
The Main Challenges of Eu Financial Market Transformation in the Digital Age

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Abstract: The main challenges of financial market development in terms of digitization are considered. Digitization has a significant impact on the development of financial markets. In today's digital age, the financial sector faces many challenges that need to be addressed by international financial institutions. The current state of the EU financial market requires finding new solutions needed to develop in the digital age. Risks in the financial market tend to increase, especially in the context of the digitization of the economy. The persistent risks of variations in economic growth are exacerbated by the need to improve the balance of payments of euro area countries with high debt and the banking sector, driven by its low profitability. The features of development and regulation of the European financial market have been analysed. The main challenges that need to be addressed in today's context of digitization and the risks involved in developing financial markets are increasing cybercrime in the financial sector; compliance with financial market regulations; use of BigData in the financial market; use of artificial intelligence in the financial market; use of Fintech in the financial services market; customer retention in the consumption of financial services; retention of providers as producers of financial services; blockchain integration in the financial market; experience and expectations of clients in the financial market; crossing the digital divide in the marketing of financial services; and impact on the financial market of global climate change. Proposals have been developed to mitigate the effects of financial risks in the information age. Anticipating and considering the potential challenges of financial market development and understanding its changing trends in regulatory policy development makes it possible to ensure sustainable development.

Keywords: European Financial Market, Digitization, Digital Literacy, Risks, Cybercrime, Blockchain Technology, Financial Stability, Regulation of the Financial Market

1. Introduction

Digitalization has a significant impact on the evolution of financial markets, and it is one of the critical tools for sustainable and inclusive development. The financial sector faces many challenges that need to be addressed by international financial institutions. The current state of the EU financial market requires the search for new solutions needed for development in the digital finance era. Risks in the financial market tend to increase, especially in conditions of digitalization of the economy.

The persistent risks of fluctuations in economic growth exacerbate the need to improve the balance of payments of high-indebted euro area countries and the banking sector due to its low profitability. Such tendencies are exacerbated by the instability of specific political processes in the EU.

Prolonged periods of slow economic growth may raise concerns about the sustainability of financial systems caused by the debt problem.

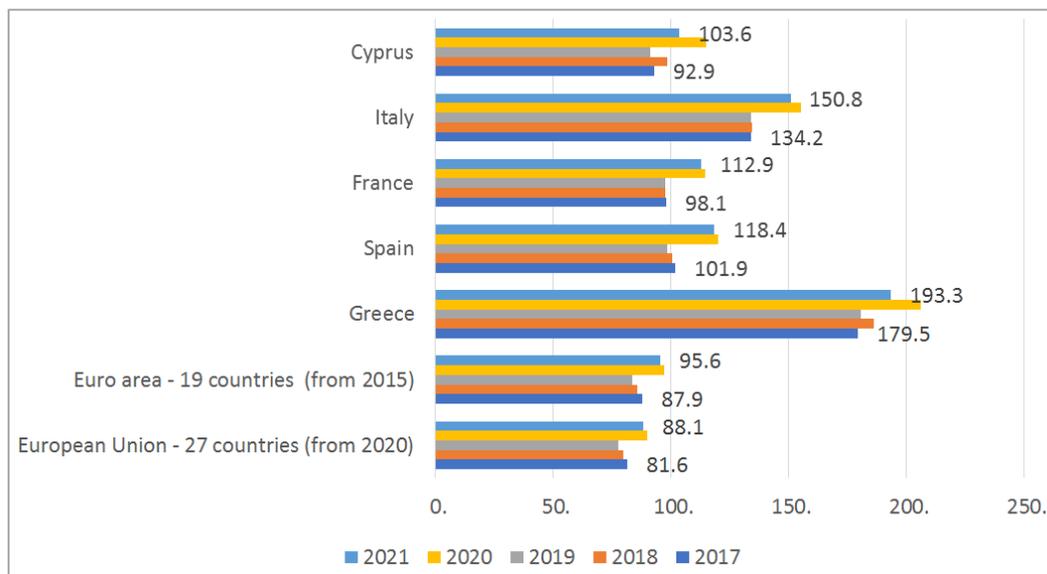
The total level of public debt in the euro area due to the COVID-19 pandemic has increased in almost every country. On average, general government gross debt (as a percentage of GDP) increased by 12.5% in the EU-27 (from 2019 to 2020). [1].

