# Chapter 15
# Digital Finance Is a Key of European and Global Integration

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**Abstract** The current needs of the financial consumer are constantly changing in the context of the digital era, which is why we can appreciate that the future of financial instruments that satisfy these needs is given precisely by the digitalization of financial instruments through technologies, financial innovations and, finally, new models of business in the financial field. In our paper, we propose that, based on the analysis of existing empirical studies in international scientific databases, we highlight those innovative financial solutions based on artificial intelligence, which have contributed to the acceleration of the process regarding innovations in digital financial services, as well as to the development of digital infrastructure related to institutions financial, which from a strategic point of view offers accessibility, reliability, safety and comfort to the final consumer.

**Keywords** Digital finance · Financial instruments · International agreements

## 15.1 Introduction

Digital finance has recently been increasingly associated with the concept of "FinTech." For the terms associated with the concepts related to financial innovations to be as clear as possible, at the European level, experts have redefined the concepts and associated different terms, respectively, "FinTech" comes from the association of the terms "technology" and "finance". Moreover, it is important that within these associations we contribute to the sharing and reuse of personal data to offer a wide range of financial services. At the same time, the concept of "digital

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financing" represents financing that uses digitized infrastructures according to European and global regulations related to the digital era.

The evolution both at the financial and technological levels has been analyzed since 1928 with the development of technology and the innovation of the telegraph as a direct instrument for transmitting information of a financial nature, as well as certain data, being otherwise generically called Fintech 1.0. Technology has evolved, and with it, blockchain has also appeared, with direct implications both in finance and in the generation of data blocks with a direct influence on all sectors of activity and even with a direct impact on social life, being called Fintech 5.0 with the period of reference 2014 and 2016. The process of accelerated digitization has led to the development of innovative solutions both in the financial industry and in the IT industry, which makes them currently generate the concept of "open finance," which creates an innovative environment dynamic in the field of financial innovations. At the same time, it is also worth mentioning the dynamics of the robotization of banking institutions" front office activities, which makes artificial intelligence play an active role in defining the current architecture of the global financial market with an impact on the economies of states and implicitly on the users of digital financial services.

## 15.2 Literature Review

The current financial regulations show us that we are in a new era of finance, namely digital ones, this aspect being due both to the change in the profile of consumers, and especially to the offer of financial products and services adapted to this new era. Moreover, this aspect is also due to the active participation of financial innovators through the development of technologies oriented toward new models of development of financial institutions.

Financial technologies support the current needs of companies and the population, and this aspect is also being accelerated by the COVID-19 pandemic. The online space allows a new digital identity for the consumer, which gives them the possibility to optimize the time of identifying financial offers, as well as financing processes according to their own needs. Along with the basic offer of financial institutions, namely that of financing, there is an online payment service that has seen exponential growth because of the accelerated development of electronic commerce, as well as the development of a new remote work strategy that generates access to these financial services.

Financial technologies in the last period have seen a growing evolution and have helped to facilitate access to loans/financing, including grants managed by management authorities during the COVID-19 pandemic. The infrastructure of financial services has undergone a radical change in the last period, because of the fact that more and more people are using online financial services, activities are performed remotely in some jobs, and we can say that many of the back-office employees in the institution's financial banking, remote access also works.

Europe, by taking major decisions toward the digitization of the economy, should take advantage of its resilience and recovery strategy, so that social and economic damage is limited in this post-pandemic period. Digital technologies are support tools not only for the field of finance, but also for all fields of activity, being essential for the relaunch and modernization of the European economy. All decisions, strategies, regulations, and directives will contribute and enable the member states of the European Union to advance globally as a digital actor.

A key priority established in 2020 at the European level is the date of supporting the transition to digitization through financial instruments, a priority that has been transposed in all areas of activity, including the financial one, which can be found in the states" resilience and recovery plans at the European level. The programs of the EU, and other innovative financial instruments, allow the creation of a flexible framework for the initiation and development of innovative projects in the financial field at the level of member states, and innovative digital technologies involved in the process of online payments remain a priority in terms of innovation and security digital.

