, or a combination thereof, including one or more official currencies (but is not an e-money token)
general crypto-asset		other crypto-assets not classified into the above categories; MiCA refers specifically to **utility tokens**, that is only intended to provide access to a good or service supplied by its issuer

Source: MNB based on MiCA.

2.3 PREPARING FOR THE LAUNCH OF THE REGULATED CRYPTO-ASSETS MARKET IN THE EUROPEAN UNION

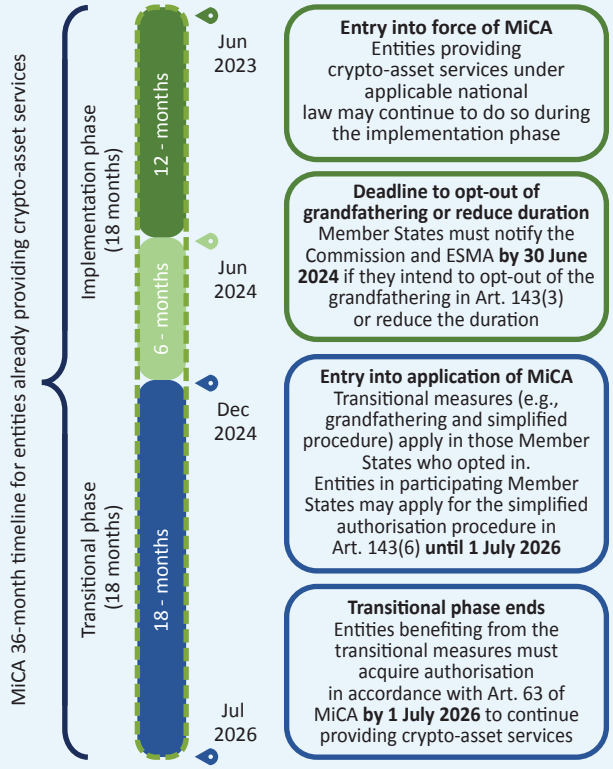
With the entry into force of the Markets in Crypto-Assets (MiCA) Regulation[31] last summer, preparations began for the full implementation of the world's first comprehensive crypto-asset framework covering a wide range of crypto-assets from 30 December 2024[32] (Table 6). Of the rules, initially the provisions on asset-referenced and electronic money tokens – i.e. "stablecoins" –, their issuers and their trading will be applicable from 30 June 2024; therefore, this summer will be a watershed in terms of the number of stablecoin issuers applying for MiCA authorisation, i.e. the initial composition of the now regulated EU stablecoin market.

As regards the time limit for compliance, crypto-asset service providers are in a special position, as they are granted a grace period of one and a half years longer by the EU legislation (Chart 30). However, this 18-month period may be significantly reduced in practice. The transitional, "grandfathering" period set out in the legislation enables crypto-asset service providers already providing services under their national law prior to the end-December deadline to continue to operate until they are authorised under the MiCA or until their application for authorisation is rejected, but no later than until 1 July 2026. Service providers already holding a national authorisation on 30 December 2024 will also benefit from a simplified authorisation procedure if the relevant Member State so decides. However, Member States may decide not to grant a "grandfathering" period at all or to provide only a shorter period if they believe that their national law is

[31] Regulation (EU) No 2023/1114 of the European Parliament and of the Council of 31 May 2023 on markets in crypto-assets and amending Regulations (EU) No 1093/2010 and (EU) No 1095/2010 and Directives 2013/36/EU and (EU) 2019/1937

[32] For more details on developments in the EU regulation of crypto-assets and the content of the Regulation, please see pages 21–28 of the Magyar Nemzeti Bank's FinTech and Digitalisation Report 2023. The Report is available at https://www.mnb.hu/letoltes/final-mnb-FinTech-digitalisation-report-2023.pdf.

Chart 30
Main milestones in the application of MiCA and the transition period



Source: MNB based on ESMA.

less strict than the Regulation. Given that Member States are to notify EU bodies of this choice by 30 June 2024 at the latest, it is now up to service providers to monitor the administrative processes of their own Member States alongside EU regulatory developments, and adapt their preparation schedules accordingly. The reduction of the transition period to a maximum of 12 months and its early announcement has already been advocated by the European Securities and Markets Authority (ESMA)[33] in order to avoid regulatory arbitrage ("forum shopping"), ensure a smooth transition and a level playing field for investors and a level playing field in Europe, and at the time of writing, some Member States, including Austria, Germany, Ireland, Italy, Latvia, Lithuania, the Netherlands, Spain and also Hungary, will make use of this option.

The preparatory period is not only an active period for market participants, but also for the secondary legislative processes related to the Regulation, which are still actively in progress in the EU organisational system. The MiCA sets out the basic framework for EU crypto-asset regulation and gives the Commission, the European Banking Authority, the European Securities and Markets Authority, and the European Central Bank as a participant, the task of supplementing and further interpreting the Regulation – either independently, or in collaboration – by developing *delegated acts, guidelines and regulatory and implementing technical standards* on nearly 60 topics (Table 7). Most of the regulatory instruments may be put in place by summer 2024, but secondary legislation on some issues will take until the end of the year. These processes are essentially consultative, allowing a wide range of stakeholders – market and academic players, individuals, interest groups and non-profit organisations – to express their views on specific draft regulatory instruments. In some areas, complementary rules are already in place; for example, Commission legislation has already been adopted – e.g. on certain criteria for classifying asset-referenced tokens or electronic money tokens as significant, and on the supervisory fees to be paid by the issuers of these tokens –, and is awaiting the final legislative procedures necessary for its entry into force.

[33] The letter of the European Securities and Markets Authority on the effective application of MiCA is available at https://www.esma.europa.eu/sites/default/files/2023-10/ESMA75-840896669-45_Letter_to_MS_on_effective_MiCA_application.pdf.

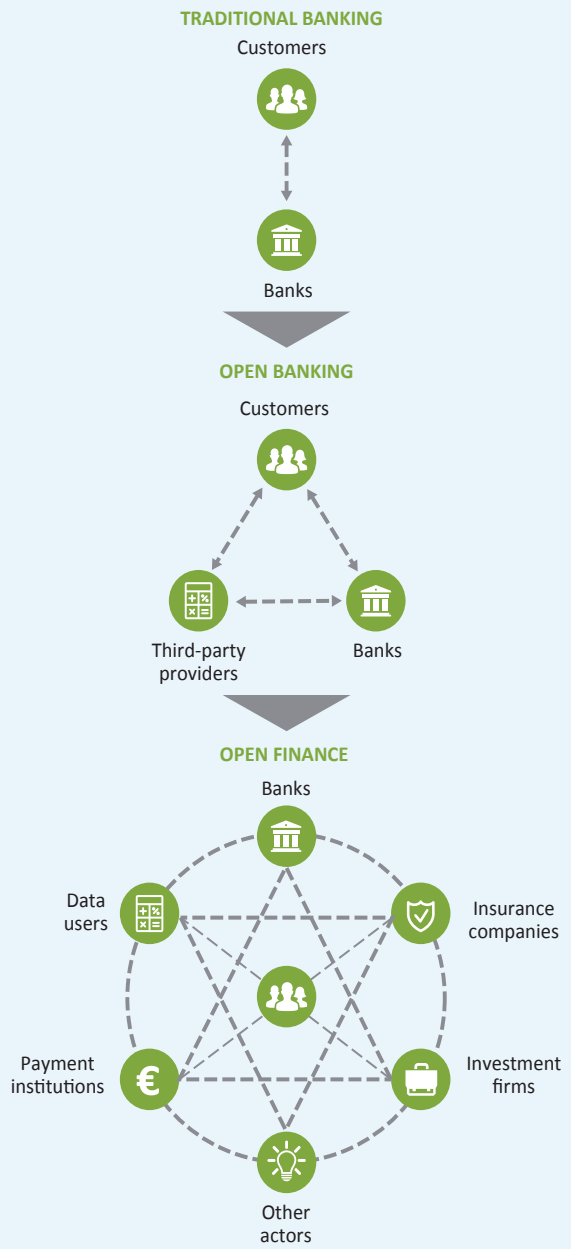
Table 7
Main secondary legislative topics associated with MiCA

Topic	Competent authority
conditions for the qualification of crypto-assets as financial instruments	ESMA
acquisition of a qualifying holding in the issuer of an asset-referenced token	EBA, ESMA
classifying the issuers of asset-referenced tokens as significant	Commission
recovery plans of the issuers of asset-referenced tokens	EBA, ESMA
stress test scenarios	EBA, ESMA, ECB
liquidity management policies and procedures, liquidity requirements (issuers of significant asset-referenced tokens)	EBA, ESMA
minimum content of the governance arrangements on the remuneration policy (issuers of significant asset-referenced tokens)	EBA, ESMA
adjustment of the amount of own funds (issuers of significant asset-referenced tokens)	EBA, ESMA
redemption plans	EBA
draft technical standards for crypto-asset white papers	ESMA, EBA
sustainability impact assessment of consensus mechanisms	ESMA, EBA
reverse solicitation	ESMA
application for authorisation as a crypto-asset service provider	ESMA, EBA
assessment of the suitability of the members of the management bodies, shareholders and members of crypto-asset service providers	ESMA, EBA
sustainability indicators in relation to adverse impacts on the climate and other environment-related adverse impacts	ESMA, EBA
business continuity	ESMA
complaints handling	ESMA, EBA
conflict of interest	ESMA, EBA
rules for the operation of the trading platform of crypto-assets (e.g. content and format of order book records)	ESMA
advice on crypto-assets and portfolio management of crypto-assets	ESMA
transfer services for crypto-assets (procedures, policies)	ESMA, EBA
assessment of proposed acquisitions of issuers of asset-referenced tokens	ESMA, EBA
public disclosure of inside information and delay of such disclosures	ESMA
prevention and detection of market abuse	ESMA
cooperation between competent authorities, with European authorities and with authorities in third countries	ESMA, EBA
promotion of convergence on the classification of crypto-assets	EBA, ESMA and EIOPA jointly
registry of crypto-asset white papers	ESMA
specific rules relating to the coherent functioning of the colleges for the issuers of significant asset-referenced tokens and significant e-money tokens	EBA, ESMA, ECB
imposition of fines and periodic penalty payments	Commission
supervisory fees	Commission

Source: MNB based on MiCA.

In parallel with the EU processes, preparations for the transposition of the MiCA into national law and supervisory preparations have also started. Entering into effect on 30 June 2024, the Act on the Market in Crypto-Assets carries out the harmonisation tasks related to the application of the EU legislation, also transferring the Hungarian supervision of this market to the Magyar Nemzeti Bank. Accordingly, among other things, the Act strengthens

Chart 31
From traditional banking to open finance



Source: FIDA: Open Finance is coming, Deloitte (2023)

the definitions and service provision rules under the MiCA, sets out supervisory powers, fees and fines, lays down principles for advice on crypto-assets and minimum requirements for service provider complaints handling, and by amending specific finance-related legislation – in particular, those related to crypto-asset services and electronic money tokens –, it will ensure the harmonised domestic application of the Regulation's rules, for which the Magyar Nemzeti Bank, as the newly designated supervisory authority, is also preparing in the framework of active organisational development and by developing educational materials[34] and licensing guides[35].

2.4 FROM OPEN BANKING TO OPEN FINANCE

Digital technologies – with data at their core – are constantly shaping the economy. The European Union has recognised the potential advantages of data, setting itself the goal of reaping the benefits of using data more effectively, and the financial sector is no exception. In June 2023, the European Commission published a Proposal for a regulation on a framework for Financial Data Access (FIDA)[36], to digitalise the financial sector and improve its competitiveness. The main goal is to introduce regulated customer data sharing in the financial sector beyond account management purposes, i.e. to opening access to data with additional financial products and services to third party institutions.

The FIDA establishes the first ever regulatory framework for open finance (Chart 31), opening the way for additional innovative financial services. The market for payment services has changed significantly in recent years. The PSD2 Directive[37] introduced the concept of open banking by establishing the sharing and use of payment account data based on consent, enabling the provision of services based on the secure transfer of this information, including to FinTech companies. (For more on PSD2, its revision and the new EU payment regulation plans, see Box 3). The FIDA

[34] The most frequently asked questions and answers about crypto-assets and service providers are available at https://www.mnb.hu/letoltes/24-05-07-kriptoeszkozok-es-szolgaltatok-kerdesek-valaszok-final.pdf.

[35] Authorisation of the activities of asset-referenced token issuers: https://www.mnb.hu/felugyelet/engedelyezes-es-intezmenyfelugyeles/engedelyezes/szektorok/tokepiac/eszkozalapu-token-kibocsatok; updating the scope of activities of a credit institution by ART issuance: https://www.mnb.hu/felugyelet/engedelyezes-es-intezmenyfelugyeles/engedelyezes/szektorok/penzpiac/hitelintezet/tevekenysegi-engedelyek/hitelintezet-tevekenysegi-korenek-art-kibocsatassal-torteno-modositasa

[36] Regulation of the European Parliament and of the Council on a framework for Financial Data Access and amending Regulations (EU) No 1093/2010, (EU) No 1094/2010, (EU) No 1095/2010 and (EU) No 2022/2554 (proposal)

[37] Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market, amending Directives 2002/65/EC, 2009/110/EC and 2013/36/EU and Regulation (EU) No 1093/2010, and repealing Directive 2007/64/EC

proposal goes one step further by enabling customers to share certain financial data (personal and non-personal) with other data-using financial institutions on request and under their control, which could enable the development of new innovative, data-driven, personalised business models, financial products and services. Under the proposal, data will flow through so-called financial data sharing schemes, one or more of which all data holders and data users will be required to become a member of. In addition, to ensure transparency, data holder financial institutions that collect, store and manage customer data will also need to provide their customers with a permission dashboard to manage and track the permissions of data users who access their data to provide innovative services in a simple and efficient manner.

Box 3
Developing a new EU Payment Services Regulation (PSD3, PSR)

Entering into force on 13 January 2018, the Second Payment Services Directive (PSD2) already set out significant requirements that have had a major impact on the rapid development of electronic payments in the recent years. The PSD2 was, at the time of its publication, very forward-looking, given that it brought a number of rules into law, some of which were already in practice, but needed to be defined at the level of legislation in order to establish a uniform legal practice. The PSD2 has, among other things, laid the legal foundations for open banking, thereby strengthening competition and ensuring the involvement of new types of players in the payments industry, such as providers of account information services and payment initiation services. The Directive also lays down detailed rules for cross-border payment services, thus ensuring the freedom to provide services in the field of payments. The PSD2 also includes measures to ensure customer security and prevent fraud, such as the introduction of strong two-factor customer authentication and liability rules that place the responsibility for damages on payment service providers for payment transactions not initiated by customers, thus typically fraudulent.

The rules and measures introduced by PSD2 have had a significant and positive impact on the regulation of payments, in particular electronic payments, but the acceleration of digitalisation and innovative solutions has led to the need to change many of the previous expectations. The legislator has recognised this need, and in June 2023 the European Commission published the legislative proposals revising the PSD2 provisions. One of the most significant innovation in terms of enforcement and implementation in the Member States is that, compared to the previous legislation, the framework for the operation of payments will no longer be set out in a directive, but in a regulation (Regulation on payment services in the internal market – PSR[38]) and a directive (the Third Payment Services Directive – PSD3[39]). The PSD3 will mainly contain prudential provisions on the authorisation and supervision of payment institutions, while the PSR will lay down rules on the conduct and provision of payment services. The importance of the new package of payment regulation proposals is also reflected in the fact that the Commission's proposal on the creation of the digital euro also brings payment transactions in the digital euro within the scope of the PSR.

[38] Proposal for a Regulation of the European Parliament and of the Council on payment services in the internal market and amending Regulation (EU) No 1093/2010
[39] Proposal for a Directive of the European Parliament and of the Council on payment services and electronic money services in the Internal Market, amending Directive 98/26/EC and repealing Directives (EU) 2015/2366 and 2009/110/EC

The PSR and PSD3 would no longer separate the rules on electronic money services and payment services at the regulatory level but would define them in a single framework. It would harmonise the requirements expected of service providers and the rights and obligations of service users. The category of institutions currently issuing electronic money would also be defined as a category of payment institutions. **The new package of proposals, in addition to those mentioned above, focuses on the following issues:**

- reducing and preventing the recently increasing cash-related fraud and mitigating customer losses,
- guaranteeing customer rights, providing more transparent requirements,
- further support for open banking, facilitating the provision of services by third-party providers and clarifying the relevant rules.

As fraudulent payment transactions have been one of the biggest challenges in recent times across Europe and in the field of payments, the Payment Services Directive sets out targeted provisions that put customer security at the forefront. Under the new regulation, payment service providers will have to use even more advanced transaction monitoring mechanisms, and, in the case of a suspected fraudulent payment transaction, the regulation explicitly allows for the sharing of information between service providers on the unique identifier of the payee. Furthermore, in consideration of the fact that most cases of abuse result from misleading customers, the legislator considered it important to introduce customer education measures at the legislative level to better promote financial awareness and preparedness for abuse. In addition, the service requiring the same account number and payee name, which will be introduced by the Regulation on instant credit transfers in euro[40], is already included in the PSR.

The regulatory proposal aims to enhance the liability regime further, relative to PSD2 rules, so that payment service providers are primarily liable for damages caused by payment transactions not initiated by customers. In relation to the latter, the PSR also plans to introduce a new liability regime specifically for those types of fraud where the payment transaction is authorised by the customer as a result of a deception where the fraudster pretends to be a bank employee. The draft shows that the legislator is placing increasing emphasis on defining liability rules from a customer perspective and on striking the right balance between the payment service provider and the customer. However, the rules governing fraudulent payment transactions need further clarification in order to ensure that payment service providers treat consumers more favourably in practice and in actual day-to-day application than has been the case so far.