The international regulatory environment of the financial market is changing. The results of the Financial Stability Board (FSB) work on setting standards for the post-crisis functioning of financial institutions are significant. By introducing international standards and new principles of regulatory cooperation, global financial markets have become more integrated and the financial system more secure and resilient. Considerable progress has been made at the

regional level, and single banking supervision has been established in the euro area to harmonise supervisory action in member countries. The single regulations have been strengthened, and an ambitious program to create a single capital market (CMU - Capital Market Union) has been launched [2]. However, as the risk of a recurrence of the financial crisis gradually decreases, the reforms initiated are slowing down. As a result, the fragmentation of the financial market is intensifying, which in recent years has become one of the most pressing problems for international regulators. Fragmentation of the EU financial market can occur for several reasons, such as technological differences, different tax regimes or differences in local financial structures. Various regulatory and supervisory practices may also play a role. Today, cross-border risk-sharing in euro area countries is low [2, 3]. The turmoil in some countries (e.g. Greece and Spain) will continue to lead to persistent disparities in the economic performance of the euro area, undermining real convergence and hampering coherent monetary policy. Financial disintegration is particularly damaging in a monetary union, where more developed financial markets

must be able to compensate for the lack of necessary intra-regional shock absorbers, such as flexible exchange rates. In the future, financing conditions may be under the pressure of a cyclical downturn or recurrence of crisis signs in countries facing debt security and repayment problems (southern eurozone countries - Greece, Portugal). In addition, downgrades are likely for banking institutions and insurance companies [2]. More and more companies are focusing on ESG factors to achieve greater sustainability and better results. The Financial Stability Board (FSB) has identified climate change as a potential systemic risk. This pushes regulators to change financial systems towards more environmental and social governance and reduce negative externalities. Supporting the environment, including digital technologies, will be one of the main vectors for developing and regulating the financial market.

Despite the significant achievements of domestic and foreign scholars in activating and researching the processes of digitalization of the financial market, at the present stage, it is essential to identify the main challenges and prospects for the development of the financial market of the EU.



Source: EUROSTAT, 2021.

Figure 1. General government gross debt (Percentage of GDP).

2. Objectives

The article aims to identify the main challenges to the development of the financial market in a digital age and propose ways to improve its regulation.

3. Materials and Methods

The main research methods were a scientific abstraction, logical generalisation of changes in the financial market in a digital economy, a graphical method for visual reflection of trends, and an analytical method for determining trends and changes.

4. Results and Discussion

Financial markets, which can effectively absorb shocks and contribute to macroeconomic stability and resilience, create more political space in a downturn for fiscal and monetary policy [3]. But the change in the market for digitalization opens up new opportunities. For example, Fintech provides new funding sources and opportunities for investors, such as crowdfunding. And the work of the EU Technical Expert Group on Sustainable Financing helps to deepen the market for "green" investments and introduce a standard system of sustainable financial instruments [2]. Cooperation between UN Environment Programme Finance

and the financial sector will ensure the financial market's stability by introducing Principles for Responsible Investment, Principles for Sustainable Insurance and Principles for Responsible Banking.

According to the IMF, growth projections (real GDP, annual per cent change) will decrease from 5.2% in 2021 to 2.5% in 2022 in Euro Area, which drives the need to develop and implement new policies in line with new conditions and challenges [4].

In 2022, global financial conditions continue to deteriorate due to the Russian invasion of Ukraine. This happened in a pandemic that has already destabilised the financial market. There has been a sharp rise in commodity prices, which significantly increased general inflation [5]. According to the McKinsey Global Survey, 76% of all respondents consider geopolitical instability and conflict the main risk to global economic growth over the next 12 months. As a result, the threat of cyber risks to the financial market grows. This can be targeted at systemically important financial institutions and can lead to a loss of confidence in the entire financial system, as it affects global financial stability in general [6].

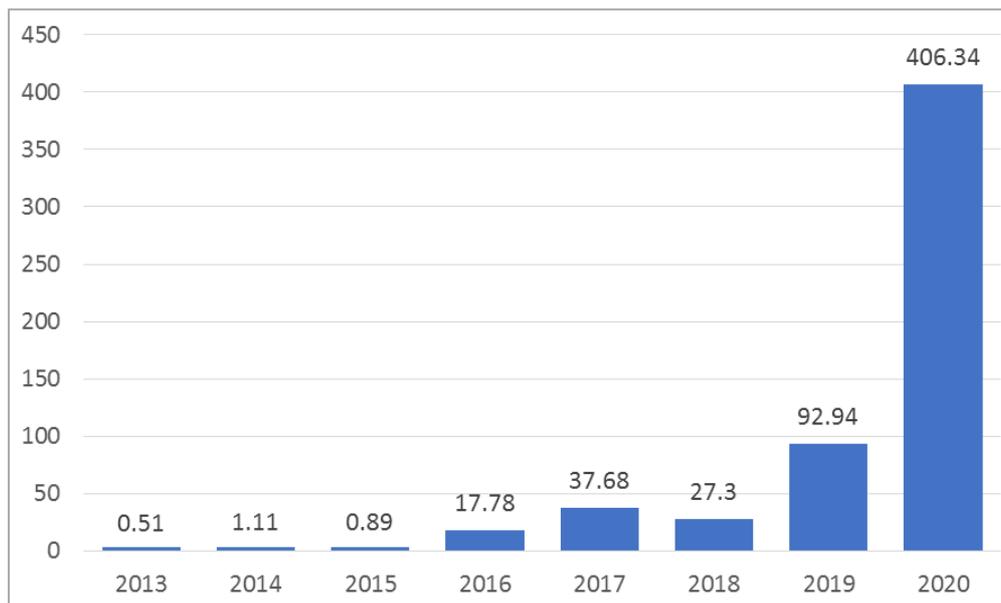
The main challenges that need to be addressed in the current context of digitalization and the existing risks of financial markets are:

1. Increasing cybercrime.

Cyber threats are a critical short-term threat globally and are exceptionally high in developed countries. There are risks to cyber threats that may hinder the development of digitalization worldwide [7].