It is obvious that these financial innovations will have a direct impact on consumers, natural persons, and legal entities implicitly changing the profile and the business model. Certainly, the decisions at the European and global levels regarding the digitization process will change society at a global level. In terms of financial innovations, the technologies regarding payment services and their integration at the level of the activity sectors, not only of the banking financial institutions but also at the level of all the activity sectors, represent the financial innovation with the greatest impact, which allows everyone to optimize the most of price "time" resources in an efficient and safe framework. Digital payment solutions are indispensable for making payments in stores and on e-commerce platforms, paying money transfers for any payment obligation, regardless of whether it is financial products (loans, insurances, and others) or usual payments for any type of user. The regulatory framework at both European and national levels provides security in the use of this service in terms of "digital payments," as we otherwise identify regulated measures and included in the "EU Retail Payments Strategy," strategy that was published in 2020. As I mentioned before, these decisions to transform economies through the digitization process directly changed both innovations in the financial field and business models at the level of all sectors of activity in the real economy (including the financial sector).

The digital space is a generator of digital innovation, facilitating the development of enterprises. Increasingly, innovation involves new products, processes, or business models that are made possible by digital technologies. While in the beginning they performed only a simple support function, information technology systems, combined with the corresponding software applications directly contribute to the optimization of internal processes at the level of the business environment, as well as at the level of public institutions that opt for such a solution. The digitization process has multiple effects, from optimizing work times to cost efficiency and, finally, increasing the level of productivity and quality through the digitization process.

In the innovative processes, the models are more and more oriented toward the collaborative economy model, which makes the level of innovations in the digital space maintain the accelerated growth rate. The developers of digitized application solutions through the offered solutions allow development adapted to both the current needs of the market and an integrated development based on specialized modules, which makes innovations to be transposed as easily as possible on these specialized modules and with friendly communication interfaces and easy to understand for the end user.

In 2022, numerous FinTech events and rankings were organized at European and international levels (Singapore, USA, India, and others), which confirm that this market has an accelerated dynamism. The traditional financial institutions themselves are in a process of reinvention and re-adaptation in the context of the digital age and associate their activity with the partnership with IT experts. IT companies are becoming more and more oriented toward the financial industry, and the financial industry is more and more involved with IT companies, which makes us confirm that partnership is the basic solution in the sustainable development of the financial market digitized. A major challenge in the digitization process is the management of risks, especially cyber risks, with a direct impact on financial stability and with a direct impact on those active in this market.

As we could see from the elements mentioned above, digitization comes with multiple opportunities, but also with related risks. In terms of opportunities at the European level, one of the most relevant is the one related to the consolidation and integration of the European financial market through the Banking and Monetary Union of Europe, as well as the opportunity to develop new innovative financial instruments to support the programs, managed both in the MFF 2021–2027, and the European Green Agreement, respectively, the programs managed by the European Investment Bank.

Through a regulation of the digital financial sector, we appreciate that this digital financial market can contribute to strengthening convergence and increasing the development capacity of the European economy and implicitly of national economies, as well as to financial stability at the European level.

## 15.3 Methodology

The methodology is based on empirical research, using tools for synthesis and analysis of the current context of digital finance, open finance, and entrepreneurial finance, as responses to the adaptation of local finance to these technologies that are present at European and global levels, being increasingly innovative and with specific new elements. The basis of the structuring of the work is the synthesis of information from specialized studies of the European Commission, the International Monetary Fund, World Bank projects, specialized reports, and scientific research existing in the specialized literature and identified in the main academic networks (e.g., ResearchGate, Academia.edu, Clarivate, Elsevier, and SSRN). In addition to the innovative financial instruments identified and aimed at limiting the risks generated by these changes on the markets, the existing priorities at the level of the institutions involved in supporting digital financial technologies, the digitization of finances, and open finance are presented, which guide their adaptation policies and strategies, i.e., enforcement solutions through strategic action plans. At the same time, the paper also presents local solutions for the national economy starting from the population"s financial data (relevant derived indicators) through innovative elements presented in the paper. Moreover, the identification and presentation of financial instruments are not only a determination for this paper, but also the starting point for future research on innovative financial instruments intended for the national economy.