The PSR also aims to address the shortcomings of the open banking rules introduced by PSD2 and to address the problems that hinder the operation of third-party service providers by adding detailed requirements and requirements for payment service providers that operate payment accounts. Under the open banking rules created by PSD2, payment service providers are required to provide secure data transfer connections to third-party service providers to enable them to access customers' payment accounts and payment account data and to provide services based on these (payment initiation service, account information service). The PSR prescribes a mandatory dedicated interface (API) to be provided by account servicing payment service providers (ASPSPs) and sets out standards for the operation and performance of the interface, which the legislator intends to better facilitate the uninterrupted and unhindered provision of services by third-party service providers.

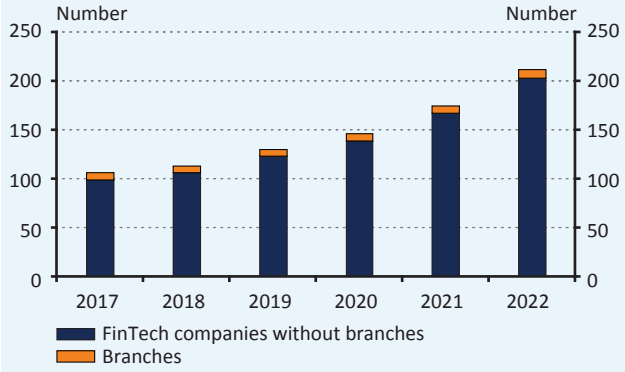
The Presidency-in-Office of the Council of the European Union launched the discussions of the legislative proposals and the package of proposals is expected to be adopted next year. It is important to stress that the new package of proposals for payment regulation is still only a draft to guide future regulation, but the final adopted legislative text may obviously differ from the current content.

[40] Regulation (EU) No 2024/886 of the European Parliament and of the Council of 13 March 2024 amending Regulations (EU) No 260/2012 and (EU) No 2021/1230 and Directives 98/26/EC and (EU) 2015/2366/EC as regards instant credit transfers in euro

3 Domestic FinTech sector

Over the past few years, the domestic FinTech ecosystem has become increasingly extensive: in 2022, there were 212 Hungarian-based companies operating in the market. By company size, four-fifths of FinTech firms are micro and small, and their share is increasing slowly and steadily. The number of firms in most FinTech services continued to grow compared to 2021, with the largest increases observed in blockchain and virtual currencies – the share of which is insignificant – and the more numerous service line of data analytics and business intelligence; these two service lines increased their share in the total number of companies. Total employment and net sales rose sharply compared to 2021, but the former is already decelerating according to preliminary data for 2023. As regards Hungarian-owned majority start-ups, the average number of employees of the recipients of at least one venture capital investment in the first six years of operation (45 per cent of start-ups) consistently exceeds the number of employees of companies with no venture capital investment from the second year onwards. Average turnover is catching up with the average of non-beneficiaries, and even exceeds the latter starting from the 5th year of operation. Profitability is not a requirement at the beginning of a lifecycle, and the proportion of profitable firms is therefore significantly lower than in the other group. Capital injections to a firm in several rounds increased the likelihood of a strong scaling of turnover.

Chart 32
Number of domestic, operating companies and branches involved in FinTech activities



Note: Companies that submitted annual reports to the National Tax and Custom Authority (NTCA) at least for 2022 are shown.

Source: NTCA, MNB.

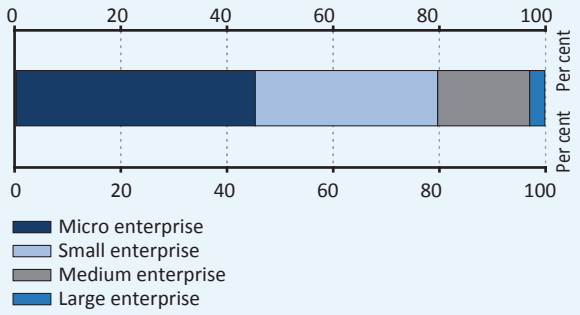
3.1 ANALYSIS OF THE DOMESTIC FINTECH SECTOR BY COMPANY SIZE AND NUMBER OF EMPLOYEES

The number of FinTech companies operating in Hungary has doubled in six years. We can see continued growth in the Hungarian financial technology market: in 2022, 212 FinTech companies operated in Hungary already (Chart 32), of which nine international companies are currently present as domestic branches, which are shown separately this year in order to provide a more comprehensive view. The FinTech firms were identified from a set of firms reporting for the year 2022, filtered by the activities that fit the definition used[41], after a machine search and detailed examination of all potential firms' websites. Nine new companies have been identified that filed their first report to the NTCA in 2022. The additional changes in the size and composition of the sector are due to companies that have resumed operations after a period of inactivity, new additions to the scope of activities or other market movements (acquisitions, mergers, liquidations, etc.).

Micro and small enterprises continue to characterise the Hungarian FinTech sector. Compared to the figures presented in last year's Report, the sector has grown significantly in terms of numbers, but the distribution of the companies has not changed: as in previous years, 80 per cent of the market is composed of micro and small firms (Chart 33). There has also been growth in medium and large companies, with more

[41] In our analysis, the Hungarian FinTech sector comprises only of companies with a Hungarian tax number, operating in a corporate form and active in 2023 (in their case, the latest available annual reports – and thus our assessment – refer to 2022). For details on the identification methodology, see the MNB FinTech and Digitalisation Report 2020, Box 3.

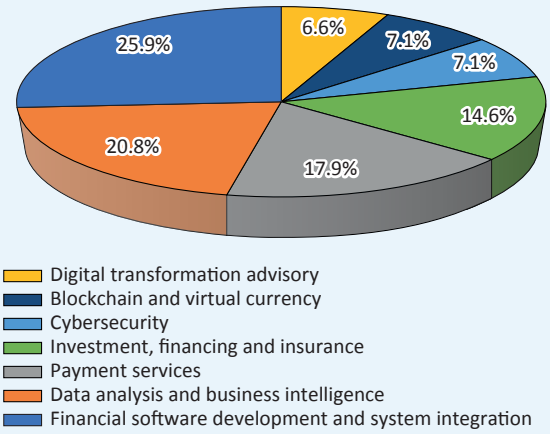
Chart 33
Distribution of FinTech companies by company size (2022)



Note: Company size is determined based on the 2022 accounts and year-end headcount, turnover and balance sheet total.

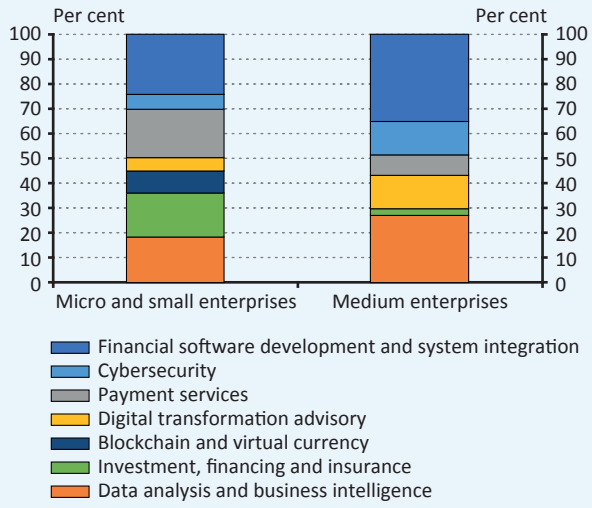
Source: NTCA, MNB

Chart 34
Distribution of FinTech companies by service scope (2022)



Source: NTCA, MNB

Chart 35
Distribution of the number of FinTech companies by company size and services provided (2022)



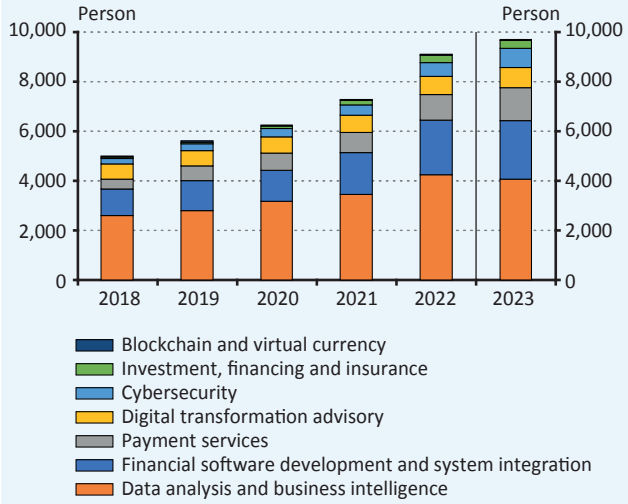
Source: NTCA, MNB

companies moving into the larger size category as a result of growth, but they still account only for 17 per cent and 3 per cent of the FinTech sector, respectively. As regards ownership, the pattern has remained the same for years: the number of Hungarian-owned companies declines in line with the increase in size. While 86 per cent of micro enterprises are Hungarian-owned, only 60 per cent of small and medium-sized enterprises are. The largest firms, which typically have FinTech as an additional activity or are Hungarian branches of international firms, are all foreign-owned at present, with one exception.

The order of the top three services has changed on the domestic FinTech scene, with sectors that have been less active catching up. After financial software development, the data analytics and business intelligence sector came second with a 4 percentage point increase compared to last year, pushing payments services into third place, which thus recorded a 2 percentage point smaller share of the sector in 2022 (Chart 34). The biggest growth was seen in data analytics and smaller services such as blockchain and virtual payments, the number of firms operating in these sectors rose by one and a half times compared to 2021 and accordingly, the latter recorded a market share 1.5 percentage point larger than in the previous year. A third of the new firms founded in 2022 also started with blockchain activities. Cybersecurity, an increasingly important area for emerging, innovative markets, is set to grow by 25 per cent in 2022, that notwithstanding, it only accounts for 7.1 per cent of the market. The development and maturity of the FinTech ecosystem and the increasing penetration of digitalisation can be demonstrated by the fact that the digital transformation advisory services sector was relegated to last place in 2022, with only 6.6 per cent of the market being represented by companies active in this area.

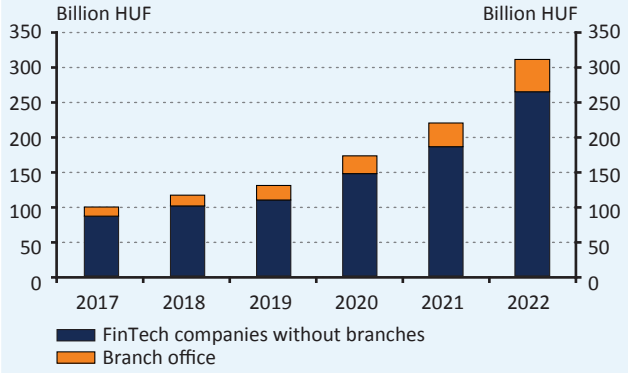
Distribution by size of the services concerned is changing, however, financial software development and systems integration remain the most dominant segments among micro, small and medium-sized enterprises. Among the smallest-sized companies, there has been a significant increase in the number of firms operating in the data analytics area, where a 72 per cent increase was observed in 2022 (Chart 35), bringing this segment to third place with 18 per cent. For medium-sized firms, financial software development exhibited the largest growth, increasing almost one and a half times compared to 2021, accounting for more than a third of medium-sized firms in 2022. Among this size of enterprises, there are no companies with blockchain activities at all in Hungary, and the number of investment and payment services companies is almost negligible – nearly all of these companies were micro and small in 2022.

Chart 36
Distribution of the number of employees by service scope at domestic FinTech companies



Note: Annual average figures are shown for each year.
Source: NTCA, MNB

Chart 37
Sales set of the FinTech sector



Source: NTCA, MNB

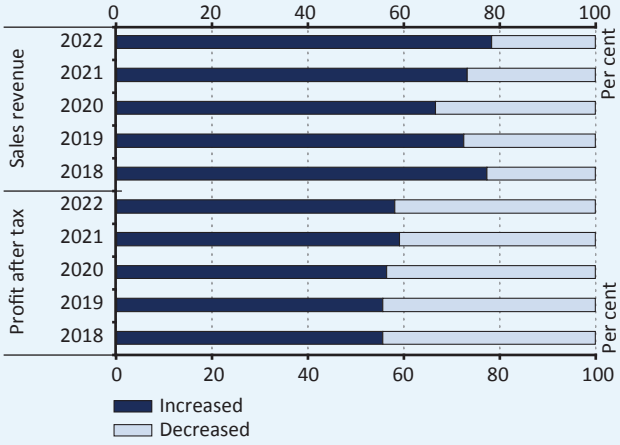
The number of people employed in the FinTech sector exceeded 9,000 in 2022: similar to the number of firms, the number of employees has doubled in the last six years. Almost half of FinTech workers were employed in the data analytics and business intelligence segments, and 24 per cent in financial software development (Chart 36). The third largest sector, payment services, employed only 11 per cent of the sector in 2022. Blockchain, as one of the fastest-growing sectors in the year under review, accounts for 1 per cent of the workforce, but this is a 12 per cent increase compared to 2021. As company size increases, it is increasingly common for a significant part – or, in the case of large companies, the majority – of employees to be employed by foreign-owned companies. Although micro and small enterprises account for 80 per cent of the FinTech firms operating in Hungary, only 19 per cent of the workforce is employed by these firms. It is also interesting to see that 10 enterprises accounted for more than half of total employment in 2022, including the top 5 large companies, two of which are branches. Looking ahead to 2023,[42] it is apparent that, although the number of people employed in the sector continues to grow (almost reaching 10,000), the rate of growth has slowed. According to already available data suggests that cybersecurity's area is coming to the fore not only in principle but also in practice: in 2023, 40 per cent more people were working in this sector than in 2022. And the share of data analysis has slightly fallen back.

3.2 SALES REVENUE AND PROFITABILITY OF THE DOMESTIC FINTECH SECTOR

Sector-wide sales revenue exceeded in 2022 HUF 310 billion, an increase of more than HUF 90 billion compared to last year. Despite the post-pandemic economic crisis, the domestic FinTech sector has tripled its sales revenue in the last six years (Chart 37), with the share of branches ranging between 15 and 19 per cent (17 per cent in 2022, HUF 46.3 billion). Five large companies accounted for one third of the market's sales revenue (HUF 111 billion) in 2022, four of them foreign enterprises. Of these firms, those operating in the data analysis area accounted for EUR 63 billion in revenue. Micro and small enterprises had a total income of HUF 77 billion. The median turnover of the companies was around HUF 350 million, while average turnover amounted to HUF 1.5 billion. Data analytics companies accounted for 36 per cent of the total sales revenue in 2022, while financial software development and systems integration, which represent the largest number of companies in the sector, accounted for 24 per cent. The increasingly focused

[42] Unlike the other data under review, employment information for 2023 is already available.

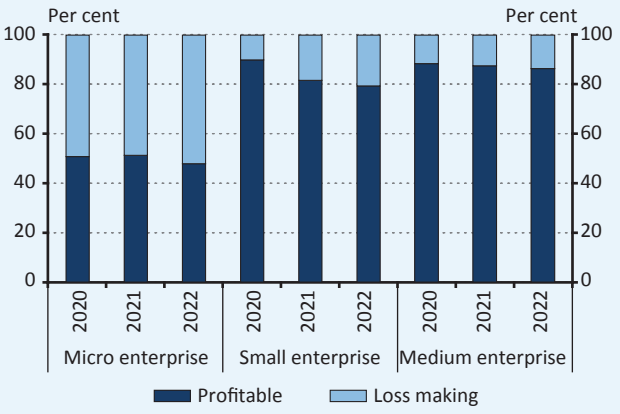
Chart 38
Breakdown by number of players in the domestic FinTech sector by year-on-year change in revenue and profit after tax



Note: The set of companies examined is the set of companies that have filed reports for two consecutive years. For this reason, companies reporting for the first time in 2022 are not included in the graph. Unlike last year, the change in profit after tax includes all companies, not just those that are profitable.

Source: NTCA, MNB

Chart 39
Distribution of profitable and loss-making companies in the domestic FinTech sector by size



Source: NTCA, MNB

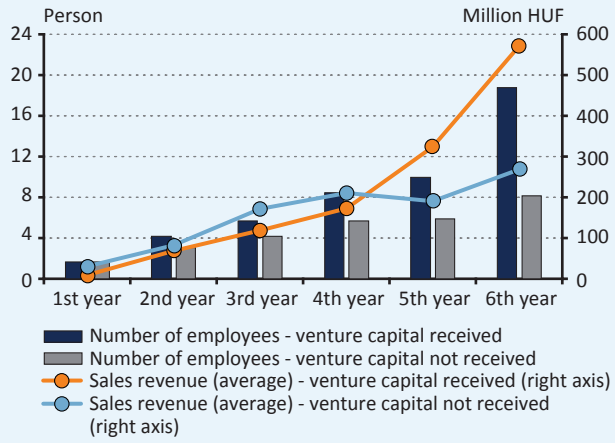
cybersecurity area added 5 per cent to the sector's total annual revenue, while the emerging blockchain services area added 1 per cent.

Further expansion is seen among firms with growing sales revenue (Chart 38). Firms with growing sales revenue were able to increase their income by an average of HUF 495 million, with a median of HUF 56 million. Most of these companies are engaged in financial software development and data analysis. Data analytics and blockchain services represent the area where most of the companies in this segment have increased their incomes compared to the previous year.

