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## Article

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# FinTech regulation and the development of the FinTech sector in the European Union

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## ABSTRACT

The aim of the article is to identify the relationship between the level of regulation of various segments of the FinTech industry and the level of development of this sector. To address this research problem, the paper analyses the scope of regulation in 14 segments of the FinTech sector, and based on that, develops the FinTech Regulation Index for the individual European Union countries. Then, the paper uses this index to examine if there is a relationship between the level of regulation and the level of FinTech development in the various European Union countries. The econometric analysis confirmed the initial hypothesis that there is a significant relationship between the level of FinTech sector regulation and the level of its development.

*JEL Classification:* G2, G23

*Keywords:* FinTech, FinTech Regulation Index, digital innovations.

## 1. INTRODUCTION

Already a few years ago, the European Union noticed significant changes in the financial sector due to the digitalisation of financial services. Supervisors and regulators have been facing the challenge of regulating the FinTech sector and the various segments of finance supported by new technologies (Lehmann, 2020). Additionally, new market players and the possibility of operating in a single financial market in the EU present significant challenges in applying the same rules to the same activities. However, when analysing changes that have taken place in the environment of financial institutions, it can be observed that technology is developing exponentially, whereas the same cannot be said about the legislative process. The dynamics of technological change overtakes the regulatory process despite the fact that it is very advanced in the financial system. The uneven development of these two areas can lead to a risk of hampering

innovation. Moreover, innovations in the FinTech sector pave their way through the maze of regulations and unregulated areas (Kasiewicz & Kurkliński, 2018).

Undoubtedly, new technologies in the banking market have enabled the dynamic development and growth of interest in digital finance, which responds to the needs and preferences of financial market participants. Digital finance encompasses a wide range of products, applications, processes and business models that changed the way financial services are delivered to customers, and the FinTech sector exerts a significant impact on the development of the financial market. There is a need for significant changes in the regulation of the FinTech sector and the effectiveness of regulatory implementation. This is also an important issue for market regulators (Restoy, 2021). Most often, FinTech market regulation is dedicated to the payments segment (Khiaonarong & Goh, 2020), but this paper presents a broader approach that addresses a regulatory impact in the various segments of FinTech activities.

The paper presents the authors' attempt to identify the relationship between the regulation level of various segments of the FinTech industry and the development level of this sector in the European Union countries. The authors' analysis on the level of regulation of the FinTech sectors was based on data obtained from the World Bank database. It covers the level of regulation in more than 200 countries around the world until mid-2021. Additionally, the level of fintechisation was determined based on the Findexable database, which contains information about more than 11,000 FinTech companies.

## 2. LITERATURE REVIEW

Numerous banking regulations, poor confidence in financial institutions as well as conservatism of traditional banks have enabled the emergence and rapid development of new players in the financial market. Those entities propose a personalised offer in order to meet the needs of the modern customer of financial products and services. Solutions based on new technologies most often focus on providing services using the internet and mobile devices.

Recently, the concept of financial technology (FinTech) has attracted extensive attention from international organisations and regulators, in particular, as regards the ways to achieve a “win-win” situation between financial institutions' FinTech innovation and effective regulation (Yueling et al., 2021). In legal and regulatory debates on issues related to regulatory regimes, the FinTech sector is increasingly mentioned in terms of the need for regulatory changes that could replace the traditional approaches to systemic risk and financial stability regulatory models (Saule, 2020). Effective financial regulation is clearly crucial to innovation and the future success of the financial services industry and, specifically, the FinTech sector (Treleven, 2015). However, regulating the FinTech sector presents significant challenges. The rapidly evolving technological landscape poses challenges for financial regulators, which are already facing the need to address a broader set of regulatory objectives and policy priorities (Bromberg et al., 2017). Digital innovations are created very quickly, along with emerging activities of new players in the financial market. This leads to the situation when regulators need to change their approach to regulating the financial sector towards a new model of regulation that takes into account digital finance (Douglas et al., 2017).