## 15.4 Analysis/Result Interpretation

Among the existing priorities at European level, the four priorities[1] related to the digital transformation of the EU financial sector are relevant, respectively:

- Following digitization, priorities are identified, such as the one related to the fragmentation of the common financial market, which allows users of digital financial services to access financial services both at the European and global levels, thus supporting the expansion of the financing offer for the European business environment by expanding activities in the digital space. Moreover, this cross-border process of digital financial services supports the internationalization process of companies at a global level and with positive elements on product policies (higher quality following the increase in market demands) and with an appropriate price policy (optimized and even lower prices).
- Another priority is the regulatory framework adapted to financial innovations and supporting the needs of users of digital financial services and market efficiency. It is evident that artificial intelligence is increasingly present in the world of finance, and innovative applications are coming to optimize repetitive activities in the industry. However, it is very important that, through regulation, the companies developing such innovative solutions are held responsible and, moreover, that they guarantee the effective and responsible way of use and in direct correlation with the existing values at the European and global levels. Regulatory and supervisory institutions continuously provide direct support for the development of digital and open financial markets but must keep pace with these accelerated financial market innovations. Another priority at the European level in terms of digital finance is the creation of a common space of data and financial information, which can be shared among the member states, but above all can be permanently improved, as so are the details regarding the mechanisms and procedures within the payment services directive, which common space will con-

[1] Regulation (EU) no. 910/2014.

tribute to supporting the common sustainable investments of the member states Also, among the priorities, we also find the one related to the risks generated by this digitization (transformation), namely the migration of these risks to different and highly fragmented ecosystems, for example IT providers that are interconnected but do not comply with financial supervision regulations, which makes this aspect have a direct impact on financial stability. Moreover, according to the market mechanisms, it is necessary to maintain the sound principles of the market economy, such as those related to fair competition, adequate and secure distribution channels, and correct mechanisms related to price policy.
- At the same time, at the level of the European Commission, the new financial activities are carefully monitored and supported, thus maintaining specific conditions of fairness both between the current financial institutions, as well as between the new actors entering the financial market and the market.

It is worth noting that the "European Digital Financing Strategy" adopted at the European level by the member states had as its main objective the capitalization of all the opportunities offered by the digitization of the single market and with a direct orientation toward the direct benefits offered to users of digital financial services. Moreover, the functioning of the single market of digital products and services will lead to the improvement on the one hand of the access to these services of those in the industries, but above all to the creation of an access channel to this market for those who are financially excluded, which makes that the European digital financial market becomes more inclusive and closer to the needs of the many financially excluded.[2]

The year 2024 is the year in which the EU member states should have a stable and secure regulatory framework, which will support the development of innovative financial invitation services on the one hand, but above all the digital identity can be used, so that users of digital financial services to access these services in real time and with maximum efficiency. At the same time, in direct alignment with these financial innovations, we appreciate that the supporting regulations of the European financial market, such as the e-IDAS Regulation, should be revised and supplemented so that these digital financial services are characterized by trust and determination in accessing and their use.

The great challenge given by the digitization of finances is given by the cooperation at the European level of all the authorities and in real time, in response to the current challenges generated by the new innovative models, which on the one hand are managed by banking financial institutions, but on the other hand are managed by non-banking institutions, or even through their mix, which generates an increase in the degree of supervision in terms of risks and challenges.[3]

[2] Regulation (EU) no. 910/2014.

[3] https://ec.europa.eu/info/departments/structural-reform-support_ro

### *15.4.1 Support Program for Structural Reforms (PSRS)*[4]

Support program of the EU comes to the support of the member states to support the reforms generated by the digitization of finances. At the level of the Commission, in 2018, the FinTech digital finance laboratory of the European Union was established, within which all the institutions and actors involved in the development and support of digital financial innovations were brought together, including the authorization, supervision, and regulation institutions existing at the European level.