The average cost of cyber attacks for businesses has increased by 70% over the past five years, and the number of security breaches has increased by 60%. The number of cyberattacks is growing every year, leading to a new segment of the insurance market - cyber insurance, valued at \$ 7 billion, according to Munich Re. Webmail and SaaS users are the most common targets of phishing attacks (29.1%). Financial institutions are in second place (17.8%) [8].

Companies are increasing the cost of data protection and leakage prevention. IT systems and cyber-attacks have become more complex; and cloud services are growing. Unification and regulation of data confidentiality are essential, increasing in many countries. Of more significant concern is the involvement of nation-states in cyberattacks, especially critical infrastructure [9]. In 2020, installation of malicious software increased by 358% and the number of ransomware attacks increased by 435%. In a special risk zone is cryptocurrency, which can be obtained by ransomware (Figure 2). The development of artificial intelligence may exacerbate these trends [10].



Source: World Economic Forum, 2022

Figure 2. Total Cryptocurrency Value Received by Ransomware Addresses, 2013-2020 (Cryptocurrency value in millions of US\$).

According to the Global Cybersecurity Index in the EU, the following countries have among the highest ranking: the United Kingdom (2 ranks), Estonia (3), Spain (4), Lithuania (6) [11].

Every cyberattack is highly costly to financial institutions, so innovative solutions are needed to avoid and prevent cybercrime. The basis of new transactions is blockchain technology. As more and more institutions use DLT, the blockchain will continue to be the de facto solution for

keeping financial data secure. But the integration of DLT with the existing financial infrastructure creates serious obstacles that need to be overcome [12].

Given the importance of digitalization for the economy, the European Commission and the European External Action Service (EEAS) presented 2020 a new EU cybersecurity strategy. In March 2021 EU adopted conclusions on the cybersecurity strategy for building a resilient, green, and digital Europe [13].

2. Compliance with regulatory norms in the financial market

Changes in the regulatory environment are a constant challenge for financial institutions of all types. The introduction of Regtech regulatory technologies can help ease the burden of compliance. They use the latest FinTech technology to address regulatory compliance and RegTech to coordinate between regulators and financial institutions. The main advantages of using RegTech are forming automated reporting, auditing and streamlining processes. In regulating financial markets, it is essential to harmonise the insolvency framework, an area in which synergies between banks and capital markets are powerful [12]. Ensuring a transparent and effective insolvency framework is the basis of cross-border operations in capital markets. Such "safeguards" guarantee trust and legal certainty for issuers and investors, increase the expected return on investment and thus stimulate investment in both credit and capital markets [14]. For example, in the banking sector, complete harmonisation of the hierarchy of creditors on the bank's insolvency is one area where tangible results would significantly impact [3, 14]. The end focus of these actions is the desire for higher economic growth rates, ensuring a developed local economy and better allocation of privacy risks.

The second area, which is given considerable attention, concerns the convergence of supervision. Technology and product development, climate change, and cybercrime increasingly require a coherent approach and transparent governance and accountability structure for the European Securities and Markets Authority (ESMA). However, despite significant legislative efforts, the recent revision of the European Market Infrastructure Regulation (EMIR 2) expands the EU's regulatory framework for clearing activities

that are systemically important to the EU but takes place in non-EU countries [14].

3. Using BigData in the financial market

Big data provides both many opportunities and limitations for financial service providers. Using social media and consumer databases can significantly improve customer service while protecting their interests. Therefore, powerful data analysis technologies should be provided [12].

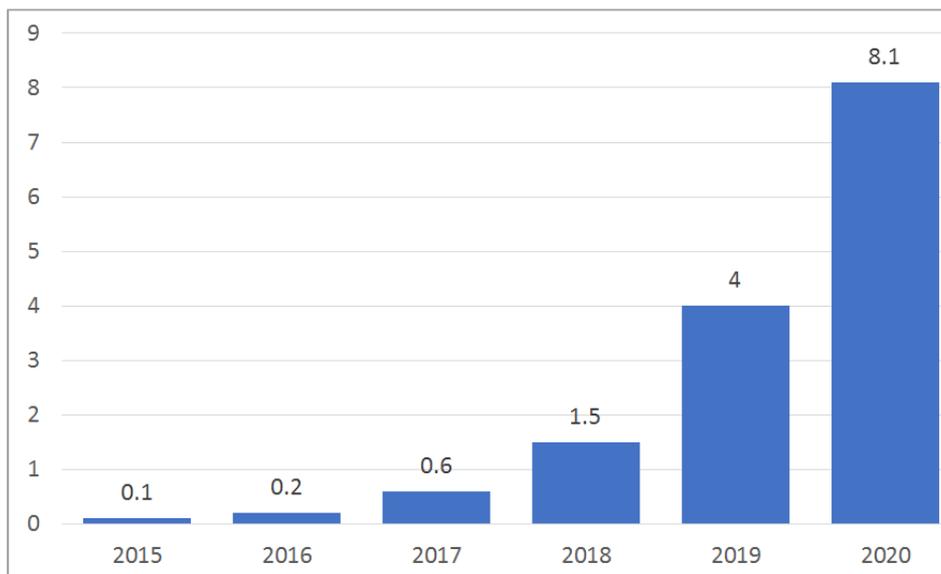
4. Use of artificial intelligence (AI) in the financial market