The European Commission noticed a significant impact of the FinTech sector on traditional finance. For this reason, it adopted in March 2018 an action plan for the FinTech sector to support a more competitive and innovative European financial sector (European Commission, 2020). Initiatives taken by European authorities aim to enable the rapid initiation of innovative digital financial solutions across EU countries. Digital innovation also generates various risks. Therefore, the main objective of creating a safe, single, innovative and digital banking market in the EU is to ensure consumer protection and enhance financial stability. Digital innovation brings significant

benefits, both to consumers and businesses, as well as to financial institutions, by enabling greater access to financial services. It also fosters the elimination of national barriers and leads to dynamic growth in the European single market, especially in the e-banking, money transfer, social lending and personal finance sectors.

The Digital Finance Strategy is a new digital roadmap based on a new plan of cooperation with FinTech towards a more competitive innovative European financial sector (European Commission, 2018). In recent years, the financial sector has become the largest user of digital technologies, but it is also a major source of digital innovation.

FinTech entities very often provide their services in one or more financial sectors. Therefore, they should not be fully regulated like credit institutions. Nevertheless, it is worth bearing in mind that these new actors create new services and processes that may not have been subject to supervision and regulation so far. A lack of control of such entities may not only lead to inadequate consumer protection in the financial market but also threaten the stability of the financial sector (Chen et al., 2019)<sup>1</sup>. In this context, it is worth considering measures aimed at bringing new innovative business models, especially FinTech companies, under regulation and supervision.

The EU encompasses many economies and may therefore have different regulatory approaches to innovative solutions. National supervisors should cooperate with each other so that the approach to regulation is uniform in each EU country. The European Commission is therefore seeking to set a clear and consistent direction for authorisation requirements for FinTech companies. This direction will encourage the setting of common FinTech standards and solutions. The preferred approach is to develop global operating standards. One of the first challenges for the financial sector in this respect was the implementation of the Payment Services Directive 2 (PSD 2 Directive). It was based on global collaboration between banks and FinTech companies. As part of it, banks had to create and open appropriate communication channels to enable FinTech companies to provide their services based on access to payment accounts held by banks. To assist national supervisors, an innovation-friendly environment is being created in cooperation with national coordinators/innovators. Such environments are innovation hubs and regulatory sandboxes (EBA, 2017)<sup>2</sup>. Therefore, creating the conditions for innovative business models in the EU using innovation coordinators is necessary.

The rapid growth of the FinTech market has created numerous challenges for market regulators and supervisors. The FinTech sector has the potential to significantly impact the stability of the financial system and its safety, especially in the context of cyber-attacks. Following the 2007–2009 financial crisis, numerous legislation acts had an impact on the perception of banking sector stability. However, the widely highlighted lack of regulation of FinTech activities could lead to significant stability problems of the financial sector as a whole. The European Commission and supervisory authorities recognise the rapidly growing FinTech sector and attempt to identify possible risks emerging from it.

The direction of change that eliminates the risks associated with financial innovation is one that ensures consumer protection and attention to financial stability. The quality of law or even the lack of it in terms of consumer protection, such as in crowdfunding and community lending, should also be improved. There is also a need for legislative acts to ensure that financial stability is strengthened alongside the development of financial innovation. The European Parliament has therefore called on regulators and supervisors to continuously monitor the impact of digitalisation on the competitive situation in all key segments of the financial sector.

<sup>1</sup> Research shows that some start-ups can negatively impact financial sustainability, see more: Chen et al. (2019).

<sup>2</sup> “*Innovation hub*” refers to an institutional arrangement in which regulated and unregulated entities (e.g. unlicensed companies) establish a relationship with a competent authority to share information, views, etc. and to obtain clarification on the compliance of business models with the legal framework or regulatory or licensing requirements (i.e. individual guidance for companies on the interpretation of applicable regulations). “*Regulatory sandboxes*” provide financial institutions and non-financial companies with a controlled space where they can test innovative FinTech solutions with the support of an authority for a limited period of time, and thus validate and test their business models in a secure environment.