The creation of common infrastructure (including common data space) that meets the needs of the development of mechanisms for securing and supervising institutions involved in the development of innovations based on digital financial technologies represents a key priority in the optimal functioning of this digital financial market in the context of the digital era,[5] and with an impact on the increase of digital knowledge of the European societal environment, including the challenge of access to innovative technologies with the effects on the optimization of processes, the increase in security, and supervision at the institutional level. Networking and inter-institutional information and data exchange directly support European financial institutions internally and externally.[6]

The specific elements of digitization at the level of financial institutions trigger certain specific risks and changes, such as the following:

- Elements for strengthening financial stability starting from the well-known principle "same activity, same risk, same rules"
- The specific elements of protecting consumers of financial services and protecting markets
- Operationally strengthening the digital financial market

In order to know the realities of the population to which these innovative measures are applied, we took as an example some indicators derived at the level of Romania, respectively (Fig. 15.1).

*Indicator 1: Coefficient of the population"s financial financing capacity (Cdf)*

The formula is:

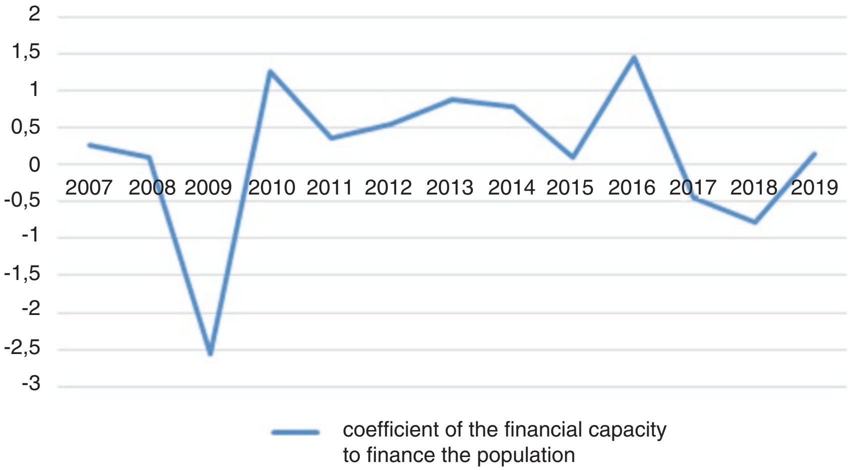
$$Cdf = \frac{\mathrm{CNP}}{\mathrm{AFP}}$$

[4] Idem[13]

[5] https://ec.europa.eu/info/funding-tenders/find-funding/eu-funding-programmes/digital-europe-programme_ro

[6] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12417-Digital-Services-Act-deepening-the-Internal-Market-and-clarifying-responsibilities-for-digital-services

https://ec.europa.eu/competition/consultations/open.html




*Source: own processing based on data from the Financial State of Romania project, CCFM,2022*