The global AI in the Fintech market was estimated at USD 7.91 billion in 2020, and it is expected to reach USD 26.67 billion by 2026. Global spending on AI is forecast to double over the period 2020-24, growing from USD50 bn in 2020 to more than USD110 bn in 2024 [15].

Industry experts believe that AI will transform almost all aspects of the financial services industry, including automated cash management, customer due diligence and banking. Virtual agents and chats can provide round-the-clock availability of financial services, such as answering contractual questions immediately, such as means of payment, statements of expenditure or movement of accounts and transfers, or even instant insurance claims [12, 16].

Thanks to these changes, it is now possible to make better use of artificial intelligence capabilities. As a result, its use is growing significantly in the financial sector and the economy.

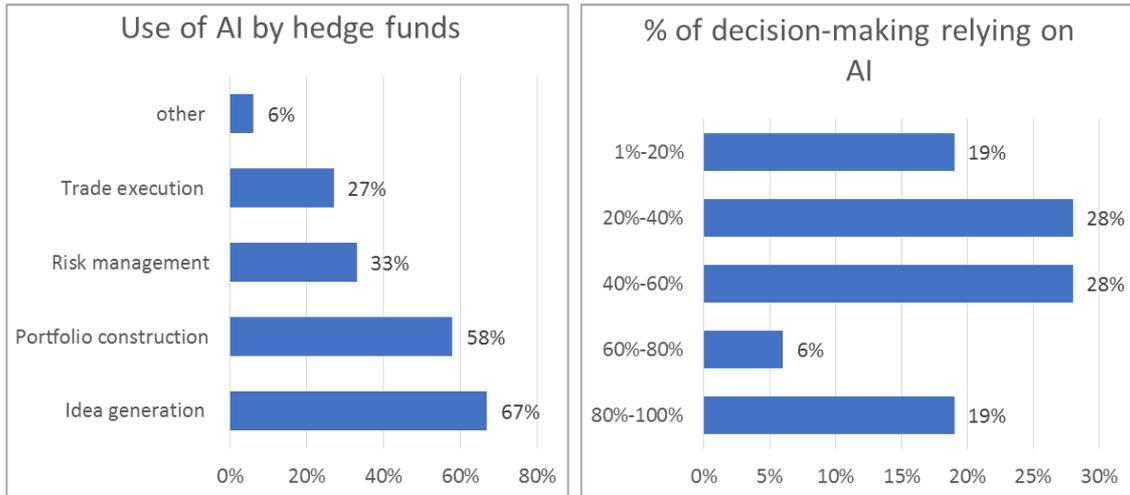
In the finance industry, AI is used to: 1. Fraud Detection. 2. Increasing security 3. Spending Pattern Prediction. 4. Stock Broker system 5. Client-side user authentication asset management, algorithmic trading, credit underwriting, or blockchain-based financial services are enabled by abundant available data and increased and more affordable computing capacity [15].



Source: Mordor Intelligence, 2021 [17]

Figure 3. Market Value of Asset Under Management by Robo Advisors, in USD trillion, Global, 2015-2020.

In hedge fund management, AI is most often used to generate ideas (67%) and form a portfolio (58%). Almost 20% of all decisions are made based on AI (Figure 4).