Technological innovation in financial services is evolving rapidly and there are and will continue to be opportunities and threats to financial stability that regulators and supervisors should pay close attention to. Risk analysis is particularly important because many financial innovations have yet to be tested in a full financial cycle, and decisions taken at this early stage can be the basis for maintaining stability in the whole financial sector. Currently, any assessment of the impact of the FinTech sector on financial stability is difficult due to the very limited availability of official data, which is very often only held by the private sector. The lack of access to data and the lack of regulation of the FinTech sector, which has been very often mentioned in many opinions of researchers and practitioners, implied a request by G20 countries to the Financial Stability Board (FSB) to formulate a report on regulatory and supervisory issues in the development of the FinTech sector and its impact on financial stability. The FSB has identified three key areas in international cooperation: operational risk management, cyber threat analysis, macroeconomic risk monitoring. The FSB emphasises the role of international cooperation in the regulation and supervision of the FinTech sector, which will reduce the risk of regulatory fragmentation or divergence (Kobza, 2019). Both the European Parliament and the European Council called on the European Commission to prepare a legal framework. The framework:

- a) will be more oriented towards the development of the FinTech sector;
- b) will be open to digitalisation;
- c) and will create an environment where innovative FinTech services and solutions can be rapidly deployed across the EU member states.

The aim of this framework is to achieve the economies of scale of the single market without undermining financial stability or weakening consumer and investor protection (European Commission, 2018). The European Commission's plan provides an overview of initiatives and an action plan for the development of the FinTech sector in the EU countries. The European Commission has also proposed a plan to support the introduction of financial innovation into the financial sector in order to make the financial sector safer and more resilient and to create the conditions for the spread of innovative business models across the EU.

The increasing area of FinTech companies' activity leads to the establishment of research teams operating alongside institutions that form a financial safety net at the national and international levels. The European Banking Authority (EBA) has identified the following challenges facing the financial market as a result of the emergence of technological innovation (EBA, 2018b):

- consumer protection,
- prudential risk analysis,
- impact of the FinTech sector on the business models of financial institutions,
- creation of regulatory sandboxes,
- impact of technological innovation on the resolution of credit institutions.

The EBA is particularly focused on consumer protection in the financial market. Digitalisation of financial services leads to the exposure of financial institutions and their customers to cyber-attacks. As a result, financial institutions incur an increasing cost to protect their consumers against the risks associated with the growth of the internet. The scale of the financial institutions' operations enables them to work continuously on their security system and to cover costs related to this work. FinTech companies very often do not possess significant capital and have not significant capital expenditures related to security systems and consumer protection. As a result, FinTech companies may have a considerable problem with proper consumer protection. It is therefore a very important task to identify and mitigate prudential risks.

The lack of regulation of the FinTech sector specifically encourages entities concerned to create a regulated space for the development of financial innovation. FinTech companies are relatively young entities that are very often unregulated. Therefore, it is difficult to obtain financial data on their activities. As a result of the aggressive expansion of FinTech companies in the financial market, the amount of analysis of this market in the literature increases. However, due to the lack



of statistical data, their analysis is a challenge (Yinqiao et al., 2017). The reason for this is that it is a very innovative, young sector which is difficult to quantify. Solving supervisory problems which are difficult or practically impossible to quantify with the application of quantitative methods can be considered not only a fundamental regulatory mistake but also an idea that creates barriers for traditional banks and prevents them from doing their business (Koleśnik, 2017). Therefore, the shape of regulation (in particular, its stringency) is very important, which, together with ICT innovations, will determine the future development of the banking sector – see Table 1 (O’Brien & Keith, 2009). The market regulator/supervisor can directly verify either the idea could exist in the market within the regulatory framework already implemented or the solution will require regulatory adaptation (Marchewka-Bartkowiak, 2018).

**Table 1.**

Scenarios for the banking future depending on the stringency of supervisory regulation and ICT innovation

Specification		Stringency of supervisory regulation	
		High	Low
ICT innovation	rapid	new technologies widely used by supervisors in both regulatory and day-to-day operations	elimination of technological and regulatory barriers, which leads to the appearance of a global market based on self-regulation and good practice
	slow	strong emphasis on safety rather than development of new technologies or products	steady emergence of transnational markets based on self-regulation and good practice

Source: Koleśnik (2017).

A number of studies indicate that, depending on the actors that implement new technologies in the financial world, they comply with or significantly violate rules/regulations (Dermot, 2021). An important challenge for the financial market is the fact that there is no single approach to methods of regulation of the FinTech sector. Everything depends on the approach of the national regulator (Yesha, 2020).