**Fig. 15.1** Cdf indicator during the reference period 2007 and until 2019

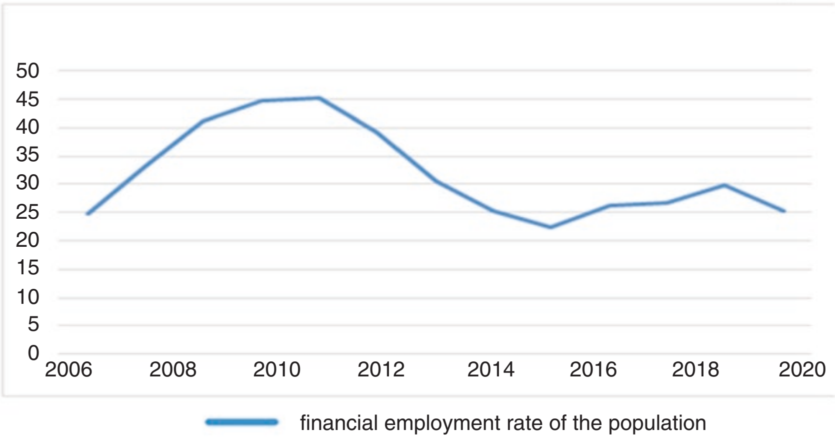
In the reference period, it is worth noting that the indicator recorded abnormal values, with the exception of 2009, 2017, and 2018) being influenced by the values of the primary indicators on which the derived indicator depends. The negative values recorded in 2009, namely −2.55%, actually meant a worsening of the population"s financial capacity, as can be seen from the graph and in direct correlation with the other indicators that reflect the financial state of the economy as a whole. It is obvious that in the last period of time, as a result of the multiple crises, the tendency to decrease the financial capacity experienced the same, respectively negative, evolution (Fig. 15.2).

*Indicator 2: Financial employment rate of the population ($R_{ap}$)*

The formula is:

$$Rap = \frac{\mathrm{DTP}}{\mathrm{AFP}} \times 100$$

The evolution of this indicator shows periods of growth, respectively, until 2011. After this period follows a period of decrease in the derived financial indicator, with trends close to the value recorded in 2007 (24.72%). In 2019, the indicator reached a value of 25.40%, and the trends are sensitive and follow the downward trend, generated by the degree of prudence of the population during periods of economic crisis. Moreover, we can observe from the evolution of this indicator and based on the calculation formula that the population"s ability to borrow is reduced, what we




*Source: own processing based on data from the Financial State of Romania project, CCFM,2022*

**Fig. 15.2** Indicator Rap of the population in the reference period

can say is that the population"s involvement in economic-financial relations is significantly reduced (Fig. 15.3).

*Indicator 3: The rate of financial indebtedness of the population ($R_{it}$)*

The formulas are:

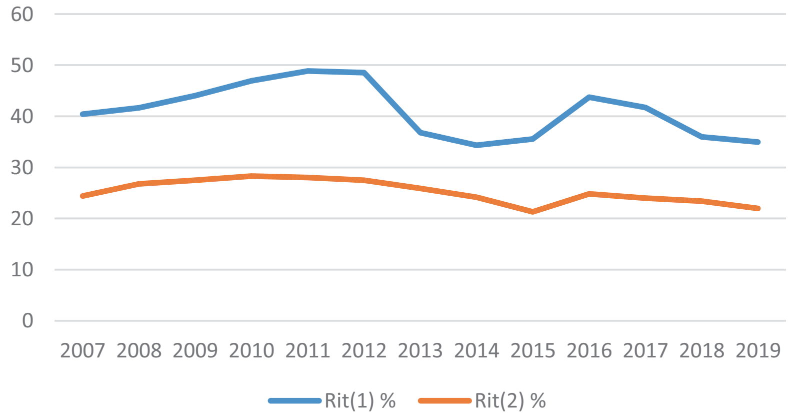
$$\mathrm{Rit}(1) = \frac{\mathrm{DTP}}{\mathrm{VDB}} \times 100$$

sau

$$\mathrm{Rit}(2) = \frac{\mathrm{DTP}}{\mathrm{GDP}} \times 100$$

The indebtedness rate, as can be seen from the graph, reflects the actual state of our economy, as well as the economic and financial state of the population. In order to reflect the evolution of the indicator in the reference period, it should be mentioned that this evolution is correlated with the dynamic mode of the indicator related to the saving of ($R_{ef}$), the rate of interest expenses for the loans committed by the population ($R_{cd}$), and the financialization rate related to citizens" incomes.

Correlatively, the dynamics of this indicator certify the financial state of the population (savings, consumption, etc.). At the national level, it is very important to adapt innovative financial instruments to the realities of financial indicators that




*Source: own processing based on data from the Financial State of Romania project, CCFM,2022*

**Fig. 15.3** Evolution of the Rit derivative indicator during the reference period

reflect the state of the population at a given moment and not to carry out experiments that can affect human lives.