With a decline of one percentage point, companies with growing results are still in the majority in 2022 (Chart 38). Examining the profit after tax we can find that two thirds of the companies (67 per cent), were profitable in 2022, with a moderate but steady decline in recent years. Companies that were able to increase their profits compared to last year account for 58 per cent; they grew by an average of HUF 132 million, or a median of HUF 4 million. Evidently, therefore, although the market accumulated record sales revenues in 2022, it is less and less profitable. Five small and medium-sized enterprises generated 75 per cent of the sector-wide loss (HUF 15 billion). Two of these five companies are engaged in data analysis. The total profit of the sector amounted to HUF 40 billion, of which the top five companies (three of which are large and two of which are also engaged in data analytics) accounted for only 35 per cent of the total profit, demonstrating that while most of the loss is attributable to only a few companies, the profit is distributed more evenly across FinTech companies. In addition to financial software development, payment service providers represented the largest share of the growing companies, including the most successful lines of services. Blockchain providers, as an emerging sector, had the highest proportion of firms with declining revenues. Eight of the nine start-up FinTech firms started their operations at a loss, with a combined loss of HUF 200 million in 2022.

Among micro enterprises, there were more unprofitable than profitable firms in 2022, but a larger share of small and medium-sized enterprises were still profitable (Chart 39). Medium-sized enterprises accounted for 38 per cent of the total sector's profit after tax. The share of profitable small enterprises in the FinTech sector decreased somewhat compared to 2021, but it still stands at 80 per cent: small enterprises accounted for 15 per cent (HUF 3.7 billion) of the sector's total profit.

Chart 40
Average number of employees and sales revenue of FinTech companies by age and venture capital investment



Source: NTCA, Crunchbase.com, MNB

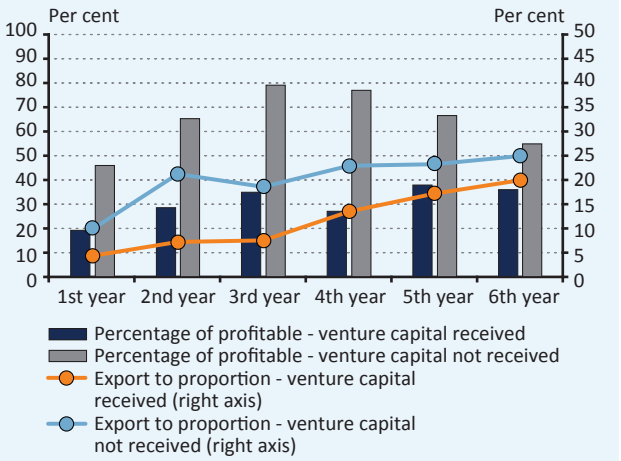
3.3 VENTURE CAPITAL INVESTMENT IN THE DOMESTIC FINTECH SECTOR

Venture capital financing[43] provides a real opportunity for selected start-up companies to implement their business plan/model as quickly and as comprehensively as possible[44]. As in last year's report, we review the operations of more than one hundred FinTech micro, small and medium-sized enterprises founded between 2014 and 2022, majority-owned by domestic companies, from the perspective of the availability of venture capital funding between their first and sixth year. We are investigating whether external, predominantly venture capital type financing changes the opportunities for start-ups in terms of their ability to grow faster than firms operating without external financing[45]. In the first six years of their lifecycle, almost 45 per cent of the enterprises under review received venture capital financing at least once. More than half of the enterprises under review received their first capital injection in the year of their establishment or the following year, i.e. at the very beginning of their lifecycle[46]. Accordingly, micro-enterprises predominate among the enterprises financed.

The average number of employees of venture capital recipients grows more dynamically at the beginning of the enterprise's lifecycle than for enterprises that did not receive external financing (Chart 40)[47]. The gap widens steadily over the first six years, driven primarily by the performance of particularly successful venture capital firms[48]. **Compared to the number of employees the sales dynamics have a different pattern and it is only from the fifth year does the average of companies that received venture capital exceed that of the other group[49].** The higher rate of headcount growth shows that building and retaining a competent and dedicated team is essential for the successful implementation of their business plan and product; however, this is quickly reflected in costs, followed – with some lag – by a dynamic increase in sales revenue.

[43] Funding from business incubators, accelerators or angels, as well as crowdfunding are also included.
[44] The main purpose of venture capital investments is to scale up and then sell businesses, which often requires financing for the accelerated growth process.
[45] We used data from the companies' annual financial statements to the NTCA and information on financing and networking (Crunchbase.com and OPTEN). We complement our similar analysis published last year by looking at the development path of the recipients of venture capital in their own right.
[46] Early-stage companies typically receive seed funding.
[47] We work with average values, which include the relevant values of both very successfully growing companies and those with stagnating growth paths.
[48] If the median values are considered, the two groups do not differ significantly in terms of employment.
[49] Turnover in this chapter means the sum of net sales revenues, other income and own-account capitalised production.

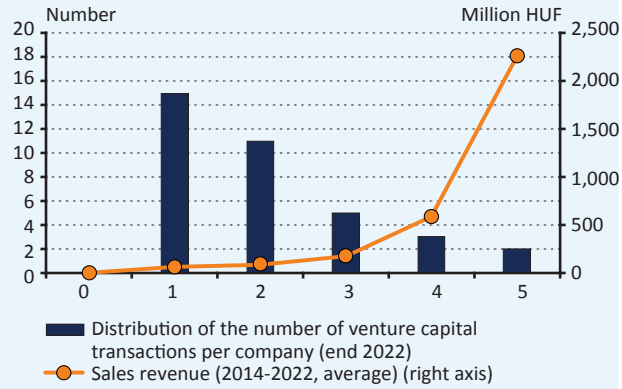
Chart 41
Proportion of profitable FinTech companies and exporters by venture capital investment



Note: Exporters are companies that realise at least 10 per cent of their net sales from foreign sales.

Source: NTCA, MNB

Chart 42
Distribution of financing transactions and revenue of FinTech companies receiving venture capital as a function of the number of venture capital transactions



Note: Average sales revenue is calculated by taking into account the current number of capital transactions in each year in the period of 2014–2022.

Source: NTCA, Crunchbase.com, MNB

The utilisation of the capital received in the start-up and scale-up phases generates an intensive growth phase, aimed at generating explosive revenue and profit growth and establishing goodwill in the long term, which inevitably results in loss-making operations during this period. Accordingly, there is a significant difference in loss/profit between the two FinTech groups under review (Chart 41). The difference peaks in the third to fourth year of operation and then gradually dissipates in later years of the lifecycle. The profitable/loss making distribution of the same enterprises before the first venture capital injection is not different from that of the FinTech firms that did not receive venture capital.

Operating at a loss is hard-wired into the way in which dynamically growing venture capital recipients operate, because the ultimate goal of the enterprises and their investors is to achieve breakout growth through niche exploitation or market acquisition, coupled with multiple venture capital injections under a viable business model. Multi-funded firms can also be considered as selected firms to which investors continuously inject fresh capital, which contributes to an exponential increase in sales revenue as the number of funding rounds increases (Chart 42). Even the fastest-growing businesses are often loss-making even in their fifth or sixth year of operation. The capital adequacy of venture capital-financed enterprises is close to that of non-financed firms, even though the former tend to have a significantly higher proportion of (persistently) loss-making firms and a significantly higher median loss.

Another important feature of FinTech start-ups is that the volume of export sales is slowly increasing with the age of the firm (Chart 41). Expansion abroad can accelerate the company's growth rate. The share of firms generating at least 10 per cent of their turnover through foreign sales is gradually increasing over the years, catching up with the average for firms that have not received venture capital.

Box 4
Factors associated with the growth path of FinTech start-ups

We rely on regression analysis to investigate the factors that might be behind the growth paths of start-up FinTech firms founded after 2010, which are predominantly domestically owned. The analysis is carried out on data pertaining to the period of 2011–2022, estimating linear models in a panel regression, where the dependent variable is the sum of sales revenue and personnel expenditure[50].

The growth path of a company may be influenced by a number of factors. Examples include the company's founding characteristics[51], the age of the company, whether and how it is financed externally, its financial situation, its scope of activities or whether it sells its products abroad. We capture the financial position and wealth of an enterprise using common indicators such as liquidity, (working) capital adequacy, level of capitalisation or capital efficiency[52].

Table 8
Regression analysis of factors associated with the growth paths of FinTech start-ups

	Dependent variable:		
	Sales revenue		Personnel expenditure
	Pooled OLS	Random effects model	Random effects model
Size	1.12***	1.17***	1.14***
	(0.08)	(0.10)	(0.12)
Working capital adequacy	0.01	0.001	-0.003
	(0.004)	(0.005)	(0.004)
Liquidity ratio	-0.0000**	-0.0000***	-0.0000*
	(0.0000)	(0.0000)	(0.0000)
Capital adequacy	0.0001***	0.0001***	-0.0001***
	(0.0000)	(0.0000)	(0.0000)
Capitalisation	0.0002	0.0002	-0.0000
	(0.0003)	(0.0002)	(0.0002)
Capital efficiency	0.0003**	0.0003*	0.0003*
	(0.0001)	(0.0001)	(0.0001)
Venture capital recipient	-0.50	-0.43	1.11*
	(0.32)	(0.39)	(0.46)
No. Of venture cap. Injections	-0.05	-0.12	-0.17
	(0.13)	(0.15)	(0.20)
Export ratio 80%–	1.15***	1.10***	0.42
	(0.24)	(0.30)	(0.48)
B2C	0.14	0.19	-0.31
	(0.31)	(0.32)	(0.40)

[50] The logarithm of sales revenue (net sales + other income + change in self-produced stocks) and personnel expenditure is examined because examining the growth rate of the sales revenue may be biased, especially at the beginning of a firm's lifecycle as enormous year-on-year changes are fairly typical at the start. We estimate random effect regressions because the Hausman test also supports this; moreover, their explanation is better than that of a similar fixed-effect model. In addition, in our case, venture capital recipients may perform similarly not only because these enterprises have received venture capital, but also because of unobservable random effects, management qualities and motivation, or employee skills.

[51] Whether the enterprise was owned by a company upon foundation or the number of the founders.

[52] Working capital adequacy: current assets – current liabilities as a ratio of total assets; capital adequacy: equity as a ratio of total assets; leverage: cash flow from business as a ratio of equity; liquidity ratio: ratio of current assets to current liabilities, capital efficiency: value added as a ratio of total capital.

Table 8
Regression analysis of factors associated with the growth paths of FinTech start-ups

	Dependent variable:		
	Sales revenue		Personnel expenditure
	Pooled OLS	Random effects model	Random effects model
Company-owned	-0.18	-0.19	-0.18
	(0.12)	(0.13)	(0.13)
Number of founders	-0.06	-0.20	0.11
	(0.28)	(0.31)	(0.38)
Random effect	no	yes	yes
Years/company age control	yes	yes	yes
Scope of activities control	yes	yes	yes
Number of observations	703	703	703
Adjusted R^2	0.60	0.54	0.47

**p<0.05; **p<0.01; ***p<0.001. The columns are independent regressions, estimated with a constant. Standard errors are clustered at company level. There is no cross-sectional dependence or autocorrelation between error terms in the models.*

Source: MNB

Overall, the results of the regression analysis indicate that neither the business-to-consumer focus nor the start-up circumstances are significantly related to company growth. Size (total assets) and company age are significantly positively related to the level of growth. Among the financial/capital position indicators, the level of liquidity is negative as expected (excess liquidity) and capital efficiency, which reflects the ability to generate revenue, is significantly positively related to both revenue and personnel expenditure.[53]

Depending on which variable is used to approximate company growth, there are significant differences in the significance of the explanatory variables. An export-oriented business model can help to increase sales revenue, especially for companies that generate the largest share of their sales revenue abroad, i.e. more than 80 per cent, as it is more difficult to rapidly ramp up sales revenue-based activities in a short time period solely in the Hungarian market.

There is mixed experience between the impact of venture capital financing and growth paths depending on which variable is used to approximate the latter. The sales revenue growth path of venture capital financed firms is not faster than that off the non-financed firms, but the growth path of funding recipients is clearly faster in terms of the growth of personnel expenditure. In other words, this dichotomy may be related to the fact that funding recipients focus primarily on selecting the right workforce rather than on increasing revenues, which may be a precondition for a higher rate of revenue growth later on. This is also supported by the fact that the growth path of firms receiving venture capital is slower on average in the early part of their lifecycle than in the other group (see Chart 40)[54]. Venture capital may make a positive contribution to the development of a FinTech company, overall, especially if it provides the financial backing for growth on a continuous basis, however, this takes a relatively long time and only slowly translates into a steady and rapid increase in revenue.

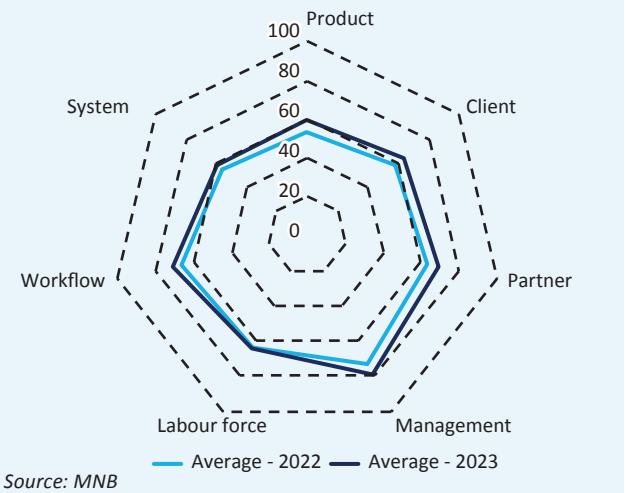
[53] High capital adequacy may be both an indication of prudence in terms of a business model that can be used to finance revenue-generating activities on an ongoing basis, and an indication that venture capital recipients are not sufficiently quick to utilise the capital received for growth.

[54] This is partly because these companies often hedge their bets and try to turn their business idea into revenue, and if they fail, they end up stagnating and often going out of business.

4 Digitalisation level of the Hungarian banking sector

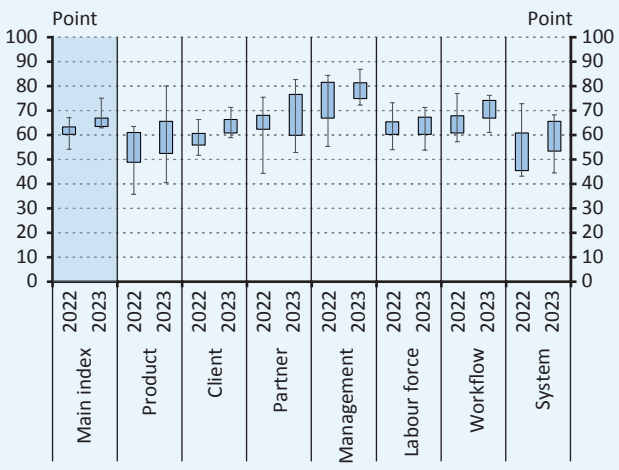
According to the results of the MNB's digitalisation survey covering more than 90 per cent of the domestic banking system in terms of balance sheet total, the digital maturity of Hungarian banks improved at an accelerating rate compared to the previous year. Some of the examined institutions have started to move away from the medium level of development, but the banking sector as a whole remains characterised by medium digital development. The average level of development has increased in each of the 7 pillars of the survey, and there has been significant progress in some cases. The leadership pillar, indicating managers' level of commitment to digitalisation, remains the most advanced pillar, with an average score that this year approached a high level of digitalisation. Significant growth was also seen in 2023 for the product, customer and partner pillars, demonstrating that the domestic banking sector's digitalisation efforts cover a wide range of banking operations. The greatest room for improvement remains in internal systems and the digitalisation of products and services, despite the important progress made this year in the latter.

Chart 43
Digitalisation development index of the domestic banking system by subcomponents



Source: MNB

Chart 44
Evolution of the scores by pillars and the total points of the digitalisation development index of the domestic banking system



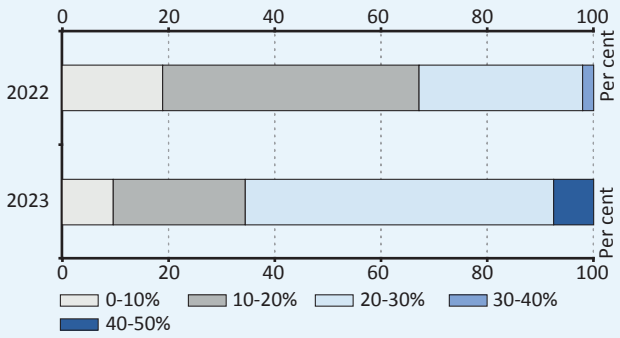
Note: The chart represents the minimum, the maximum, the lower and the upper quartiles, and the average values.
Source: MNB

4.1 DIGITALISATION OF THE DOMESTIC BANKING SYSTEM

According to the MNB survey, the digital maturity of the domestic banking system improved at an accelerating rate compared to the previous year. The MNB assessed the digital maturity of the domestic banking system for 2023 again, along 7 main pillars (Chart 43). The fifth edition of the survey covered more than 90 per cent of the domestic banking sector in terms of balance sheet total. The annual survey contains about 200 questions that provide a comprehensive view of banks' digital maturity. The majority of the questions remain unchanged from year to year, but as in previous years, some sections have been updated to provide an insight into the digital transformation in the banking sector, consistent with the latest trends in digitalisation.

As regards the digital maturity of banks, some of the examined institutions have started to move away from the medium level of development, but the banking sector as a whole remains characterised by medium digital development. The average composite index for 2023 exceeds 66, from the previous year's result of 62 reflects a significant improvement (Chart 44). Looking at the main index covering the level of digitalisation of the overall banking operation, it is encouraging that both the minimum and the maximum scores have increased significantly, showing that the banking system as a whole has made progress in terms of digitalisation. Looking at the individual pillars, we can see that the average level of development has increased in all cases, but there are also regressions in the minimum and maximum values, mainly due to the increasing digitalisation expectations and the changes in the MNB survey that tracks this process.