Source: OECD, 2021

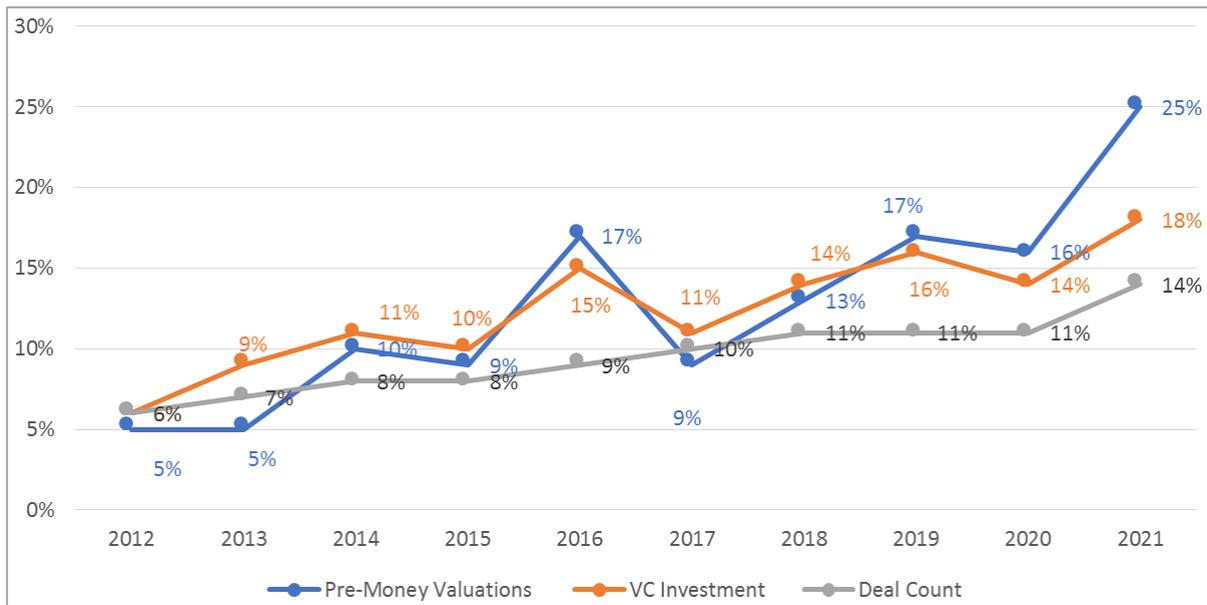
Figure 4. AI use by hedge funds (H1 2018).

Because financial products are often associated with the purchase of nonfinancial goods (as a means to an end), a financial proposition can be built directly into a purchase transaction using AI forecasting and pattern recognition techniques. However, the transformational potential of AI goes far beyond improving processes and customer service. This may allow institutions to review their core offerings thoroughly by unlocking untapped market segments and revenue opportunities with new products and services [14].

To detect fraud and anti-money laundering, it is possible to use the features of intellectual property pattern detection based on data combined between institutions. This can be pretty effective, as it will ensure the transparency of financial transactions. Employees of financial services institutions can benefit from AI in a work environment that combines the strengths of AI with human qualities. This may require

significant changes in the workforce's organisational structure, culture, and skills. By relieving people of their usual tasks, it is expected that such an organisational change will lead to much greater productivity and job satisfaction. Artificial intelligence is already used successfully by many companies. Thus, in commercial lending, HSBC's partnership with Tradecraft uses AI to analyse supply chains to optimise working capital financing decisions [14].

In processing insurance claims, the Belgian insurance company Ageas uses AI to analyse photos sent by customers to assess the damage to cars, freeing it from the need to send investigators to evaluate the damage. Financial institutions may need to upgrade and possibly wholly overhaul their existing data infrastructure to implement AI. The second prerequisite for introducing AI technologies is the availability of a sufficiently skilled workforce [16].



Source: Silicon Valley Bank, 2022 [18]

Figure 5. Fintech's share of Global VC activity.

The OECD also provides five recommendations to governments for developing AI: Facilitate public and private investment in research and development to spur innovation in trustworthy AI; Foster accessible AI ecosystems with digital infrastructure and technologies and mechanisms to share data and knowledge; Ensure a policy environment that will open the way to deployment of trustworthy AI systems; Empower people with the skills for AI and support workers for a fair transition; Co-operate across borders and sectors to progress on responsible stewardship of trustworthy AI.

5. Application of Fintech in the financial services market fintech has enormous potential for developing financial efficiency and inclusion in Europe and opens opportunities.

Consumers and businesses are moving to digital technology through the COVID-19 pandemic, boosting interest in fintech startups. Global fintech investments in 2021 recorded 210 billion USD with 5,684 deals [19]. In 2021, Fintech companies accounted for 14% of all venture capital transactions and accounted for 18% of investments. (Figure 5) [18].

The central forecast trends for the fintech market worldwide are:

1. Increasing the number of banks that offer embedded solutions. Banks are becoming more universal and offer a more comprehensive range of services.
2. Regulatory control over embedded financial proposals will increase. It is projected that regulatory intervention to protect customers will increase during the year.
3. Fintech companies will focus on branding themselves as data organisations.
4. Significant increase in the number of financial technologies focused on ESG [19].

Many small technology companies are becoming significant competitors in the financial market. Recognising