We appreciate the Fintech financial instrument as an innovative solution for the financial market both from an innovative point of view and from the point of view of convergence and competitiveness of financial markets.

Fintech represents the bridge between finance and technology, especially in the context of artificial intelligence between humans and robots involved in the innovative development of the financial market. The European financial sector is more competitive and innovative, as it is oriented towards ensuring the integrity of the EU financial system following the application of the digital financial strategy at the European level (Fig. 15.4).[7]

The digital financial market has reached and will reach very high figures. For example according to Will McCurdy,[8] the total value of embedded finance "will reach $7 trillion" in 2026. Furthermore, business lending will be a key growth area for embedded finance and is expected to grow fivefold over the next five years from just 200 million dollars in 2021 to $1.3 billion by 2026. Another example is FinTech app Mmob, an embedded financial FinTech founded in 2020, which has PensionBee and iwoca as clients, raised £five million sterling in a seed round in March 2022. Modulr, which counts Revolut and financial resilience startup Wagestream as partners, secured a $108 million Series C funding round in the same month to expand the platform"s reach its embedded financing.

[7] Report Europena Commission COM(2017)340 final, 26.6.2017.

[8] Press release Will McCurdy, September 15, 2022.

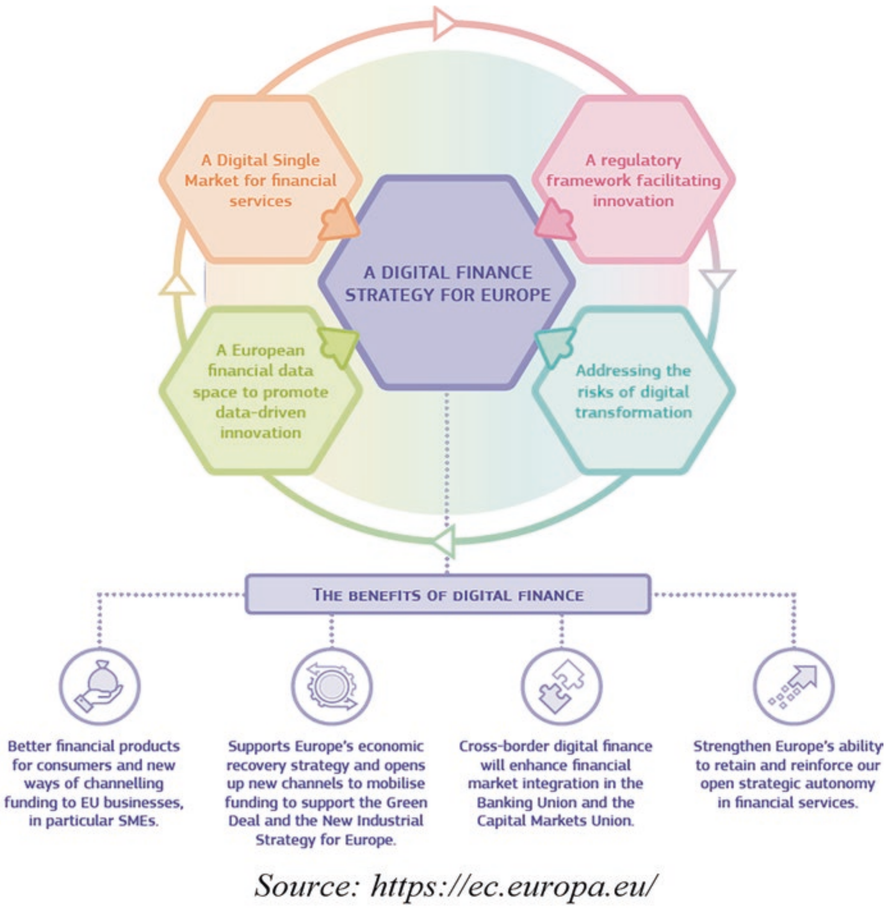



**Fig. 15.4** Digital financial strategy at European level

The evolution of purchases of FinTech applications by the main players of the financial market proves to us that this conclusion between finance and technology represents the future of finance. For example, the purchase of a cloud payment technology company by the JPMorgan financial group strengthens its position in the field of payments with innovative "Modernizing Payments" tools, a purchase made in 2022 according to official sources.[9]