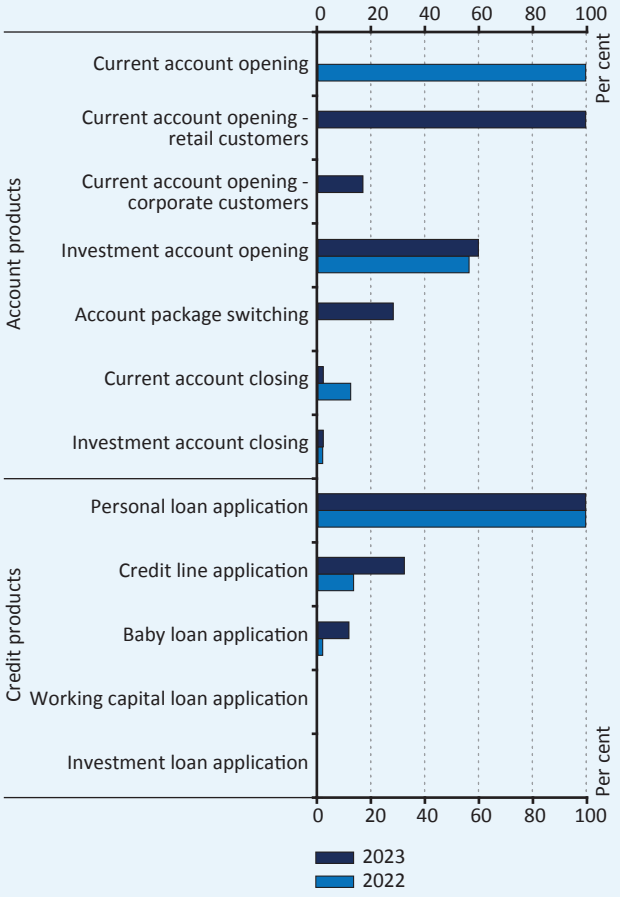
Chart 45
Ratio of revenues from digital product sales to total product sales



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

Source: MNB

Chart 46
Availability of digitally accessible products



Note: The weighting was done in proportion to the total assets of the institutions surveyed. In 2022 survey did not cover the account package switching; therefore, data for 2022 is not available. Customer-specific breakdown for current account openings is available from 2023.

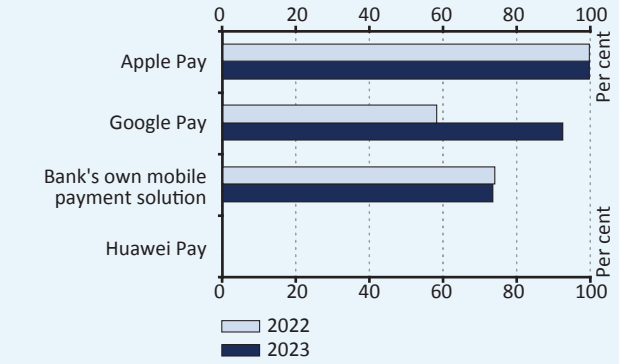
Source: MNB

In 2023, several pillars demonstrated major progress. Compared to last year, the largest improvements were seen in the product, leadership, customer and partner pillars, while the only pillar to stagnate was the labour pillar. Despite the improvement in the score of the products pillar it is still clear that the greatest room for improvement for domestic banks is in the digitalisation of products and services, alongside internal systems. It is encouraging that, based on the latest results, this has been recognised by the domestic banking sector, and significant progress has been made. Thus, in 2023, the lowest level of digitalisation was recorded for the system pillar, highlighting the need to modernise the internal systems of domestic banks. In terms of the score of the labour pillar, a deceleration was observed at sector level this year, despite the growing importance of developing the digital skills of workers as digital technologies and solutions become more widespread, which is essential to maintain long-term, knowledge-based organisational competitiveness. The most advanced pillar continues to be leadership, which has already approached a high level of digitalisation this year, showing a high level of leadership commitment to digital transformation.

4.2 DIGITALISATION OF INTERACTIONS WITH EXTERNAL STAKEHOLDERS

Retail clients are able to open current accounts and apply for personal loans through digital channels at all banks surveyed. In recent years, all domestic banks under review have developed their own online current account opening process. Several solutions have been introduced by institutions, with the selfie solution via mobile device proving increasingly popular, and several institutions have promoted it with various marketing campaigns during 2023, as shown by the increase in revenues from digital product sales (Chart 45). Examining client groups in more detail, while the opening of current accounts is already fully available digitally for households, it is less widespread in the corporate sector. There is a significant lag in this respect, with businesses often needing to deal with the process in person from the very first step, as most banks do not even offer the possibility to apply online to open an account. Digital account closure is still not a priority for any of the institutions in either client group. In the case of digital applications for credit products, there is also considerable scope for the development of corporate products, but in this respect, there is also a lag on the retail side (e.g. baby loans), despite the fact that personal loans have been available fully online for years at all banks selling the product (Chart 46).

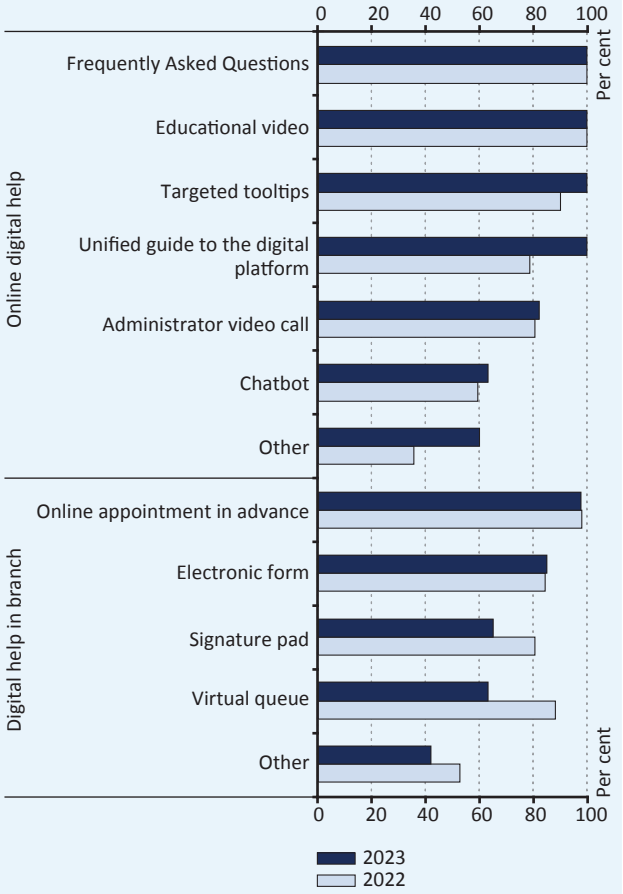
Chart 47
Availability of mobile payment solutions for payment accounts held at domestic banks



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

Source: MNB

Chart 48
Availability of digital assistance solutions for customers



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

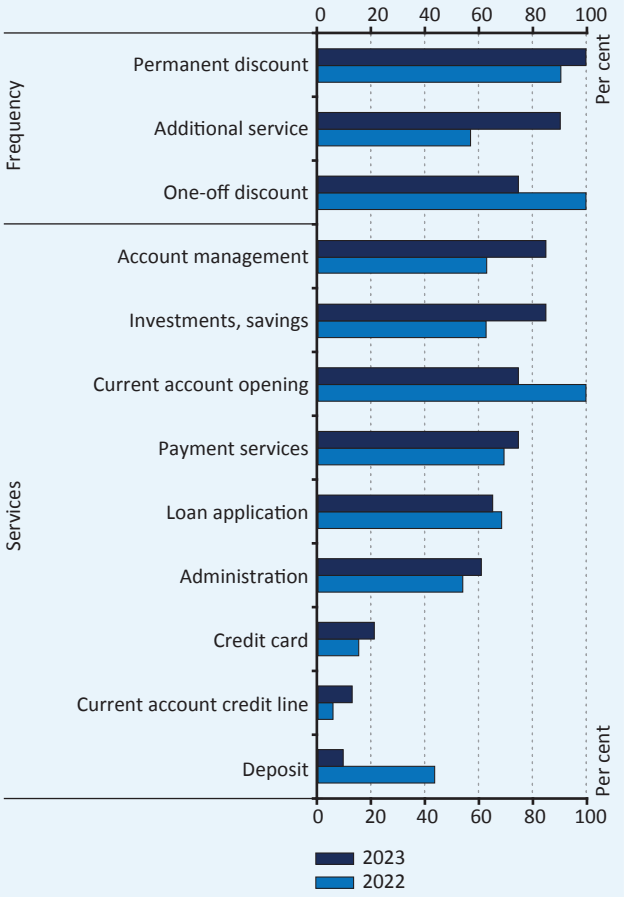
Source: MNB

The primary mobile approach of domestic banks essentially offer convenience to retail clients, while the development of internet banking interfaces is targeted at the corporate sector. As regards the progress of digitalisation product development, it should be stressed that domestic banks – in line with international trends – are primarily focusing on mobile banking interfaces, while the increasingly frequent regular updates include continuous feature enhancements and the improvement of the customer experience. At the same time, internet banking platforms remain essential for certain types of customers, especially businesses, and the development of internet banking interfaces is also on the agenda of institutions.

The two BigTech providers cover almost the entire domestic banking sector with their mobile payment solutions. In the context of digital payment solutions, the ability to integrate bank cards into mobile wallets was enhanced further in 2023. Apple Pay was available at all banks surveyed in 2023, as it was in 2022, and Google Pay made significant progress. At the same time, bank-developed customised mobile payment solutions are still available for a significant share of the sector, and may be considered for the development of a number of payment processes in the future (e.g. AFR-based, qvik QR code payments) (Chart 47).

Beyond the digitalisation of product applications, banks already offer a range of digital solutions to help customers navigate both online and in the physical space. By 2023, the majority of the online support functions examined by the MNB became available across the entire sector: clients do not only find general descriptions and guides, but also FAQs or tutorial videos on the internet platforms. In addition, MNB surveys show that banks are also making efforts to familiarise customers with the use of digital channels in their branch services. As banks' efforts are aimed at the increasing convergence of branch and online processes, a growing proportion of transactions in the branch are recorded digitally already, replacing paper-based solutions altogether. Although the data for 2023 show a regression in the penetration of some solutions in these categories, this may be mainly due to the merger process in the Hungarian banking sector, which is expected to have caused only a temporary slowdown (Chart 48).

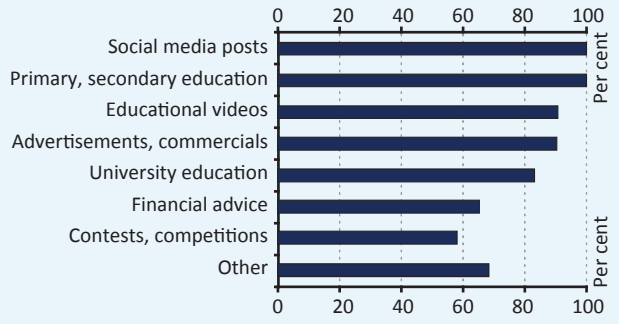
Chart 49
Application of pricing and other incentives for various digital banking products and services



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

Source: MNB

Chart 50
Banking tools to develop financial literacy and awareness



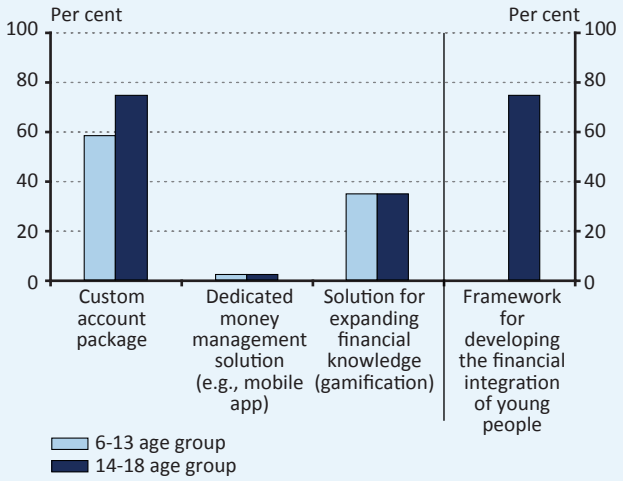
Note: The weighting was done in proportion to the total assets of the institutions surveyed.

Source: MNB

In order to promote digital client service, an increasing number of banks are using extensive incentive schemes. The growing presence of pricing and other incentives is aimed at developing more regular digital connections, which will also contribute to increasing digital sales revenues. In terms of incentives, digital banking is no longer primarily supported by one- off/ ad hoc discounts; banks have moved towards permanent discounts, and we have seen significant progress in 2023 in providing additional services in respect of online customer interfaces, while the focus on user experience is also expanding the features available to clients in the digital space (Chart 49). In response to the competition generated by the neobanks, more and more institutions are offering convenient digital currency account opening and low-margin currency exchange services in Hungary, with incentives and discounts. Client service also sees the introduction of automated solutions, both by sending personalised messages and notifications and by automating the administration process. However, the application of pricing incentives remains inconsistent across product lines and the focus in this respect continues to change from year to year, depending on the current product sales targets of some institutions.

Over the past year, banks have made significant steps forward to promote financial literacy among their clients. While the institutions under review continue to use social media platforms to disseminate financial education, there have also been significant improvements in school settings. Participation in primary and secondary education was a priority for all banks, and progress was also made in university-level initiatives (Chart 50). By reaching out to secondary school and university students, banks aim to equip young people with basic financial literacy skills to help create a generation of financially literate adults, and to develop a potential client base that is more confident in using an ever wider range of banking services. In educational institutions, a strong emphasis was also placed on the distribution of educational videos to provide access to financial information through alternative channels that are more popular with the age group.

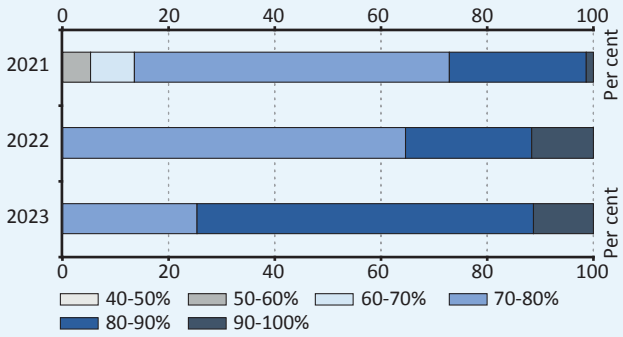
Chart 51
Solutions supporting the development of financial awareness and integration among young people



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

Source: MNB

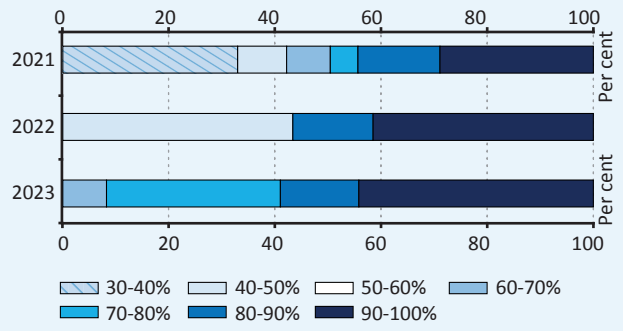
Chart 52
Proportion of retail clients receiving regular monthly bank statements in electronic format



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

Source: MNB

Chart 53
Proportion of corporate clients receiving regular monthly bank statements in electronic format



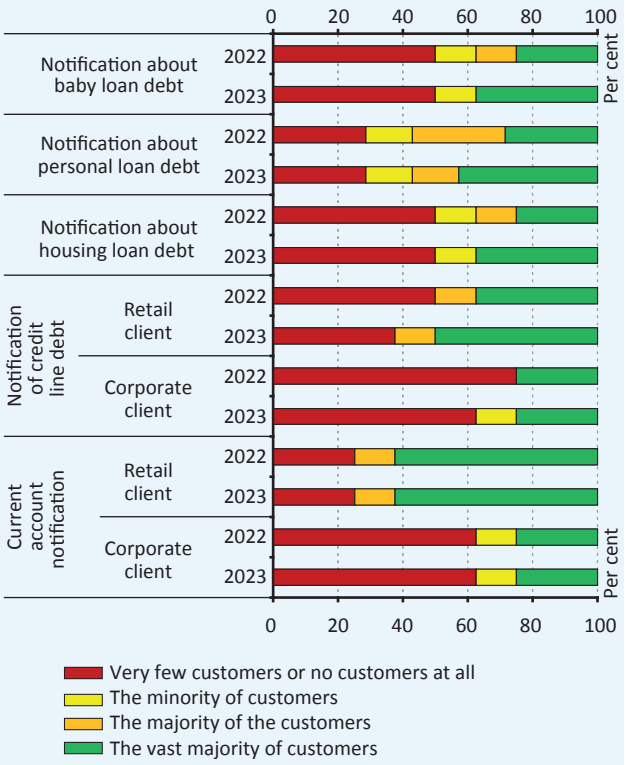
Note: The weighting was done in proportion to the total assets of the institutions surveyed.

Source: MNB

More than three quarters of domestic banks now also target young people. In addition to their presence in the education system, banks are trying to develop an active relationship with young people through various services. In particular, individual account packages have been developed with a focus on the 14–18 age group, but almost 60 per cent of them now also offer solutions for primary school pupils. Although dedicated mobile apps for young people have already appeared in the offer of domestic banks, they have not yet been widely adopted. In contrast, more than a third of the sector operates gamification platforms to make the user experience more interactive and the learning process more engaging, which, in addition to financial literacy, also promotes more informed money management among young people (Chart 51).

The proportion of both retail and corporate customers receiving regular monthly bank statements in electronic format has increased significantly. The vast majority of domestic banks had already implemented a wide range of incentives to support digital customer service in 2022, and this was still the case in 2023. This has laid the groundwork for further growth in the popularity of electronic bank statements, which are now taken for granted by large part of the retail client base (Chart 52). At the corporate level, a great step was taken forward in 2023, when most bank statements were sent to clients electronically (Chart 53). At the same time, the number of banks where electronic bank statements are widely accepted has not increased significantly, neither at retail nor at corporate level.