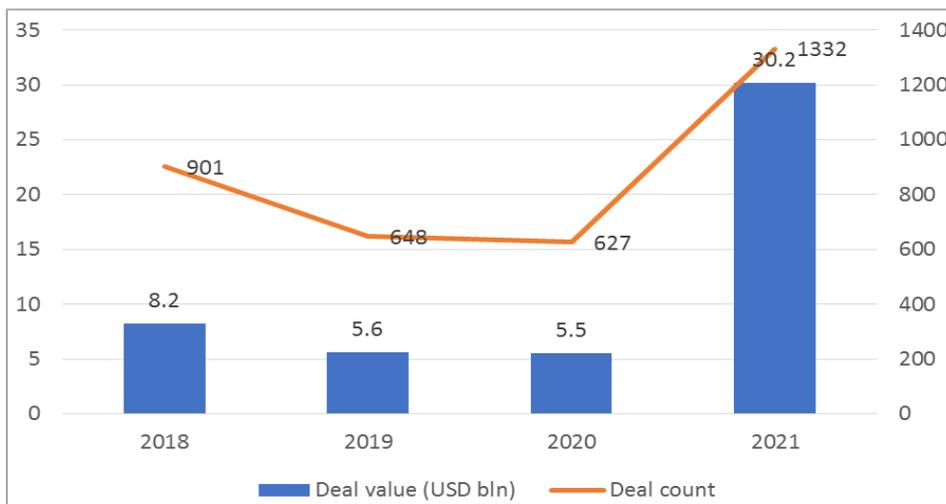
that partnering with these experienced startups may be more intelligent than countering them, many financial executives say they plan to work with FinTech companies in the future. Financial institutions engage fintech startups as investors or through strategic partnerships. According to McKinsey Panorama, almost 80 per cent of financial institutions have partnered with FinTech companies [20]. The agreed EU AI plan aims to increase public and private investment in technology to € 20 billion a year by 2028, and financial services are one priority area. The combination of experience in advanced modelling, analytics and the availability of data required for the application of AI technologies will impact the structure of financial institutions and the composition of their workforce [21].

5. Retaining customers in the field of financial services.

Personalisation, more automated services, and easier access to services are most important to most customers in the current period. Financial institutions that can provide this will capture their (and growing) market share. The ECB supports market development efforts by establishing a modern market infrastructure. For example, in 2018, the ECB launched the Targeted Instant Payment Settlement (TIPS), which allows payment service providers to offer customers real-time and round-the-clock money transfers across Europe [2, 12].

6. Maintenance of employees-providers as producers of financial services

Today, financial services companies find it challenging to attract customers and find it difficult to attract employees. Lack of qualified personnel to perform new technological tasks and avoid long-term employment among highly qualified specialists. Institutions that want to attract and retain a skilled workforce need to change their philosophy. It is no longer enough to offer good pay and benefits. Employees now expect employers to cultivate a consistent culture with the employee's values and lifestyle [3, 12].



Source: KPMG, 2021

Figure 6. Total global investment activity (VC, PE, and M&A) in blockchain and cryptocurrency 2018–2021.

7. Blockchain integration in the financial market

Blockchain is becoming a key component in the fight against cybercrime. But data security is not the only advantage for blockchains in the financial sector—the value of the blockchain in a wide range of banking and investment decisions. From solving the problems investment banks face to helping customers make payment transactions more secure, the list is growing daily [12, 21]. Investment in the crypto and blockchain space soared in 2021, rising from \$5.4 billion in 2020 to over \$30 billion [19].

8. Experience and expectations of clients in the financial market

Customer expectations are one of the most critical issues facing financial companies. Bank customers expect banking to be mobile, and they don't care if the bank is FinTech. Changing traditions will require time and investment, but mainly openness [3, 12].

9. Crossing the digital divide in financial services marketing

Success in the digital banking age means more than having a mobile app. This means digitising the entire brand and using big data and AI to find potential customers and deliver special offers in real-time. According to the latest survey, only 7% of financial companies have implemented a cloud set of technologies [14].

10. Impact on the financial market of global climate change

In March 2018, the EU adopted its Sustainable Growth Financing Action Plan, which sets out a comprehensive EU strategy on how the financial sector could support the transition to a climate-neutral, circular and inclusive economy. The action plan is based on three policy objectives: managing financial risks arising from climate change, resource depletion, environmental degradation and social issues; refocused capital flows on sustainable investment to achieve sustainable and comprehensive growth; and promoting transparency and longevity in financial and economic activities [3].

Within Europe, discussions on the financial aspects of climate change began with the European Commission's ongoing work to develop taxonomies to support transparency and, consequently, market adjustments, to establish the Financial System Greening Network (NGFS), where central banks and financial supervisors Continents have joined forces to support the transition to a low-carbon economy and manage climate change risks. Most financial institutions currently lack a clear understanding of the effects of climate change risks. This is partly due to the lack of reasonably useful public data [2].

First, climate change can directly affect financial stability through the impact of more frequent and severe disasters and changes in economic development, an essential part of which is financial markets. Second, financial markets may be negatively affected by uncertainties about the timing and speed of adapting to a low-carbon economy. Physical risks, when realised, can significantly destroy the value of

collateral and assets and have an impact, in particular, on insurance liabilities. This can reduce the value of collateral and assets for many financial institutions. Insurance liabilities are particularly vulnerable to the increased frequency and severity of climatic and weather events that damage property or disrupt trade. The development of new models would improve the ability to predict and manage the risks associated with insurance coverage and pricing. From the point of view of social security, there is a risk that certain losses may become unsecured. For example, real estate in areas vulnerable to floods, fires or hurricanes is becoming harder and more expensive to insure. This can increase costs for households, non-financial corporations, and governments when they are the last resort insurers [2, 3]. Therefore, it is necessary to consider ESG factors that can improve the financial results of companies in the long run; they must be included in fiduciary duties by UNEP FI and PRI initiatives. Creating digital investment platforms for ESG development and attracting financial intermediaries (investment banks, stock exchanges, advisory firms and ESG rating agencies, proxy voting service providers) has helped the ESG market grow.