### 3. METHODOLOGY, DATA AND RESULTS

Due to the rapid growth of FinTech companies and their wide range of activities, national financial market regulators/supervisors approach the regulation of the various FinTech segments in different ways. In line with the World Bank’s methodology and based on the Global Fintech-enabling regulations database, the FinTech sector was divided into 14 tiers. This division is in line with the division of the FinTech sector proposed, among others, by Ehrentraud et al. (2020):

- Anti-money laundering – regulations and rules related to anti-money-laundering/combating the financing of terrorism,
- CBDC – includes those that are actively working on understanding the feasibility of the economics and technology surrounding Central Bank Digital Currencies,
- CDD – Community-Driven Development (CDD) programmes operate under the principles of transparency, participation, local empowerment, demand responsiveness, greater downward accountability, and enhanced local capacity,
- Cryptocurrency – very few have issued regulations on cryptocurrencies; there are, however, guidelines on their use as outlined below,

- Cybersecurity – regulations and rules as related to cybersecurity,
- Equity crowdfunding – regulations or guidelines in this regard,
- P2P,
- Data protection – includes laws and regulations relevant to the security and transmission of data,
- Digital banking – the treatment of digital-only banks as part of the regular bank licence or as a separate entity in the banking system,
- Digital ID – includes those that currently have digital ID systems and regulations surrounding them,
- Electronic money – highlights the ability to conduct electronic transactions including the ability to use debt-like instruments, i.e. so called e-money,
- Electronic payments/transactions,
- Innovation facilitators – typically, innovation facilitators are one of three types: innovation hub, regulatory sandbox and regulatory accelerator,
- Open banking – regulation that allows a bank to share customer data with customers' consent and in their interest.

In view of more and more emerging technological innovations in the banking sector, one can also observe an increasing number of entities applying for a licence granted by the national authorities responsible for licensing entities in the financial market. Therefore, an important challenge is the licensing of new entrants by national authorities but also the sealing of regulations already in place. In order to ensure the full transparency of the research conducted, the authors based their study on the level of regulation examined by the World Bank. The information collected focuses primarily on legislation and regulations implemented, but also includes related guidelines where relevant. These are laid out in a searchable, easy-to-use format. The database covers country treatments of two foundational regulations such as anti-money laundering and countering financial terrorism and the rules to combat cybercrime as well as regulations specific to FinTech business models such as digital banking and cryptoassets and marketplace lending (World Bank, 2022).

The analysis of the level of regulation in selected financial market segments varies according to the level of development of the regions under analysis. It is also worth noting that several segments around the world are significantly regulated and some are not sufficiently regulated by national supervisory authorities. Significantly regulated FinTech sectors are:

- Digital banking – 197 countries have regulated this sector, 1 country has not,
- Anti-money laundering – 194 countries have regulated this sector, 4 countries have not,
- E-money – 178 countries have regulated this sector, 20 countries have not,
- Cybersecurity – 173 countries have regulated this sector, 25 countries have not.

There are also areas of FinTech that are materially unregulated as regards the conduct of business. These are primarily sectors related to the cryptocurrency market (only 25 countries have regulations in this area, 173 do not have them) and the sector of digital currency of central banks – CBDC (54 countries have regulations in this area, while 144 do not have them). It is also worth noting that financial market regulators are sceptical about supporting innovation implementation processes in a regulated environment – through, among other things, an innovation hub and a regulatory sandbox (75 countries have regulations, while 123 do not have them).

Creating a regulated environment for digital innovations in the financial market is particularly important. Unlike traditional financial innovation implementation centres, which provide legal advice on demand, the regulatory sandbox approach usually involves a prior application process with the regulator/market supervisor. A company – usually a FinTech company applying to participate in a regulatory sandbox – must meet numerous criteria set by the sandbox developer. The undoubted advantage of the regulatory sandbox is that both regulated entities (financial institutions) and unregulated entities (e.g. start-ups) can participate in it. Additionally, a regulatory

sandbox can address supervisors' challenges to improve consumer protection in the financial market. Benefits of participating in a regulatory sandbox are:

- shortening the process of introducing innovations into the market,
- enabling FinTech companies (mainly start-ups) to access funding more easily,
- allowing more services to be tested,
- enabling cooperation between the supervisor and a FinTech company on the application of consumer protection safeguards to the financial service offered.