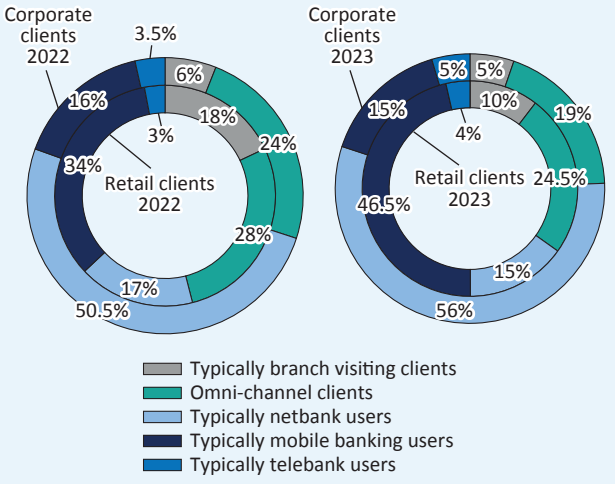
Chart 54
Proportion of bank clients receiving digital notifications about their loans



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

Source: MNB

Chart 55
Distribution of retail and corporate customers by channel usage



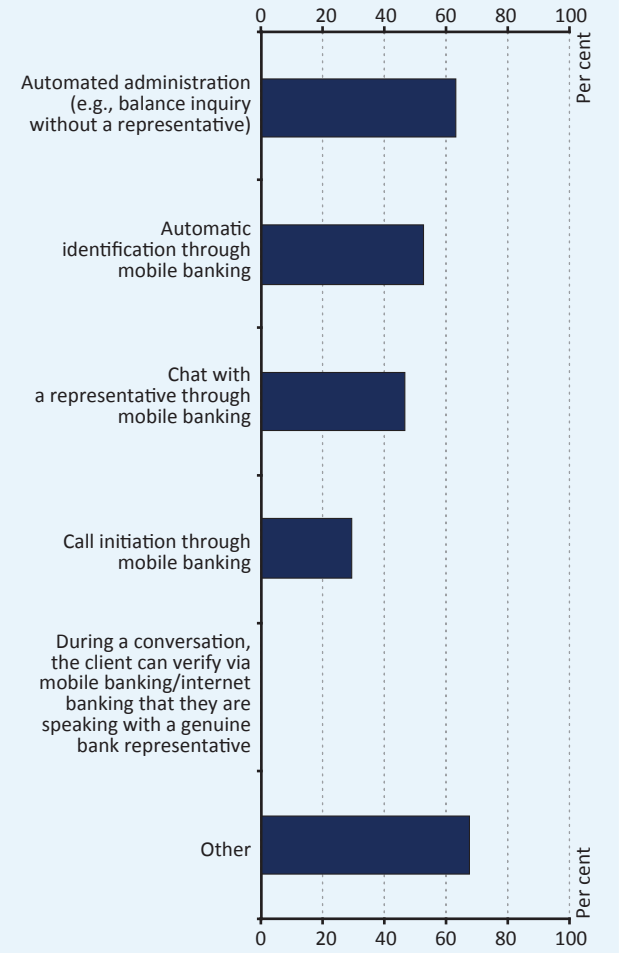
Note: Based on the banks' self-declaration, in proportion to the total number of customers.

Source: MNB

For retail credit products, the share of digital notifications continued to rise. In 2023, the number of clients who received digital notifications of their outstanding retail credit debt increased, but they were clients of banks that had been digitally connected already. In addition, the number of banks that do not support digital notifications did not change. Similarly, no significant improvement was seen in relation to companies, with clients receiving mainly paper-based notifications of their outstanding borrowing, which may be partly attributed to the fact that credit products are less standardised in this segment (Chart 54). In terms of the channel for digital notifications, besides netbanking, the use of mobile banking also increased. In addition, there was significant progress in the real time traceability of housing loans. This transparency may assist clients further in understanding the lending process, and for banks, automating the process improves operational efficiency and frees up resources to perform more complex tasks.

For retail clients, the use of mobile banking channels increased in 2023, while for the corporate clientele reliance on the online banking channels increased. In the retail segment, the use of internet banking did not decrease significantly, despite the expansion of mobile banking functions, for ergonomic reasons on the one hand, and on the other hand, many functions are only available through this channel (Chart 55). Omni-channel service continues to be important, while the number of clients visiting a branch only in person decreased. In terms of the function of the branches, the advisory role is increasing, while the administrative role is decreasing. To support this transition, many banks are strategically developing virtual contact through a verified phone number, an in-app call or even a video call, providing a smoother customer experience, faster processes and more cost-efficient operations. All of these efforts are in line with the need to develop an ever-expanding digital customer journey. Among corporate clients, netbank remains the most popular channel – with a slight increase –, while the share of mobile banking showed a moderate decline, despite the fact that several mobile banking features were added last year, especially in the small enterprise sub-segment.

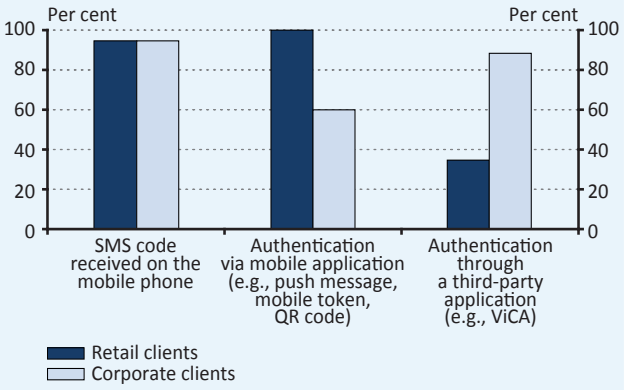
Chart 56
Availability of digital solutions for call centres



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

Source: MNB

Chart 57
Availability of internet banking authentication solutions during administration

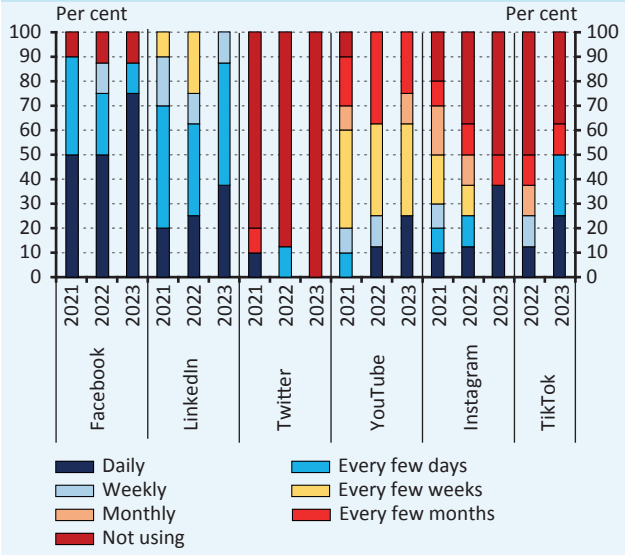


Note: The weighting was done in proportion to the total assets of the institutions surveyed.

Source: MNB

An increasing number of banks are developing administrative support through the mobile app. The convenience and practicality of digital access is manifested in automated administration (e.g. by querying balances, statements), but in order to administer more complex processes and maintain trust based on personal contact, the goal of domestic banks is to develop secure in-app communication (Chart 56). Mobile banking authentication is prevalent in the retail segment, while third-party authentication via an application is prevalent in the corporate segment, and authentication via SMS codes is still used in both cases (Chart 57).

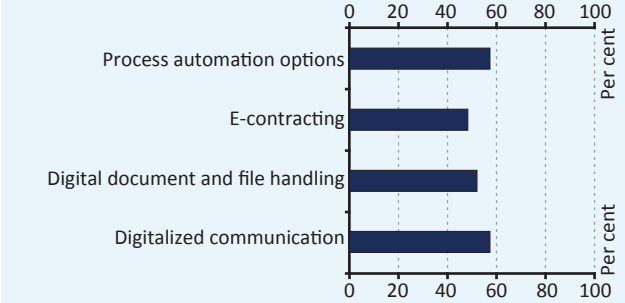
Chart 58
Frequency of use of some social media interfaces among domestic banks



Note: In the proportion of respondents.

Source: MNB

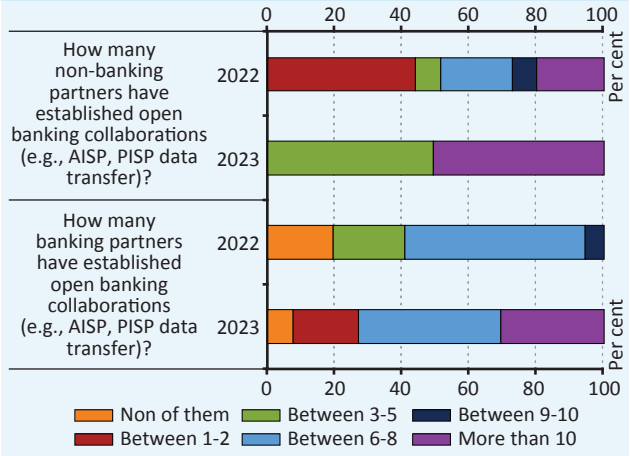
Chart 59
Consideration of digitalisation aspects when renewing supplier contracts



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

Source: MNB

Chart 60
Prevalence of open banking partnerships categorised by type of partner



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

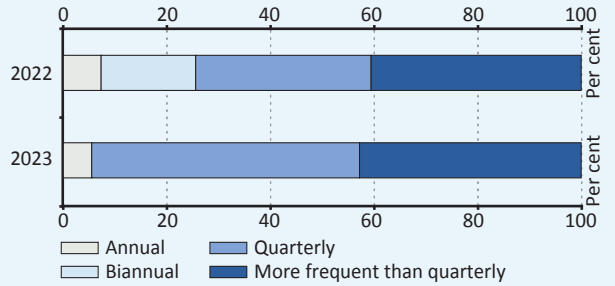
Source: MNB

There is strong brand building in the competition between banks, supported by a greater social media presence than in the previous year. In the past year, efforts to engage younger generations led to increased activity on social media by banks. For all popular platforms, we observed more campaigns and posts, but the self-reported totals show no change in media spending in this area, nor an increase in the number of social media teams (Chart 58).

For domestic banks, the degree of digitalisation of the partnership when renewing supplier contracts is an increasingly important consideration, which may bring about a significant change in the way in which business relationships are managed. Digital solutions may increase efficiency, reduce costs and improve the transparency of collaboration processes (Chart 59). Recognising this, nearly 60 per cent of banks are already considering process automation and digitalised communication, while around half are also taking advantage of e-contracting and digital document management. This trend demonstrates that in today's business world, digitalisation is no longer a competitive advantage only; it has become a fundamental expectation. The automation of processes linked to partnerships may reduce the risk of human error while increasing efficiency; digital communication enables faster and smoother communication, and digital document management not only reduces the burden of paper-based administration but also contributes to environmental sustainability.

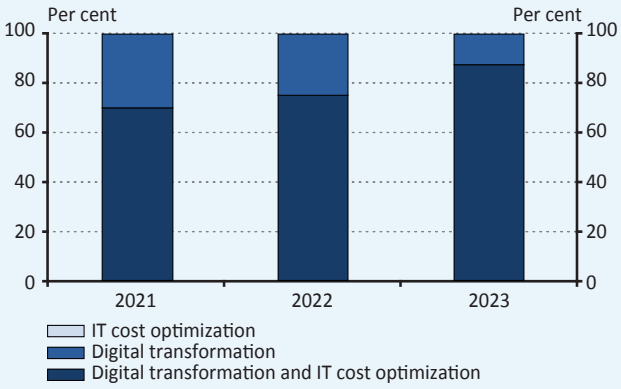
Open banking cooperation agreements are increasingly common among banks, both with bank and non-bank partners. In 2023, 30 per cent of the banking sector already has at least 10 banking partners supporting open banking, and more than 50 per cent also has non-bank partners (Chart 60). These collaborations support the secure sharing of financial data in a regulated environment, creating new opportunities to develop personalised financial services, introduce innovative solutions and improve the user experience. The increase in the number of such agreements shows that domestic banks have recognised that the future and competitiveness of the financial sector is based on cooperation and innovation.

Chart 61
Frequency of comprehensive development needs assessment



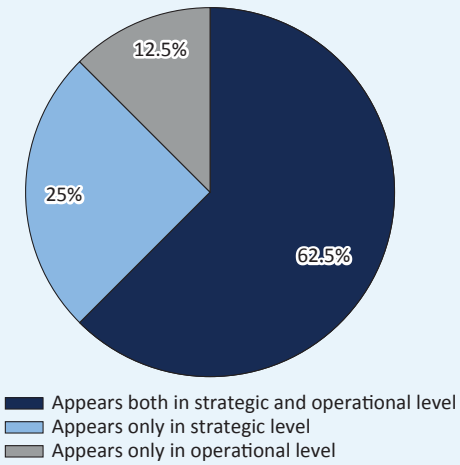
Note: The weighting was done in proportion to the total assets of the institutions surveyed.
Source: MNB

Chart 62
Main focus areas of institutional strategies regarding implementation of digital transformation



Note: The weighting was done in proportion to the institutions surveyed.
Source: MNB

Chart 63
Existence of principles and methodologies for the implementation and operation of artificial intelligence-based solutions in the domestic banking sector



Note: The weighting was done in proportion to the institutions surveyed.
Source: MNB

It has become standard practice in the banking sector to conduct a regular and comprehensive assessment of development needs, which provides the means for a proactive identification of development opportunities and supports innovation. In 2023, nearly all banks assessed development needs at least quarterly or more frequently, compared to a quarter of banks that did so only semi-annually or annually a year earlier (Chart 61). A frequent and comprehensive assessment of development needs enables banks to respond quickly to market changes, client needs and technological developments. Internal development needs support more efficient operations and workflow optimisation, while external development needs from clients may focus on introducing new products and services and maintaining competitiveness.

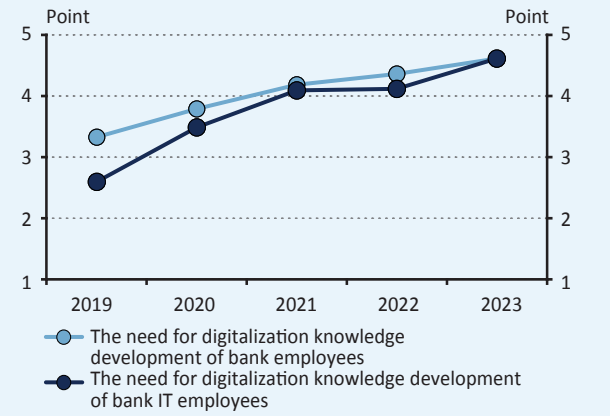
4.3 PREPAREDNESS OF MANAGEMENT AND EMPLOYEES

All banks have made further, comprehensive digitalisation a priority in their strategic objectives for the medium and long term. In recent years, the financial sector has undergone a significant transformation, driven by a digital approach in line with global trends. To support this process in Hungary, the MNB also issued a recommendation on the digital transformation of credit institutions[55], which required stakeholders to prepare a comprehensive digitalisation strategy. This strategy is reviewed at least annually by the incumbent institutions, and even more frequently, on a quarterly basis, for three quarters of the sector. The high level of leadership commitment remains unchanged, with the banks' Chief Digital Officer (CDO) being a board member at all banks. In parallel with the digital transformation process in the sector, there is an increasing focus on improving the efficiency of IT operations (Chart 62). Increased recognition of digitalisation tasks is also increasingly being reflected in the performance assessment and reward systems of the institutions.

Banks are increasingly focusing on exploring the potential of AI-based solutions. The burst of Generative AI has also had a significant impact on the functioning of the financial sector: the Hungarian banking sector has responded to the AI revolution, but the depth of the response varies widely. Some of the institutions have chosen a strategy of "wait and see" and gathering information, while others are already actively researching, using and even developing the services enabled by the different forms of AI. Two-thirds of domestic banks are considering the potential of AI at both strategic and operational levels (Chart 63). Institutions that address AI at an operational level already, have also

[55] Recommendation No 4/2021 (III. 30.) of the Magyar Nemzeti Bank on the digital transformation of credit institutions. Download link: https://www.mnb.hu/letoltes/4-2021-dig-transzformacio.pdf

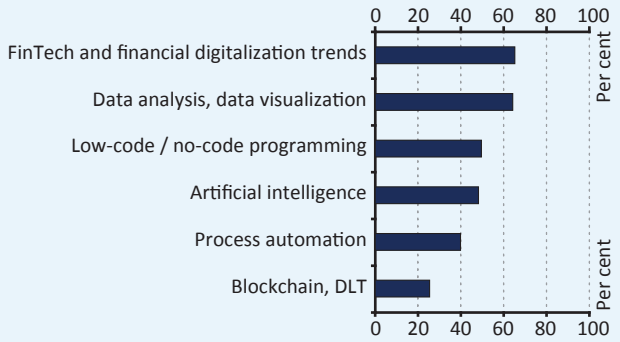
Chart 64
Need for digitalisation knowledge development based on the self-declaration of domestic banks (2019–2023)



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

Source: MNB

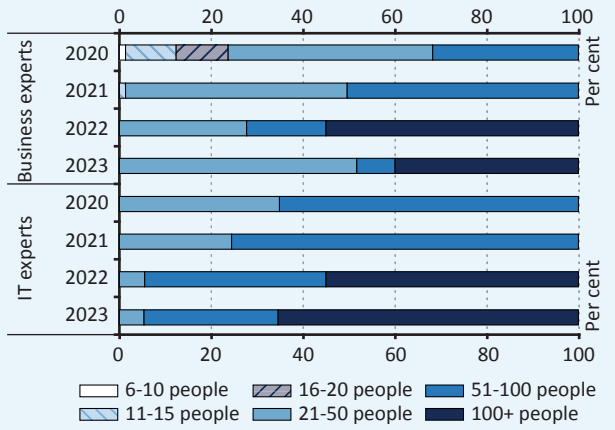
Chart 65
Prevalence of widely available training systems for employees on individual topics



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

Source: MNB

Chart 66
Distribution of employment of IT and business experts in banking digitalisation areas (2020–2023)



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

Source: MNB

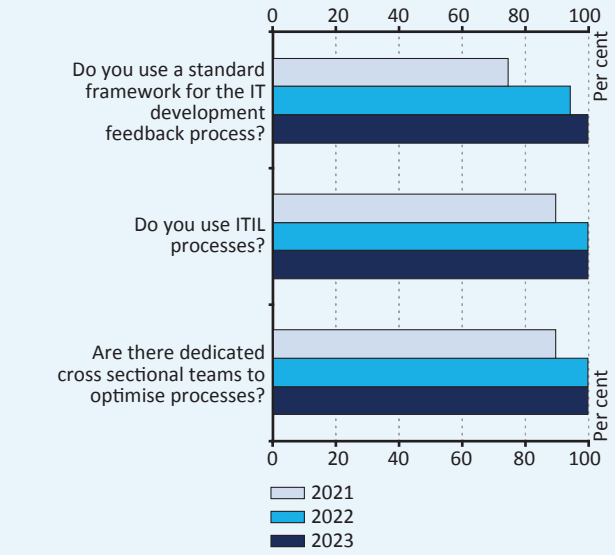
set up dedicated teams to research and develop AI-based solutions. In contrast, banks have yet to place similar emphasis on other promising innovative technologies (e.g. blockchain, DLT-based solutions).