The development of Cleantech is essential - it represents an investment class and technology covering clean energy and environmental product and services.

The financial market of the EU countries is undergoing profound adjustment in the conditions of low-interest rates and profitability. There is no doubt that the first impact of the digital surge will be to break down the boundaries of companies and strengthen the competitiveness of banking institutions and markets. Rising competitive pressures may force banks to take even more significant risks to increase profitability [22]. There is a danger of developing a parallel payment system that central banks do not adequately control. The second concern arises when some financial institutions rely on BigTech (or several of them) to provide third-party services (say, storage, data transfer or analytics) using particular cloud technologies. The banking sector is exposed to risks in the quality of its loan portfolio, in which energy companies are debtors (as the latter's activities depend on quotas and carbon emissions in compliance with environmental protection). The insurance sector is linked to both "climate" liabilities and assets. The risks of cybercrime remain significant. The threat of cyber-attacks or operational failure can pose a systemic risk. The proliferation of AI technologies and models, combined with their complexity, can be vulnerable to new forms of cybercrime. Therefore, it is indispensable to establish cybersecurity requirements for AI tools.

Training and education of employees can significantly reduce the consequences of cyber attacks, especially phishing. It is essential to establish cross-sectoral exchanges and cooperation between companies to combat cybercrime, develop common security standards and improve cyber resilience. The impact of artificial intelligence on the financial sector is difficult to assess, but the financial sector's

transformation must be now. With the help of AI, it is possible to increase the level of control, limit risks, improve the quality of governance and apply new tools for prudential supervision and law enforcement - all of this should contribute to financial stability. On the other hand, AI / ML systems may carry new and unique risks arising from the opacity of their decisions and the propensity to manipulate. There are problems with the reliability and confidentiality of information. In addition, AI / ML has the potential to create new sources and channels for transmitting systemic risks. To increase the financial system's stability, it is advisable to develop cooperation between financial institutions, central banks, and financial supervisors. It is also advisable to create clear national strategies and regulations for the technology market [23].

The development of new technologies destroys traditional models of financial services and creates new, unregulated markets [24]. Therefore, in 2022 the attention in the financial markets will be focused on creating regulatory regimes for the introduction of the financial market. Enhanced regulation is relevant in decentralised financial programs ("DeFi") and the cryptocurrency market.

In 2021, the Bank for International Settlements stressed the need for systematic regulation and coordination of DeFi supervision. A draft regulation on cryptocurrency markets ("MiCA") was introduced to harmonise cryptocurrency markets in the EU.

In 2022, open banking and Smart Data will be developed. The use of artificial intelligence must meet the critical requirements of market operators: technical reliability and security; confidentiality and data management; transparency; diversity, non-discrimination and justice; social and environmental well-being; and accountability [21].

5. Conclusion

Improving the regulation of financial markets and adapting to new challenges is becoming a top priority for euro area regulators. Among them, the ECB is a key stakeholder, as implementing a coherent monetary policy depends on the degree of financial integration in the euro area. The banking sector is increasing the intensity of new information technologies and significant amounts of data, which requires highly specialised human capital. Banks face increased competition from other financial intermediaries that take advantage of new digitalisation opportunities, such as innovations in payment systems and advisory services. The change in technology in implementing new services and business models has unfolded with the growing role of the FinTech sector and the spread of innovative information processing and automation services in financial services. In addition, regulators seek to identify threats to financial stability through new forms of systemic risk prevention [14]. The digital revolution has changed the supply and demand of financial services. Financial literacy is increasingly understood as digital literacy.

Further research on the main challenges of the digital transformation of the financial market will minimise risks and build a stable financial system taking into account ESG factors and modelling solutions through artificial intelligence.