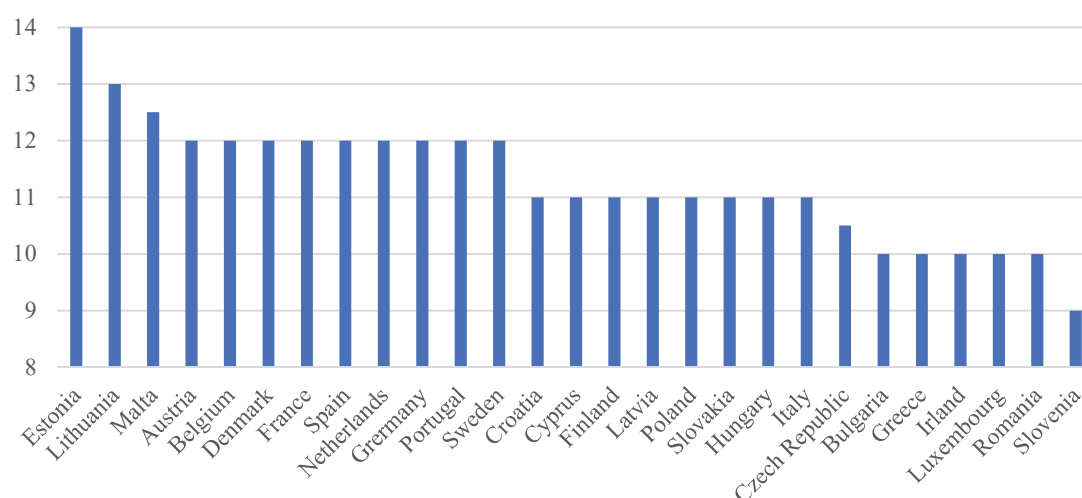
Despite the many differences between the regulatory sandboxes in use, the EBA's report indicates that they also have many features in common, among others (EBA, 2018a):

- they are aimed at the entire FinTech sector,
- they are open to both large, regulated institutions and unregulated start-ups,
- they have virtually the same goals.

Based on data from the above mentioned database, the paper proposes an Index of FinTech Regulation based on three scores: a regulated segment is attributed 1 point, unregulated but not banned one – 0.5 points, not regulated – 0 points. Based on this index, it is possible to identify countries that have a very restrictive and intensive regulation of their FinTech sectors (e.g. Estonia, Lithuania, Malta) and countries that are less determined in regulating their FinTech sectors (e.g. Slovenia). Figure 1 presents the results of the above-mentioned index for each EU country. Analysing various FinTech segments, the most heavily regulated FinTech areas are: anti-money laundering, CDD, cybersecurity, data protection, digital banking, electronic payments/transactions and open banking, while the least regulated are cryptocurrencies and CBDC.

**Figure 1.**

FinTech Regulation Index in the EU countries in 2021 (in points)



Source: Own presentation based on the World Bank database – Global Fintech-enabling regulations database.

EU countries also show variation in the level of regulation of the FinTech sectors. Countries such as Slovenia, Romania, Luxembourg, Ireland, Greece or Bulgaria can be considered moderately focused on FinTech regulation, while Estonia, Lithuania and Malta belong to leaders in terms of FinTech market regulation. Within the EU's single financial market, different levels of the sector regulation can significantly affect safety of the market. A remarkable level of FinTech market regulation in Baltic countries (Estonia and Lithuania) can be linked to the large number of players operating in these markets. In Lithuania, the rapid increase in the number of FinTech companies was a result of Brexit, after which FinTech companies from the UK wishing to continue operating in the EU single market had to apply for a licence in one of the EU member states. Lithuanian regulations are characterised by both fast procedure for obtaining a licence and preferential tax arrangements.



#### 4. THE IMPACT OF REGULATIONS ON THE FINTECH SECTOR DEVELOPMENT

Indicative capture of the FinTech sector is a significant challenge, primarily due to the continuous nature of change in this sector as well as the relatively short lifespan of financial market players. Therefore, the literature review noted several indices used to classify the sector. One of the most common FinTechisation indices is a group of indicators covering the entire FinTech system proposed by global company Findexable. It is a digital platform that allows investors to get an up-to-date assessment of the level of the FinTech sector development in a single country as well as in major financial centres of the world. A competitive advantage of this database is manifested, among other things, in the real and up-to-date analysis of the changing components of the FinTech sector. The main objective of the Global Fintech Index database (GFI) is to increase the capacity and transparency in the global financial system focused on the implementation of financial innovation. Within that index, several factors have been identified that indicate its main features:

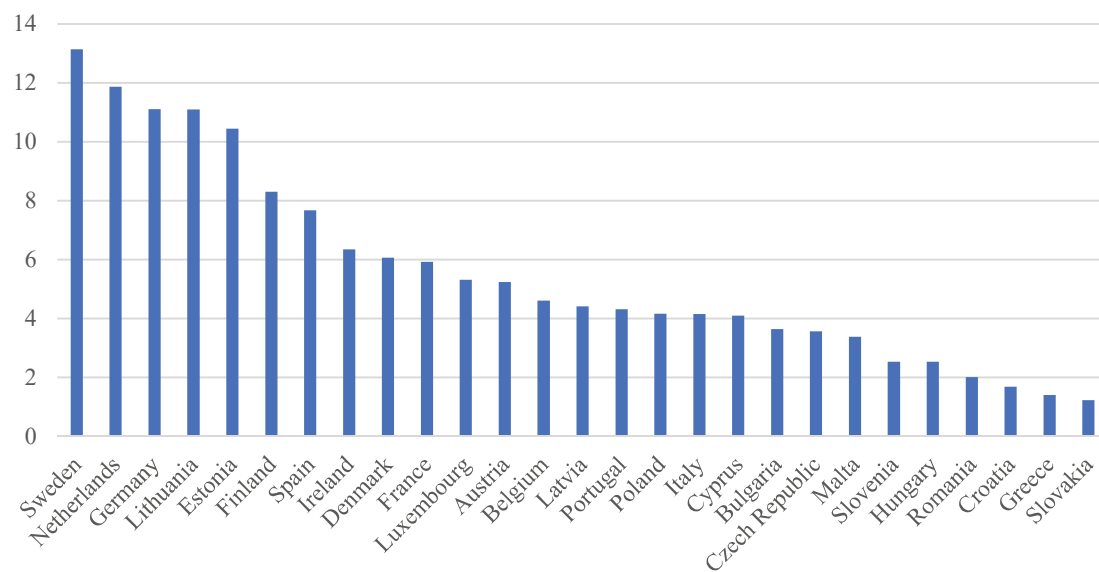
- neutrality – a strictly proprietary algorithm generates a real-time ranking which is not subject to change by an expert group,
- reality – the report is generated in real time, allowing an up-to-date assessment of the financial market situation and the level of innovation development of this sector,
- scale of activity – the index covers the entire developed financial market (global), which enables a comparative analysis between countries and cities,
- wide range of data provided by authorities analysing the role and scale of innovation implementation in the financial system.

FinTech companies have an extensive impact on the global financial system and the global economy. They help to access financial services in emerging markets and facilitate the transfer of money and international exchange. FinTechs are perceived as the ‘heart’ of digital technology in the financial world. They enable better communication between countries and regions and reduce the dependence on traditional financial institutions. Therefore, it is important to analyse and classify countries in terms of their FinTech sector development. Accordingly, different FinTech indices have been proposed in the financial world, such as the Global Fintech Index proposed by Findexable, a global data and analytics company. The index ranks the FinTech ecosystem across more than 200 cities and 60 countries, examining the activities of more than 7,000 FinTech companies. Figure 2 presents this index for the EU countries. Based on this index, Sweden, the Netherlands, Germany and Lithuania can be identified as the leaders in implementing innovations. On the other hand, there are countries that are the least successful in implementing innovations, such as Croatia, Greece and Slovakia.

The next step was to compute the correlation between the FinTech Development Index (Figure 2) and the FinTech Regulation Index (Figure 1). The results are presented in Model 1, which demonstrates a significant relationship between the analysed variables.

**Figure 2.**

FinTech Development Index in the EU countries in 2021 (in points)



Source: Own presentation based on Findexable: The Global Fintech Index database.