After a short period of stagnation, the demand for digital skills development is growing again. With the constant evolution of technology, keeping employees' knowledge up-to-date is essential for banking institutions. This is also becoming increasingly important in their own assessment (Chart 64). Evidently, this need is constantly growing in line with the progress in digitalisation. The emergence of new technologies in recent times may be behind the self-reported need to enhance the skills of both IT and non-IT personnel.

For the time being, digitalisation training systems are less technology-specific. Institutions are increasingly aware of the need to develop the digital skills of their employees, typically on 1 or 2 occasions a year. Increasing training opportunities for people working in the sector will enable banks to keep pace with the constantly changing needs and technological possibilities. Accordingly, areas such as FinTech and financial digitalisation trends, or data analytics and data visualisation are already available training areas for more than two thirds of the sector (Chart 65). However, the typically more innovative, mainly technology-focused topics are even less widespread. Knowledge transfer forums are held for new employees in all cases, and senior personnel is given the opportunity to train their employees at least once, but preferably several times, a year.

IT experts are the majority of employees working in digitalisation areas in banking. We saw a decline in 2023 in the number of specialists working in business roles (Chart 66). Cost optimisation in the ongoing organisational transformation in the banking sector resulted in a reduction in the employment of business staff responsible for digitalisation. In contrast, other – smaller – players put more focus on digitalisation and increased their workforce in both business and IT roles. The sector as a whole is increasingly attracting IT workers.

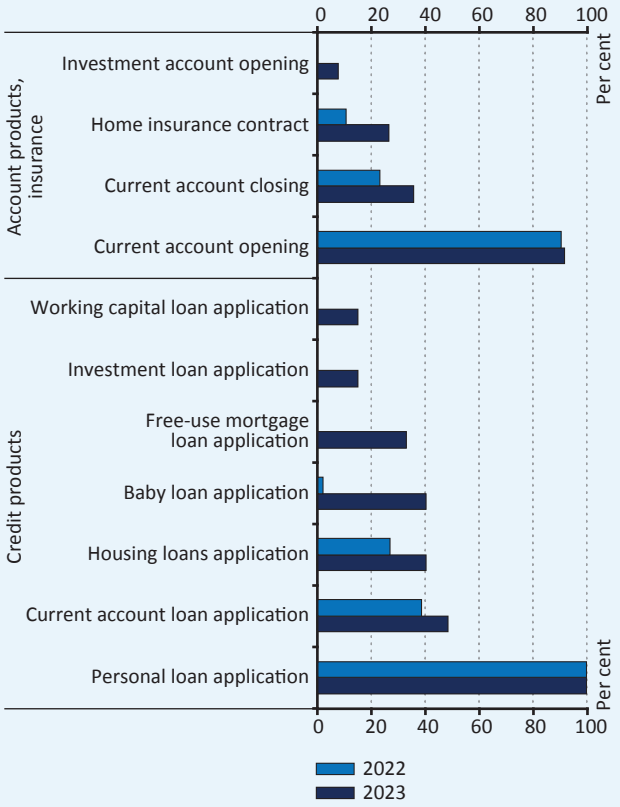
Chart 67
Prevalence of solutions reflect an innovative process approach



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

Source: MNB

Chart 68
Extent to which the complete digitalisation of processes is achieved within the value chain for specific products



*Note: The weighting is based on the ratio of the total balance sheet of the institutions examined. . *The 2022 survey did not inquire about application for home equity loans yet.*

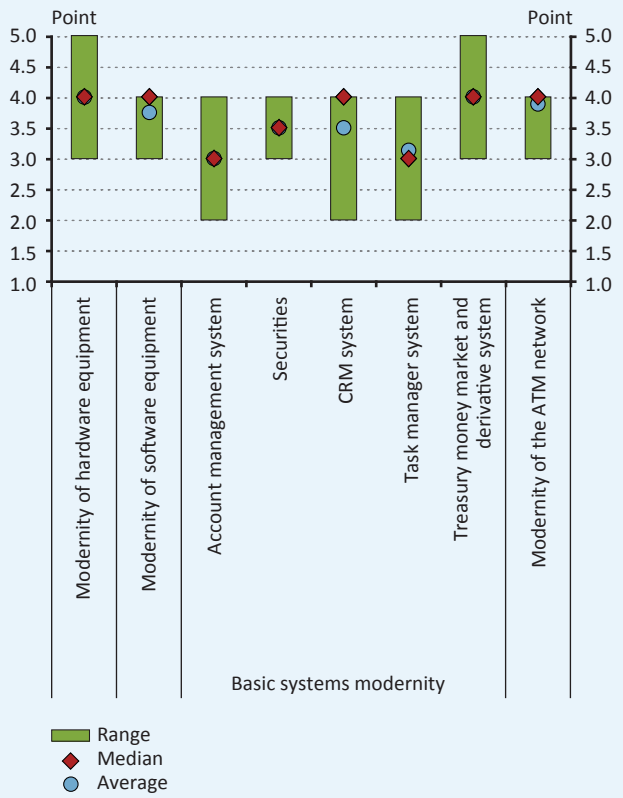
Source: MNB

4.4 DIGITALISATION OF INTERNAL OPERATIONS

In the Hungarian banking sector, the use of innovative process-oriented solutions has become commonplace. IT improvements are backtested in accordance with standard frameworks. The use of ITIL processes is widespread, not only facilitating communication between different disciplines, but also ensuring transparency in service delivery (Chart 67). As a result, a significant increase in efficiency is expected in the IT development of the Hungarian banking sector. The creation of dedicated cross-functional development teams to optimise processes has also become commonplace. These teams integrate representatives from different areas, such as product and business development, sales, marketing and IT development, to bring a user-oriented approach to banking.

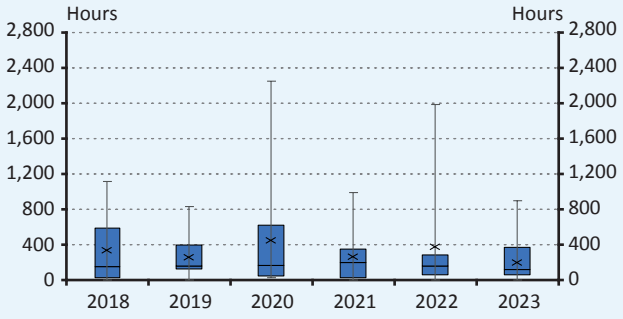
In domestic banks, the full digitalisation of value chain processes is becoming more and more common, with a number of banking products and services making significant progress in the digitalisation of related internal processes. Similar to last year, the end-to-end digitalisation of personal loans and current account opening was almost universal in the banking sector, but there were notable developments in several other products (e.g. baby loan, home loan, home insurance contract, current account closing). In addition, the digitalisation of internal processes for corporate products (e.g. working capital loans and investment loans) started in 2023; consequently, a wide range of banking products and services are now characterised by digital back-end processes (Chart 68). In parallel, paper-based documentation was reduced for many products, speeding up processes and increasing transparency. These changes demonstrate that the internal digitalisation of the Hungarian banking sector is not only characterised by technological development, but also by strategic transformation. Banks are increasingly focusing on the full digital transformation of the underlying processes of their extensive product and service portfolios, as opposed to partial process automation across an ever-increasing proportion of the product range.

Chart 69
Assessment of the modernity of bank's equipment as well the basic systems based on the self-declaration by the institutions



Note: On a scale of 1 to 5, 1 – most obsolete, 5 – most modern.
Source: MNB

Chart 70
Evolution of aggregate service disruptions due to incidents reported by large domestic banks



Note: The chart represents the minimum, the maximum, the lower and upper quartiles, the median and the mean values. In case of the mean, the weighting was proportional to the number of respondents. The data exclude outliers where no incident arose on the bank side.
Source: MNB

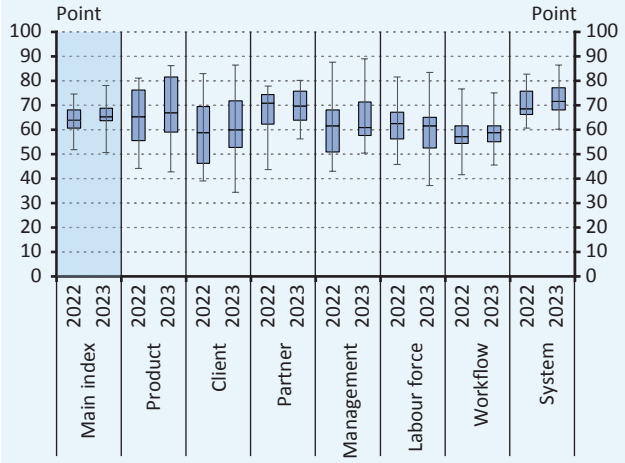
There is significant divergence among domestic banks in the modernity of core banking systems. The equipment base of domestic banks, as well as the modernity of their core systems, also need to be improved according to their own assessment; however, there has been no significant improvement compared to recent years (Chart 69). An outdated technological infrastructure may lead to slower and less reliable operations, which have a negative impact on efficiency and client service quality and may be a barrier to the next steps in technological development. Account management, securities, CRM, collateral management, treasury, money market and derivatives systems play a fundamental role in the internal operations and day-to-day activity of banks, yet in the Hungarian banking sector several institutions rated the modernity of these core systems as extremely low.

The median value of total service disruptions due to incidents reported by domestic banks has been falling steadily for three years. Uninterrupted access to services improves client satisfaction and boosts trust; it is therefore an optimistic sign that total median service disruptions for the banking sector in digital customer interfaces decreased from 157 hours in 2022 to 111 hours in 2023 (Chart 70). In parallel, the average loss of service also dropped to a half in 2023 compared to the previous year, reflecting banks' more effective protection and recovery capabilities. The increasing availability of continuous, 24/7 digital services in more and more areas is coupled with growing cybersecurity challenges, both from the side of the bank and of the client, and it is therefore an important task for the Hungarian banking sector to improve the reliability of their digital platforms through targeted improvements.

5 Digitalisation level of the Hungarian insurance companies

According to the results of the digitalisation survey conducted by the MNB in the domestic insurance sector, covering 90 per cent of the sector in terms of gross premium income, the digitalisation level of domestic insurers has stagnated in the recent period. The digital channel has been extended in several cases and institutions have started to diversify their platforms: both client portal and app functions are increasingly available to clients, but many institutions still lack of digital administration. Beyond the digital accessibility of retail property insurance products, there has been no significant progress in the digitalisation of other sector-specific products. For existing product ranges, the shift towards the use of digital channels is promoted by operators through the use of personalised, direct pricing incentives. The majority of institutions prepare and regularly review their digitalisation strategies, but a dedicated representation of digitalisation in decision-making is not yet common. The emergence of innovative technologies may also have a significant impact on the insurance sector, for which some institutions are preparing by setting up training courses or dedicated domains; however, at present these are the exception rather than the majority. The digitalisation of process management and the automation of individual processes has started in the sector, but the progress is slow. In the institutions' own assessment, their internal systems and equipment are adequate to meet expectations but need to be upgraded in the near future to meet continuously increasing client expectations and to optimise IT processes.

Chart 71
Evolution of the scores by pillars and the total points of the digitalisation development index of the domestic insurance sector



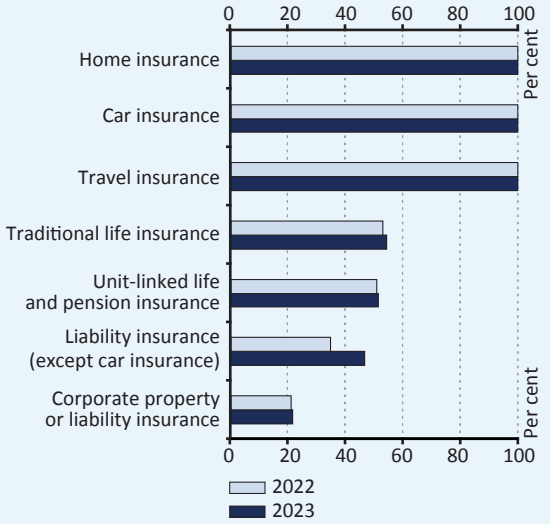
Note: The chart represents the minimum, the maximum, the lower and the upper quartiles, and the median values.
Source: MNB

5.1 DIGITALISATION OF DOMESTIC INSURANCE COMPANIES

As well in 2023 the MNB assessed the digital maturity of domestic insurers. The digitalisation-focused questionnaire contains nearly 200 questions based on 7 pillars, provides a comprehensive view of the preparedness and digital engagement of the insurance sector and the level of digitalisation of insurance products and back-office processes. Each year, the survey covers more than 90 per cent of the domestic insurance market based on gross premium income, providing up-to-date and representative information on the digitalisation of the sector.

In 2023, the domestic insurance sector exhibited moderate progress in most of the pillars surveyed. With the MNB's growing expectations for digitalisation, the sector improved from a score of 64 in 2022 to an average development level of 65 in 2023 (on a 0 to 100 scale), which translates to a rather small improvement (Chart 71). Increasing tax burdens on the insurance sector have put pressure on the profitability of the institutions, while at the same time slowing down the development of digitalisation somewhat. Among the institutions under review, there is no insurer that scored worse than its digital maturity score of the previous year. In addition, large insurers covering a broader range of products continue to dominate the top quartile of the digital maturity headline index, while the convergence of lower-scoring laggards is subdued. Due to the increase

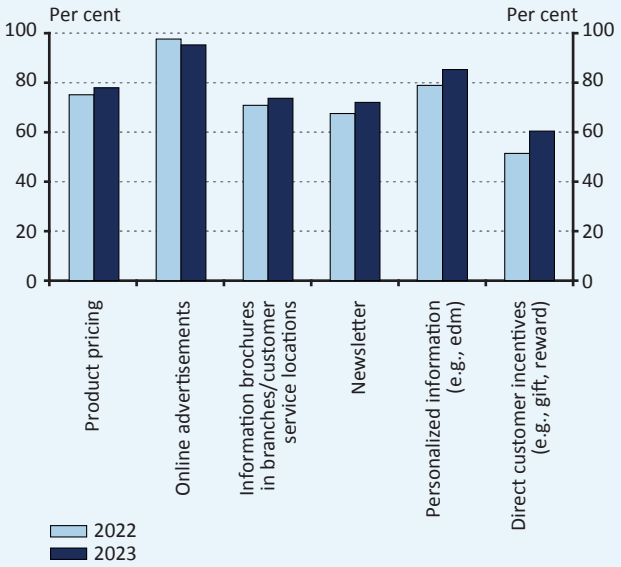
Chart 72
Availability of digitally accessible insurance products



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

Chart 73
Prevalence of tools applied to encourage the use of digital solutions



Note: The weighting was done in proportion to the gross premium income of the institutions surveyed.

Source: MNB

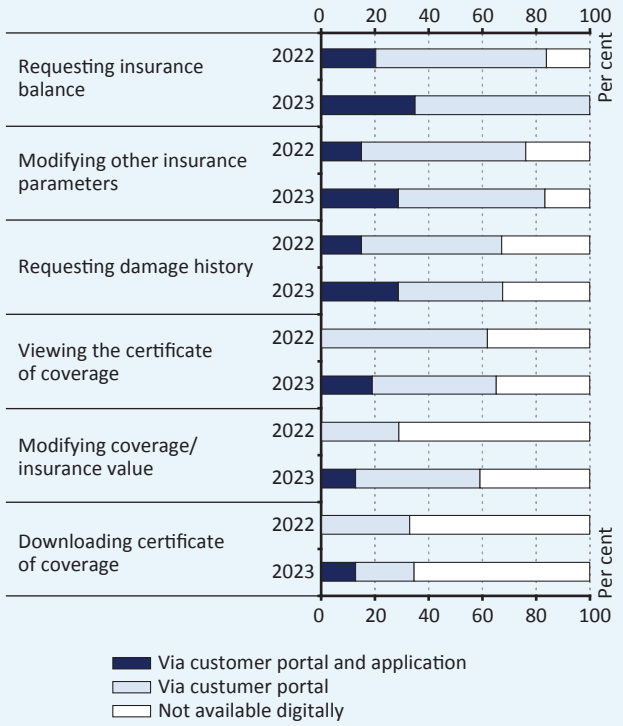
in the expected level of digitalisation, a moderate decline is observed in the sector's median score for the labour and system pillars, while stagnation or slight increases are seen in the other areas. Based on the self-assessment of insurers, the decline in the median value of the system pillar indicates that insurers consider their hardware and software equipment to be basically adequate but less up-to-date than a year earlier. For the labour pillar, the decline was due to less emphasis than expected on developing the digital skills of IT and other workers and on innovative training opportunities. Convergence is significant in the partner, leadership and system pillars, where institutions that were previously lagging behind are now approaching the median. The only pillar where we see a decline in the maximum value is the workflow pillar, despite the median showing a relatively large increase compared to 2022.