References

- [1] EUROSTAT. 2021a, General government gross debt. Available online. In: https://ec.europa.eu/eurostat/databrowser/view/sdg_17_40/sett_ings_1/table?lang=en. Date of consultation: 25/04/2022.
- [2] Benoît Cœuré. (2019). European capital markets: priorities and challenges. [Site of European Central Bank]. Retrieved from: https://www.ecb.europa.eu/press/key/date/2019/html/ecb.sp190625_1~49befd1908.en.html
- [3] Luis de Guindos (2019). Financial. Stability Review. [Site of European Central Bank]. Retrieved from: <https://www.ecb.europa.eu/pub/pdf/fsr/ecb.fsr201905~266e856634.en.pdf>
- [4] IMF, 2022 (a) World economic outlook update Available online. In: <https://www.imf.org/en/Publications/WEO/Issues/2022/01/25/world-economic-outlook-update-january-2022> Date of consultation: 25/04/2022.
- [5] IMF, 2022 Global Financial Stability: Implications of the War in Ukraine Available online. In: <https://www.imf.org/en/News/Podcasts/All-Podcasts/2022/04/19/GFSR-April-2022> Date of consultation: 25/04/2022.
- [6] McKinsey Global Survey Available online. In: <https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/economic-conditions-outlook-2022> Date of consultation: 25/04/2022.
- [7] World Economic Forum, 2022 The Global Risks Report 2022 17th Edition Available online. In: https://www3.weforum.org/docs/WEF_The_Global_Risks_Report_2022.pdf Date of consultation: 25/04/2022.
- [8] APWG's Phishing Activity Trends Report for Q3 2021 Available online. In: <https://www.comparitech.com/vpn/cybersecurity-cyber-crime-statistics-facts-trends/> Date of consultation: 26/04/2022.
- [9] AGCS Allianz (2022) Cybercrime brings expensive losses for companies, but internal failures are the most frequent cause of cyber claims Available online. In: <https://www.agcs.allianz.com/news-and-insights/news/cyber-risk-trends-2020.html> Date of consultation: 26/04/2022.
- [10] World Economic Forum, (2022b) Chapter 3. Digital Dependencies and Cyber Vulnerabilities. Available online. In: <https://www.weforum.org/reports/global-risks-report-2022/in-full/chapter-3-digital-dependencies-and-cyber-vulnerabilities#chapter-3-digital-dependencies-and-cyber-vulnerabilities> Date of consultation: 26/04/2022.
- [11] ITU Publications (2021) Global cybersecurity Index 2020 Available online. In: <https://www.itu.int/epublications/publication/D-STR-GCI.01-2021-HTML-E> Date of consultation: 26/04/2022

- [12] George Burlakov. (2019). 10 Challenges for the Financial Services Industry in 2019. [Site of Technorely]. Retrieved from: <https://technorely.com/blog/financial-industry-challenges/>
- [13] European Council Cybersecurity: how the EU tackles cyber threats Available online. In: <https://www.consilium.europa.eu/en/policies/cybersecurity/> Date of consultation: 26/04/2022.
- [14] European Commission (2019). European Financial Stability and Integration Review [Site of]. Retrieved from: https://ec.europa.eu/info/publications/european-financial-stability-and-integration-report-efsir_en
- [15] OECD (2021) Artificial Intelligence, Machine Learning and Big Data in Finance: Opportunities, Challenges, and Implications for Policy Makers, Available online. In: <https://www.oecd.org/finance/artificial-intelligence-machine-learningbig-data-in-finance.htm>. Date of consultation: 26/04/2022.
- [16] Ernst & Young (2018), Artificial Intelligence in Europe, Outlook for 2019 and Beyond. [Site of Microsoft] Retrieved from: https://pulse.microsoft.com/uploads/prod/2018/10/WE_AI_Report_2018.pdf
- [17] Mordor Intelligence (2021). AI in fintech market – growth, trends, COVID-19 impact and forecast (2022 - 2027) Available online. In: <https://www.mordorintelligence.com/industry-reports/ai-in-fintech-market> Date of consultation: 26/04/2022.
- [18] Silicon Valley Bank (2022) State of Fintech. Available online. In: <https://www.svb.com/trends-insights/reports/fintech-industry-report>. Date of consultation: 26/04/2022.
- [19] KPMG, 2021. Pulse of Fintech H2'21 Available online. In: <https://assets.kpmg/content/dam/kpmg/xx/pdf/2022/02/pulse-of-fintech-h2-21.pdf> Date of consultation: 26/04/2022.
- [20] Jeff Galvin, Feng Han (2019) Synergy and disruption: Ten trends shaping fintech. By. [Site of McKinsey]. Retrieved from: <https://www.mckinsey.com/industries/financial-services/our-insights/synergy-and-disruption-ten-trends-shaping-fintech>
- [21] Xavier Viveso (2019). Digital disruption in financial markets. [Site of Organisation for Economic Co-operation and Development.] Retrieved from: [https://one.oecd.org/document/DAF/COMP\(2019\)1/en/pdf](https://one.oecd.org/document/DAF/COMP(2019)1/en/pdf)
- [22] Joseph King. (2019). DTCC Systemic Risk Barometer Survey Launching in September [Site of DTCC.]. Retrieved from: <http://www.dtcc.com/dtcc-connection/articles/2019/august/30/dtcc-systemic-risk-barometer-survey-launching-in-september>
- [23] Nick Ismail (2019). Data breaches reported to FCA have risen 480% from financial services firms. (2019). [Site of InformationAge]. Retrieved from: <https://www.information-age.com/data-breaches-financial-services-firms-123479537/>
- [24] Fernandez, Ana, (April 5, 2019). Artificial Intelligence in Financial Services Banco de Espana Article 3/19. Available at SSRN Retrieved from: <https://ssrn.com/abstract=3366846> or <http://dx.doi.org/10.2139/ssrn.3366846>