Another relevant example is that of the Japanese financial group Mizuho involved in financial innovations in the field of the green bond market in euros, the transaction being 800 million euros, with the main purpose of the integrated green

[9] https://finbold.com/jpmorgan-acquires-cloud-payment-tech-firm-to-stay-at-the-forefront-of-payment-innovation/

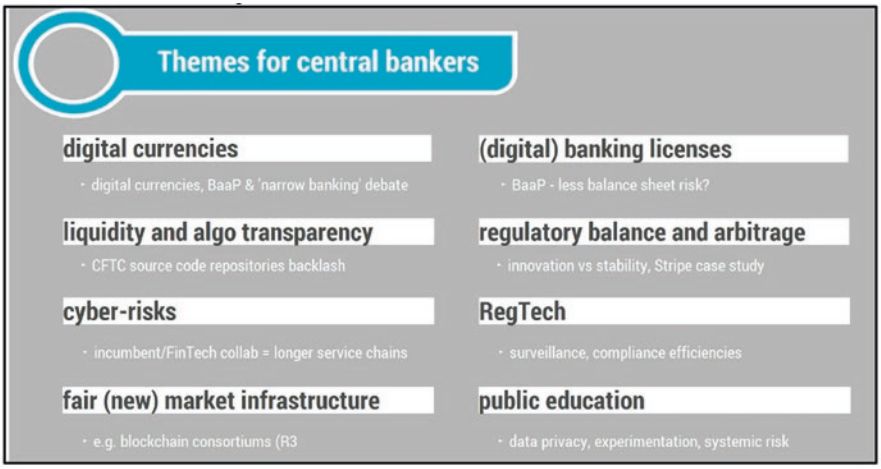



**Fig. 15.5** Main themes for central banks

financing of projects, the financial product having the following main characteristics, respectively, maturity on September 5, 2027, and interest rate of 3.490% (Fig. 15.5).[10]

## 15.4.2 Tech in Finance: Opportunities and Challenges

***Regulation of Digital Finance*** After approximately two years since the launch of the digital financing package by the Commission, we can say that progress has been made in the field of digital finance, especially in the legislative field. However, they are currently subject to major challenges, especially in the context in which innovation in the field of finance is accelerated, and multi-crises make it reach maximum heights. However, the main FinTech trends in 2022 should be noted, respectively:

1. *SWIFT transfers have become real time,* even more as a result of the innovative solutions of the new Fintech generation, payments are safer and faster globally, including using mobile technology.
2. *Biometric authentication.* The "open banking" standard encourages competition and innovation based on service quality. PwC, one of the major auditing and consulting firms, reports that almost 40% of bank clients are willing to share information related to transactions with other financial institutions. Open banking is a government-wide initiative that emerged in the United Kingdom in 2018.

[10] https://finbold.com/banking-giant-mizuho-issues-japans-largest-ever-eur-pegged-e800-million-green-bond/

It was proposed by the Competition and Markets Authority with the aim of boosting innovation and competition. At the European level, open banking has become part of PSD2 (Second Payment Services Directive), a directive designed to make payments safer, stimulate innovation, and help banking services adapt to new technologies. Open banking gives customers and businesses greater control over their own finances and the information shared with third parties. It also supports the emergence of new applications and solutions that were not possible before that connect users" finances.