5.2 DIGITALISATION OF INTERACTIONS WITH EXTERNAL STAKEHOLDERS

Digital access to insurance products has not improved among Hungarian insurance companies. The digitalisation of retail property insurance products and travel insurance remains the most advanced. No significant progress has been made in the areas of personal life insurance and corporate insurance; in the case of the latter, only a change in the relative weighting of institutions offering the products indicates some improvement. There is a moderate increase in liability insurance; however, this is not considered to be a trend for the time being (Chart 72). In general, the gap between small and large insurance companies is significant in the sector, and institutions with a smaller premium income show no sign of catching up in digitalising their product portfolios.

Domestic insurers have broadly expanded the toolkit applied to promote the use of digital solutions. Insurers continue to attach importance to serving their clients in the digital space, so they used primarily online advertising as well in the last year. In addition to that, the largest increase was observed in the use of personalised information and direct client incentives, which reflect the personalisation efforts also present in banks (Chart 73). The online presence of insurers on social media showed a slight increase on almost all the platforms under review (LinkedIn, YouTube, Instagram), with an increase in the number of insurers on TikTok, but a moderate decline in Facebook activity.

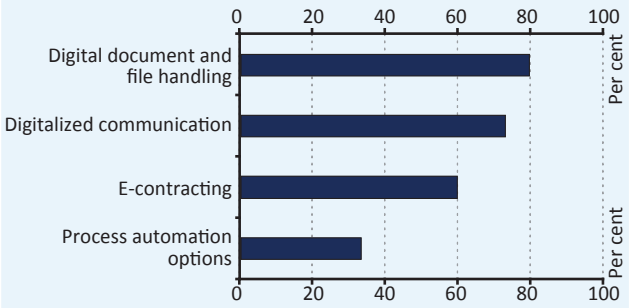
Chart 74
Availability of administrative functions for existing clients on insurance digital interface



Note: The weighting was done in proportion to the gross premium income of the institutions surveyed.

Source: MNB

Chart 75
Consideration of digitalisation aspects by insurers when renewing supplier contracts



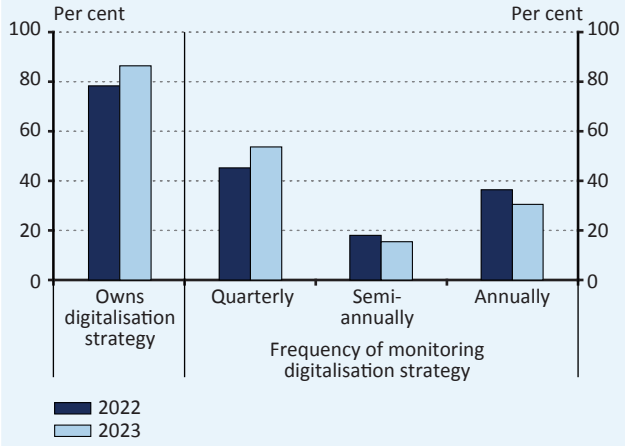
Note: The weighting was done in proportion to the number of institutions surveyed.

Source: MNB

In several cases, the digital channel has been expanded. In previous years, we have seen only marginal changes in the online accessibility of different administrative functions, but in 2023, we observed a significant improvement. The greatest improvement was the introduction of in-app insurance administration, which was available last year for all the features included in the survey. However, the app-focused development was not universal across all players, as most insurers using the solution had a customer portal already. This phenomenon also shows that there has been no convergence by the less digitally active companies, and their lag appears to be persistent (Chart 74).

When building partnerships, insurers are already putting digital processes at the forefront. In examining the digital maturity of the Hungarian insurance sector, the digital interaction of insurers with their external partners stands out of the pillars of the sector. In contrast to their internal processes, for external stakeholders, more than 70 per cent of the institutions communicate digitally wherever possible (Chart 75). For insurers to communicate successfully with their partners, it is important to use online platforms effectively, to use digital tools and to maintain stable and continuous communication channels. For 80 per cent of the insurance sector, digital document management and filing is also a particularly important aspect when renewing supplier contracts.

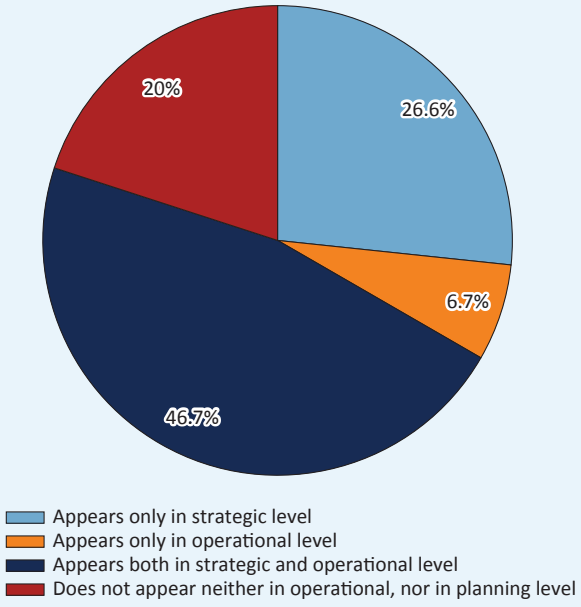
Chart 76
Availability of digitalisation strategy and frequency of reviewing within the insurance sector



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

Source: MNB

Chart 77
Existence of principles and methodologies for the implementation and operation of artificial intelligence-based solutions in the insurance sector



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

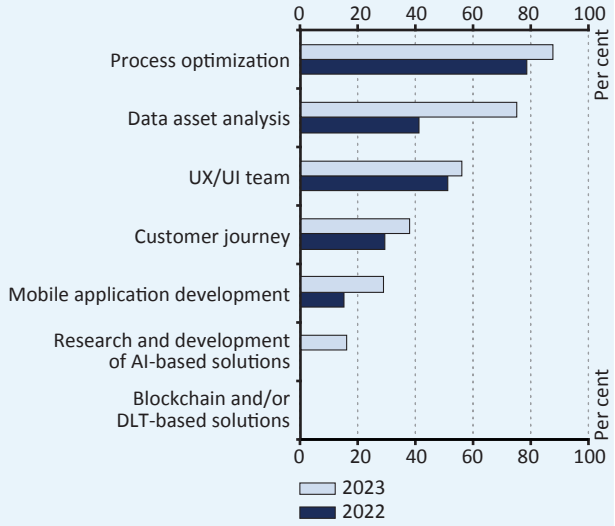
Source: MNB

5.3 PREPAREDNESS OF MANAGEMENT AND EMPLOYEES

The digitalisation focus of insurance decision-makers is increasing. In 2023, a significant proportion of insurers had a digitalisation strategy in place already (Chart 76), including institutions that did not even have a dedicated digitalisation function yet. Although institutions are not thinking about the digital availability of new products, the increasing frequency with which most of them review the achievement of previously set targets – most of them on a quarterly basis – demonstrates the seriousness of their digitalisation efforts. However, the existence of a digitalisation manager is not typical for the sector yet, and where there is a digitalisation manager, few of them are members of the organisation's board. Compared to the previous year, there has been impressive progress in the prominence of senior data and information management positions, with two-thirds of the sector employing managers in the former and 87 per cent in the latter. Digital transformation and IT cost optimisation are combined as strategic objectives for most institutions. At the same time, institutions admit that they do not feel fully prepared for the challenges of digitalisation. In the near future, accelerating the digitalisation of the sector will be an essential and necessary step for institutions, with leadership commitment to full transformation and a sense of purpose being perhaps the most important step.

The potential of artificial intelligence has also started to be explored by insurers. Knowledge of these dynamically evolving technologies is also essential for insurers: they need to keep up with evolving market trends and customer expectations if they are not to be at an irreplaceable disadvantage compared to more innovative peers. An interesting dichotomy can be seen when looking at domestic insurers: their products and processes are still underdeveloped in many cases when viewed through the lens of contemporary expectations, but at the strategic and operational level, half of the institutions are already applying principles and methodologies for implementing and operating AI-based solutions (Chart 77). However, they are not doing so through dedicated AI teams; this activity is added to existing organisational operations.

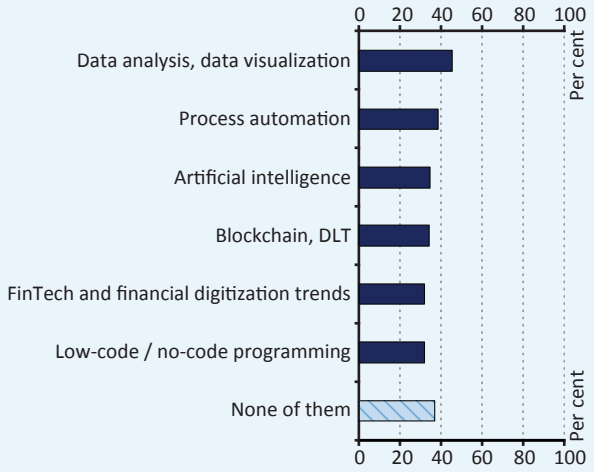
Chart 78
Dedicated teams within insurance companies



Note: The weighting was done in proportion to the gross premium income of the institutions surveyed. The AI and blockchain response options were included in the questionnaires for the first time in 2023.

Source: MNB

Chart 79
Availability of innovative training topics for employees in the insurance sector



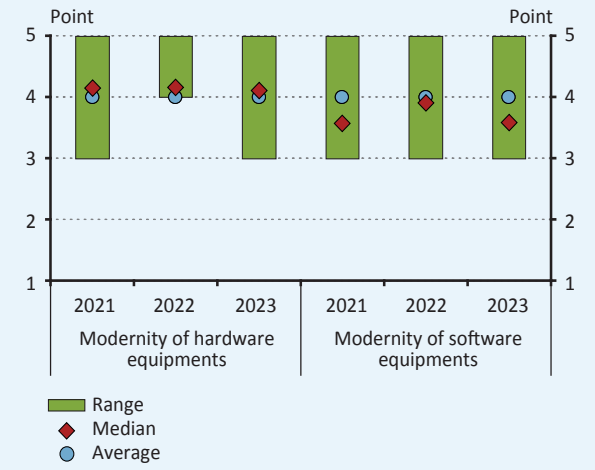
Note: The weighting was done in proportion to the gross premium income of the institutions surveyed.

Source: MNB

Insurers are not yet putting a strong focus on the use of innovative technologies and digital customer experience at organisational level. Transformation at the institutional level can be facilitated by setting up expert teams, which insurers have put slightly more emphasis on in 2023 (Chart 78). The development of forward-thinking teams to support innovation is still limited to a small number of institutions – customer journey planning and mobile app development are performed in-house in a small proportion of the sector. And the testing and implementation of the latest technologies are not performed yet at all, or only to a small extent, by dedicated teams.

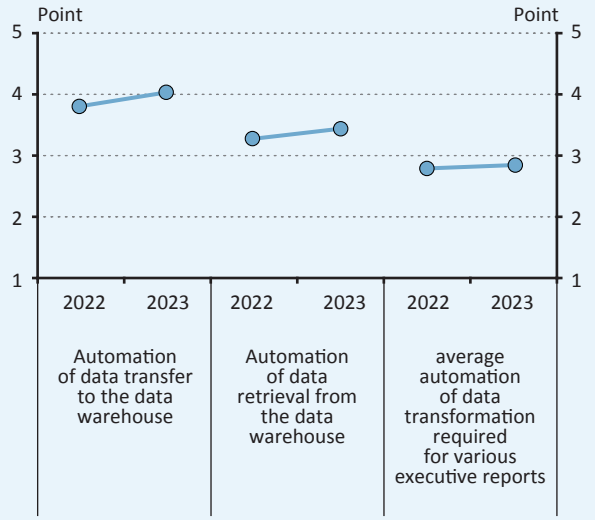
Training workers to prepare for the gaining ground of new technologies is not yet widespread in the sector. In 2023, insurers reported less need to develop the digital skills of their employees, and as a result, the availability of innovative training is low: almost 40 per cent of the sector does not train its employees at all on the broad range of innovations we reviewed (Chart 79). While training opportunities are typically available for workers in the sector, they are not regularly updated to reflect the latest technological innovations available. And this can leave institutions lagging behind in terms of internal knowledge in the long term. General internal knowledge transfer still typically takes place when a new employee arrives, but in many places senior employees also offer to their peers several opportunities for development each year. Attracting new labour – and thus fresh knowledge – usually comes at an extra cost, and today, adequate human capital is a scarce resource. For this reason, it may be worthwhile to further develop and complement existing internal knowledge in the sector and prepare staff for the digitalisation challenges of the future with dedicated, technology-focused training in order to enable institutions to benefit from the advantages of new technological innovations.

Chart 80
Assessment of the modernity of insurance equipment based on self-declaration by institutions (2023)



Note: On a scale 1 to 5, 1 – most obsolete, 5- most modern.
Source: MNB

Chart 81
Automation of data transfer processes in the insurance sector (2022–2023)



Note: The weighting was done in proportion to the gross premium income of the institutions surveyed. On a scale of 1 to 5, 1 – the process is not automated at all, 5 – fully automated system.
Source: MNB

5.4 DIGITALISATION OF INTERNAL OPERATIONS

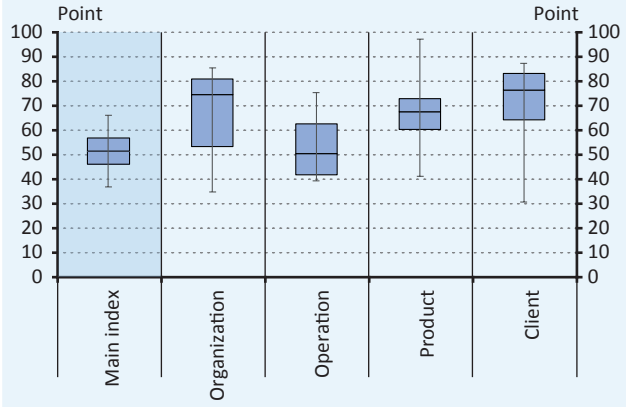
According to the assessment of domestic insurers, the tools they have in place to support their digital operations are basically adequate but have to be continuously improved to remain up-to-date and to mitigate growing cybersecurity risks. The importance of modernising the asset base is justified not only by competitiveness, but also by improving the client experience and reducing operating costs. The digitalisation of internal systems is satisfactory among insurers, but they have to improve them in the near future at their own discretion in order to meet ever-increasing customer expectations, optimise IT processes and maintain the overall modernity of these systems (Chart 80). In addition to the advances in digitalisation, managing and minimising growing cybersecurity risks is a priority. Continuous technological development requires regular updates and improvements to IT systems and security protocols.

There has been minor progress in the digitalisation of internal processes in the whole sector. The digitalisation of process management and the automation of individual workflows have commenced in the sector, with only slow progress is visible (Chart 81). There has also been progress in the automation of some data management processes, but there is still considerable room for substantial improvement, in particular with regard to the data transformations required for the various senior management reports. Automation does not only increases data management efficiency, but also reduces the possibility of human error and improves process transparency. Just as digital document management has become a consideration in contracting with external partners, insurers are also paying particular attention to this area when developing their internal systems and processes. Almost the whole sector is characterised by mostly digital archiving.

6 Digitalisation level of the Hungarian investment service providers

The MNB's digitalisation survey included the sector of investment services for the first time in 2023. According to the results of the digitalisation survey covering nearly 85 per cent of domestic investment service providers in terms of client assets, the level of digitalisation of domestic retail investment service providers is at the medium level. The digital maturity of domestic retail investment service providers is heterogeneous, with significant differences across institutions. The digital development level of the sector is most advanced in terms of interactions with clients, while the digitalisation of internal operations is the least advanced. All of the institutions under review have a client portal and a mobile app, but the range of products available fully online, without face-to-face administration, is limited. As regards the customer channels, the mobile app is the most popular among clients. Digitalisation is a high priority for the sector at management level, but not all institutions have a digitalisation strategy yet. Hungarian investment service providers reported that their equipment base was basically up-to-date, although some institutions need improvement in this regard. Overall, there is substantial room for improvement in the digitalisation of the sector and for some lagging investment service providers to catch up.

Chart 82
Digital maturity index of Hungarian investment service providers by pillar and total score (2023)



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

6.1 DIGITALISATION OF DOMESTIC RETAIL INVESTMENT SERVICES

According to the MNB survey, the digital maturity of the domestic retail investment service providers is on medium level. The MNB has assessed the digital maturity of Hungarian retail investment service providers for the first time in 2023. The survey analyses the digital maturity of the institutions under review along the lines of 4 pillars covering their entire operations (Chart 82). The annual survey contains more than 100 questions that provide a comprehensive view of the digital maturity of service providers. The institutions under review cover nearly 85 per cent of domestic investment service providers based on client assets.