3. *Mobile payments are starting to overtake card or cash payments.* Payments with mobile wallets or the iCard wallet are starting to be used more and more. Globally, mobile payments are forecast to grow from $1.15 billion in 2019 to $3.1 billion in 2024. In Europe, Sweden and Denmark are the top countries that have adopted mobile payments (36% and 41% of mobile payment users and smartphones). The United Kingdom (19%), the Netherlands (20%), Italy (21%), Switzerland (22%), and Norway (25%) are in the middle of the ranking, followed by other countries where mobile payments are used by fewer users: Germany (12%), France, Spain, and Finland (16%, 17%, and 18%).
4. *Biometric Authentication Payments Are Forecast to Grow ten-Fold by 2024,* reaching a total of $2.5 trillion (up from $228 billion in 2019). Biometric debit cards have been tested in Europe. They have a built-in fingerprint reader—the fingerprint is stored when the card is issued, so no one but the holder can use it.

## 15.5 Conclusions

The emergence of these new innovative technologies on the financial market causes the entire architecture of the financial market to change, and it is very important for our research to keep up with the news and trends in financial technologies, especially in the context where the financial industry is the pillar of support at European level and at global level, of integration, development, well-being, and societal sustainability. Therefore, paying attention to financial innovations, namely innovative companies in digital finance, open finance, and entrepreneurial finance, is a must for us financial researchers. Moreover, there are numerous predictions regarding the future of FinTech and numerous companies that through their activities and solutions are trying to shape the sector and create a new digital finance architecture. Among them, in 2022, the fastest growing FinTech companies are Paidy founded in 2008 and Paidy started as a Japanese payment company, currently has over 6,000,000 users. The year 2021 is characterized by new FinTech transactions, such as the transaction whereby an innovative FinTech company was acquired by the PayPal group for 2.7 billion dollars (USD). Papaya Global founded in 2016, which offers Software as a Service (SaaS) service managed through a platform with Israeli capital and whose main objective is to automate payroll procedures for employees internationally. Another relevant example is that of Grab Financial Group, which in 2018 focused on a new market niche, namely that of digital payments for loans, insurance, and other financial services, reaching in 2021 a value of 300 millions of dollars (USD) of capital raised from the capital market. The blockchain technology is associated with Dapper Labs, a company that was created in 2018 and is involved in the game development market, reaching 550 million dollars (USD) in the capital market. Rapyd and Mollie are FinTechs involved in the development of digital payment services, having raised more than $600 million each from capital market investors. In 2008, Fenergo company developed software products for institutions involved in the financial market, namely the well-known Client Lifecycle Management (CLM) product, by directly involving in the development of its clients" markets, especially in the management of compliance with the regulations in force. It is worth mentioning that they managed to attract more than 600 million dollars in financing from the capital market. The Trade Republic exchange that came into being in 2015 managed to attract in the year the sum of 900 million dollars (USD) from the capital market for the integrated development of the stock exchange platform. Founded in 2018, BharatPe is one of India"s largest FinTech startups, offering app-based payments and card acceptance options to business owners. In 2022, the figures that characterized the company were 1100 employees and the receipt of funding of 545 million USD (USD) from investors to develop new products and services.

According to the Global Banking Benchmark Study 2022, the financial banking industry should orientate its actions to make significant progress following the industry transformation process, i.e., open the team to innovation, innovation that is in line with the needs of customers and develops their ability to access innovative products and services with a direct effect on streamlining processes, through innovative and personalized digital applications applied to each type of customer and according to his specific needs. Therefore, the actions are given by:

(1) Creating rich customer profiles using internal and external data.
(2) Integrating channels to provide a seamless omnichannel experience (holistic approach).
(3) Digitization of core banking systems (banks must replace complex traditional core systems with modern architectures).
(4) The transformation from a product-centric to a customer-centric one.

All these are challenges and drive us to continue our research. Moreover, we appreciate that digital finance, entrepreneurial finance, and open finance will actively contribute to reshaping the present and future architecture of our financial system both nationally, Europeanly and globally. These new innovative financial instruments are concrete research subjects for us, and we appreciate that the results of our research will directly contribute to the creation of new strategies, policies and directives in the field of finance, oriented as much as possible to the needs of society and to the sustainable development of finance.

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