The digital maturity of domestic retail investment service providers is heterogeneous. The median composite index for 2023 stood at 51 points, with significant divergence observed across the institutions under review. The significant heterogeneity in digital sophistication may also be partly attributed to the different product and service focus of the players in the sector and their different institutional backgrounds (banking and non-banking service providers). Those who have experience in the banking sector, also have the advantage have the advantage of being able to easily adapt group-level digital organisational and operational procedures to the capital markets service area. In addition, they typically provide a broader spectrum of services, while non-bank institutions are specialised in terms of products and services.

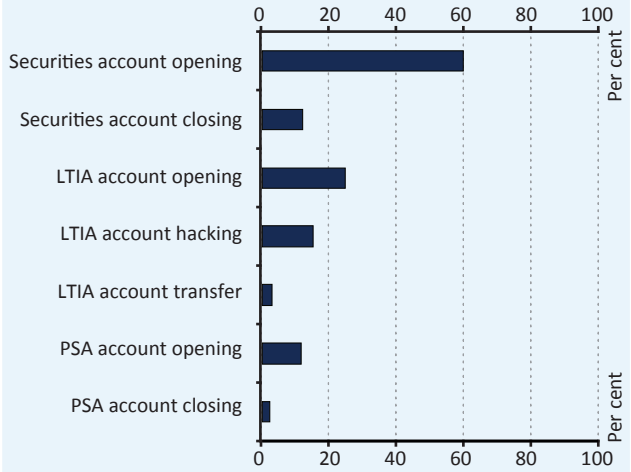
The digital maturity of the sector is most advanced in terms of interactions with clients, while the digitalisation of internal operations is the least advanced. There is also significant dispersion across the pillars among the market participants under review. The sector median is the highest in the client pillar, which demonstrates the appearance of high client-side digitalisation expectations, although the scores of the service providers under review exhibit the largest variance in this respect. The smallest difference between the maximum and minimum values is observed in the digitalisation of internal operations, which is generally low in the sector. Digitalisation at organisational level is advanced in the sector, indicating a high level of commitment both on the sides of management and employees. Institutional background is the least important determinant of the digital accessibility of investment products, with both banking and non-banking players equally showing relatively low and high levels of development.

6.2 DIGITALISATION OF INTERACTIONS WITH EXTERNAL STAKEHOLDERS

Both a client portal and a mobile app are available to the clients of Hungarian investment service providers. All of the institutions under review have a client portal and a mobile app, offering to clients a broad spectrum of functions. Almost all providers offer the opportunity to search and trade securities on these platforms, automated operations (e.g. regular trade orders), notification settings or customer service functions (e.g. chatbot, chat, video call, call origination on the platform) are typically not available. Guides or FAQs are often used to make digital interfaces easier to use, while advanced, innovative solutions such as chatbots or chat with a customer service representative are less available. Incentivising the use of digital services through pricing instruments (e.g. discounted trading fees, discounted account management fees) is common but not yet widespread.

The range of products available fully online, without the need for face-to-face transactions, is limited. When weighted by client assets, opening a securities account is fully available digitally at 60 per cent of the sector, while long-term investment accounts (LTIA) and pension savings accounts (PSA) are only available at 25 and 12 per cent of the service providers who offer these services, respectively (Chart 83). Closing these accounts without personal administration is typically not available in the market. Overall, there is a broad range of digital functionalities linked to existing products, but there is significant room for improvement in the digital accessibility of products and in strengthening the end-to-end digitalisation approach.

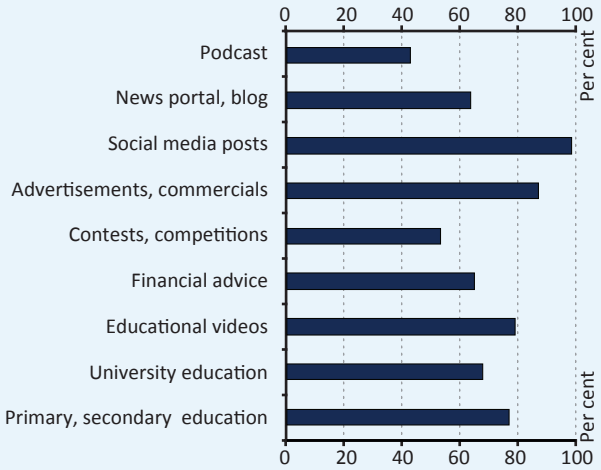
Chart 83
Availability of digitally accessible products among investment service providers (2023)



Note: The weighting was done in proportion to the client assets managed by the institutions surveyed.

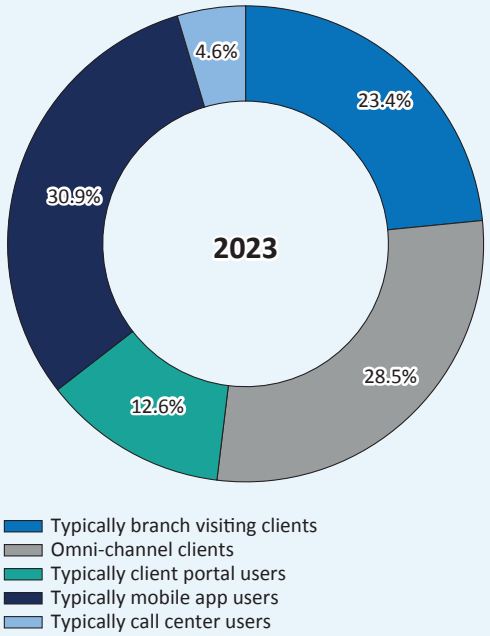
Source: MNB

Chart 84
Developing financial culture and awareness among investment service providers (2023)



Note: The weighting was done in proportion to the client assets managed by the institutions surveyed.
Source: MNB

Chart 85
Distribution of retail clients by channel usage among investment service providers (2023)



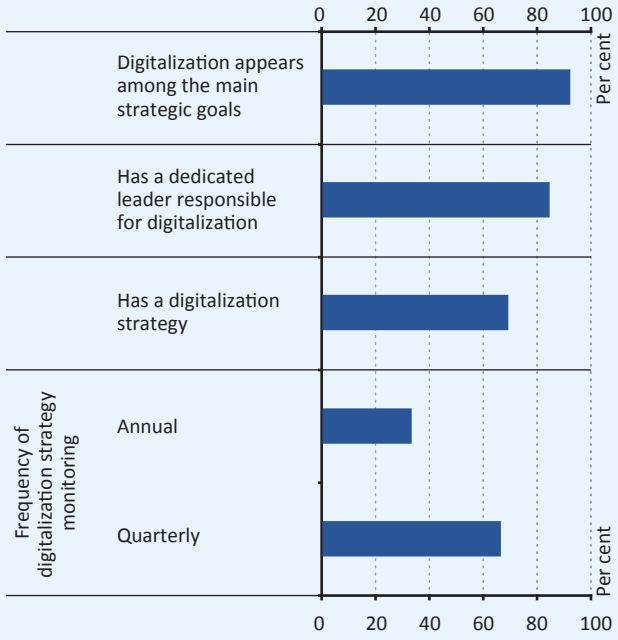
Note: The weighting was done in proportion to the client assets managed by the institutions surveyed.
Source: MNB

Increasing financial awareness and encouraging clients to use digital solutions are strategic goals for all capital market participants. The use of a variety of tools to promote financial literacy and awareness is widespread in the sector, with the use of advertisements, commercials and social media posts, as well as primary and secondary school or university education and the production of educational videos are all common (Chart 84). In addition, most service providers maintain a news portal or blog, and podcasts are becoming increasingly popular.

The mobile app is the most frequently used client channel among the clients of domestic investment service providers. A slight majority of clients (including omni-channel clients) still insist on at least some physical meeting for administration, while 40 per cent typically make their investment transactions via digital platforms (Chart 85). Clients receive their regular statements mostly in digital format, primarily through a client portal or mobile app. The sector should still improve in terms of the prominence of digital solutions for client service, with automated case management and call initiation via the app is currently the most common, but a significant proportion of institutions have access to automatic identification via the app or chat with a client service agent. Based on data available at the client level, portfolio size and product coverage are typically applied by service providers for targeted enquiries.

All institutions conduct social media campaigns, but the regularity of the campaign varies from one market player to another. Among the social media channels, Facebook and YouTube remain the most popular, although the popularity of Instagram and LinkedIn is also significant. It is a testament to the openness toe younger generations that one of the service providers is present on TikTok on a daily basis. The use of online client satisfaction surveys is also common, although it would also be beneficial if the institutions asked more regularly about services that could be improved.

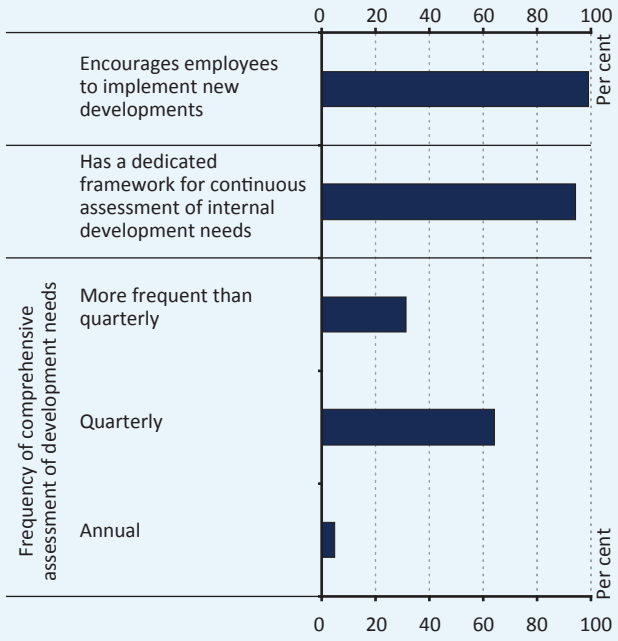
Chart 86
Availability of digitalisation strategy and frequency of monitoring within the investment service providers (2023)



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

Source: MNB

Chart 87
Employee incentives for implementing developments and assessment of development needs among investment service providers (2023)



Note: The weighting was done in proportion to the client assets managed by the institutions surveyed.

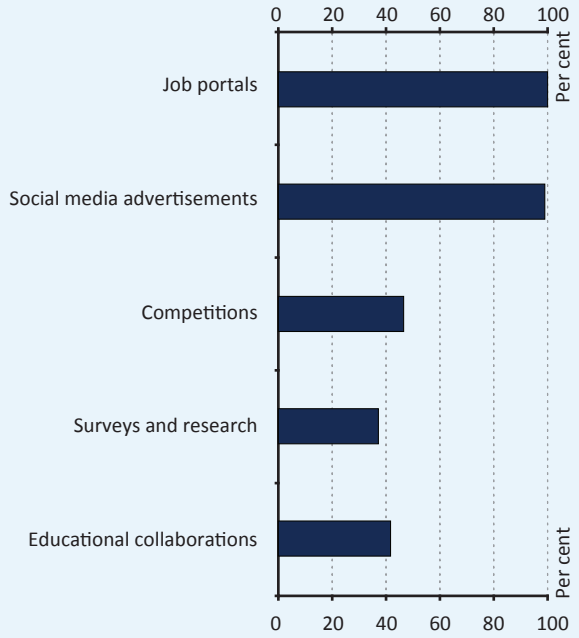
Source: MNB

6.3 ORGANISATIONAL PREPAREDNESS

Digitalisation is a high priority for the sector at management level, but not all institutions have a digitalisation strategy yet. 90 per cent of investment service providers listed the digital transformation in their strategic goals, and further digitalisation is typically a priority in decision-making in the medium to long term (Chart 86). This is supported by the fact that the vast majority of organisations have a dedicated digital transformation manager with the task of driving digital transformation. Nearly 70 per cent of the sector has a digitalisation strategy, the implementation of which is monitored at least annually, but typically quarterly. That notwithstanding, several institutions reported that they were only marginally prepared for the challenges of digital transformation, and there was room for improvement in the development of a digitally-enabled corporate culture in some of them. For institutions without a comprehensive digitalisation strategy, the preparation and timing of its implementation could be a way forward, while for others, the prominence of quarterly monitoring may be a further development. The existence of principles and methodologies for the implementation and operation of artificial intelligence-based solutions is less common among investment service providers relative to banks or insurers, with almost 40 per cent of the sector not dedicated to this issue.

In terms of stimulating internal improvements, the existence of institutionalised innovation in the investment services market is a positive sign. Almost the whole sector encourages its employees to implement internal improvements and has a dedicated framework for assessing internal improvement needs (Chart 87). This is supported by the fact that the majority of the sector's performance assessment and bonus systems also reflect a higher recognition of digitalisation tasks. The observation that these needs are typically tracked quarterly or more often reflects an innovative approach. The automation of the collection of development requests from external participants has commenced in the sector, but it remains, at least partly, an administrative responsibility.

Chart 88
Application of online recruitment techniques among investment service providers (2023)



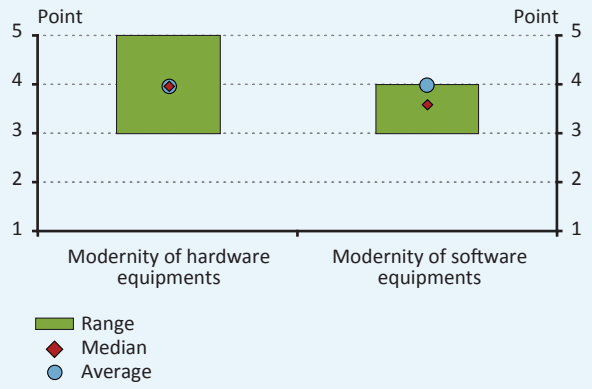
Note: The weighting was done in proportion to the client assets managed by the institutions surveyed.

Source: MNB

The digital literacy of employees is also assessed by the institutions as an area for improvement. Although the digital literacy of employees is mostly not assessed or assessed only on an ad hoc basis, the institutions reported that the digital skills of employees needed to be improved. Despite this recognition, knowledge development courses are mostly available only on an annual basis, while the sector is mixed in terms of internal knowledge transfer forums, with some participants having no internal knowledge transfer forums at all, even when a new employee joins, and others – typically service providers with a banking background – have senior employees hold knowledge transfer training at least annually, if not more frequently. Employees everywhere have some level of flexible work hours support (e.g. home office), but the use of project management applications in work organisation is not common. In terms of recruitment techniques, the use of recruitment portals and social media advertisements is common, but only a few institutions launch educational partnerships or competitions, despite the fact that these methods may assist in recruiting young talents (Chart 88).

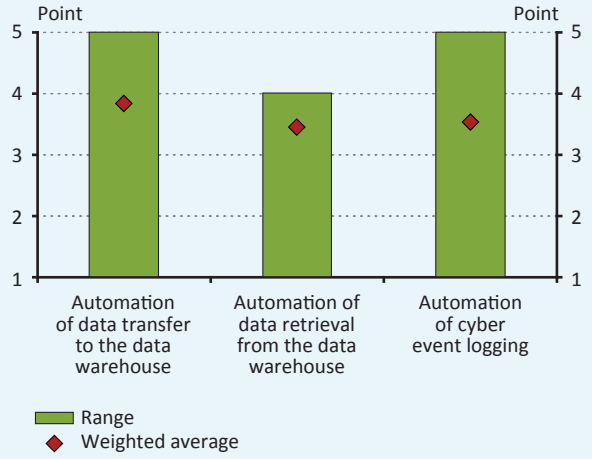
Domestic investment service providers typically prefer to implement FinTech innovations developed internally rather than working with external partners. Industry participants show a moderate openness to cooperation with FinTech participant, with the majority of them having been in contact with less than 10 FinTech companies. As a result, the number of FinTech collaborations is limited, while agreements with BigTech companies or platform providers are more common. A certain level of digitalisation of cooperation is often expected from external partners, and in renewing supplier contracts, most of the sector takes this into account (e.g. digital contact management, digital document and file management, e-contracting, possibility of process automation).

Chart 89
Evaluation of the modernity of the equipment used by investment service providers, based on the self-declaration of the institutions (2023)



Note: On a scale of 1 to 5, 1 – most obsolete, 5 – most modern.
Source: MNB

Chart 90
Automation of data transfer processes among investment service providers (2023)



Note: The weighted average was done in proportion to the client assets managed by the institutions surveyed. On a scale of 1 to 5, 1 – the process is not automated at all, 5 – fully automated system.
Source: MNB

6.4 DIGITALISATION OF INTERNAL OPERATIONS

Domestic investment service providers reported that their equipment base was basically up-to-date, although some institutions need improvement in this regard. The average modernity of hardware devices is somewhat more favourable than that of software, but in both cases, some participants rated them as only medium (Chart 89). For the latter respondents, the development of these internal systems may be of particular importance for efficient operations and long-term competitiveness. The sector is also divided in terms of digital archiving and the digitalisation of paper documents, with some service providers being advanced and others at an early stage. The majority of institutions envisage cybersecurity-related developments, but the extent of these varies: both small and large-scale developments are expected to be carried out. Typically, employees may report cyberthreats via a dedicated email address or over the phone (e.g. HelpDesk). The automation of the logging of cyber incidents needs to be improved at several institutions.

Digitalisation of internal processes is low compared to other pillars, with considerable room for improvement. Analytical accounting for back-office and front-office transactions is largely automated, but there are institutions where the share of manual accounting is still high. Integrated process management is less widespread in the sector in this regard. It is not common practice for management approvals to be signed digitally or electronically. Similarly, the digital collection of customer data and its use for targeted, even real-time, offers is even less common typically, only some service providers with a banking background use advanced data analytics in this area. It is an industry hallmark that email remains the primary online channel for customer information, and there is also significant room for improvement in the automation of complaints handling. There is also significant convergence in the automation of some data management processes, the automation of data transfers and queries in internal processes have to be improved at several institutions (Chart 90).

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 on the Moon is 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

July 2024

Print: Prospektus Kft.

H-8200 Veszprém, Tartu u. 6.

mnb.hu

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