**Model 1**

Least squares approximation, observations used: 1–26

Dependent variable (Y): FinTech Development Index

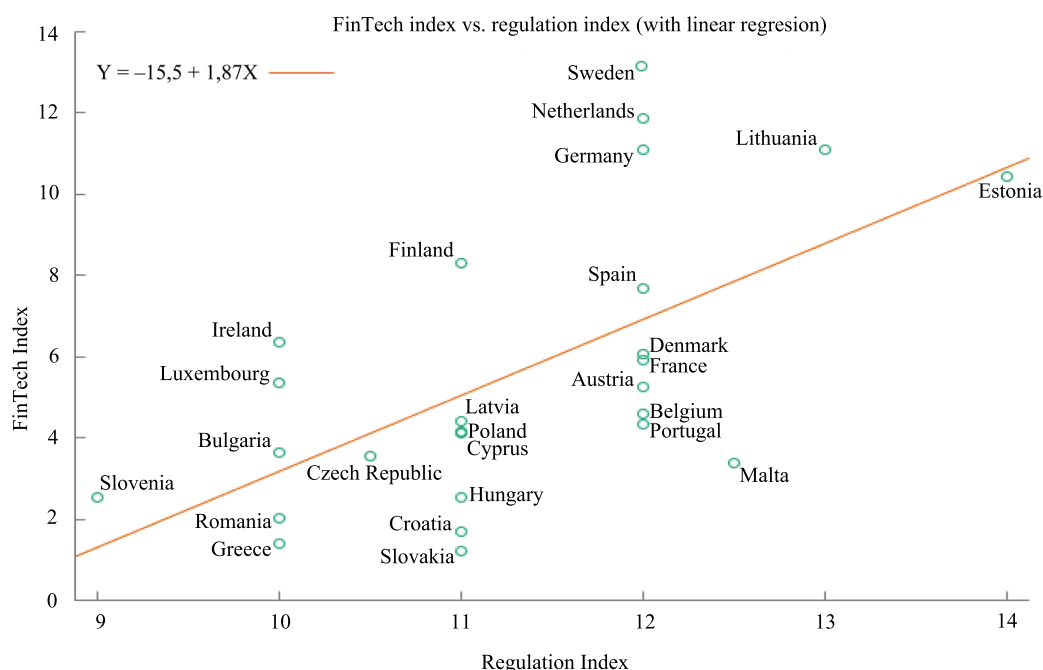
	<i>Factor</i>	<i>Standard error</i>	<i>t-Student</i>	<i>p-value</i>	
const	−15.5119	5.72810	−2.708	0.0123	**
Regulation index	1.86881	0.504218	3.706	0.0011	***
Arithmetic mean of dependent variable	5.620000	Standard deviation of dependent variable		3.451299	
Residual sum of squares	189.3863	Standard error		2.809109	
Coefficient of determination (R-square)	0.364020	Adjusted R-square		0.337521	
F(1, 24)	13.73705	P-value for F-test		0.001103	
Logarithm of reliability	−62.70640	Akaike information criterion		129.4128	
Bayesian information criterion	131.9290	Hannan-Quinn information criterion		130.1374	

The results of the analysis are also presented in Figure 3, which allows for a number of observations:

- the Baltic countries have the most developed, but also most regulated, FinTech sectors (apart from Latvia, which has a number of reputational problems in the financial industry),
- the Netherlands and Germany have highly developed FinTech sectors with relatively strong regulations,
- there is a group of countries with relatively strong regulations but low development of the FinTech sector, which illustrates the need for future research on factors stimulating financial innovations,
- however, the least regulated countries have on average the lowest level of development of their FinTech sector.

**Figure 3.**

Correlation between the FinTech Development Index and the FinTech Regulation Index in 2021



Note: FinTech Index refers to the FinTech Development Index; Regulation Index means the FinTech Regulation Index.

Source: Own calculation.

## 5. CONCLUSION

The European Commission and regulators, noting the rapidly growing FinTech sector, try to identify possible resultant risks in this sector in terms of digital inclusion (EBA, 2019; Vives, 2017; FSB, 2017). Therefore, they recommend the implementation of good practices that contain, among others, more effective consumer protection as well as the creation of a regulated environment conducive to the implementation of technology-based solutions such as regulatory sandboxes and innovation hubs (EBA, 2018b). New players in the financial market cannot be characterised by a high level of public trust in their solutions, which can lead to deterioration of digital inclusion and a decrease in the level of financial market safety. Therefore, regulatory sandboxes can be perceived as an innovative ex-ante regulatory impact assessment tool (Marchewka-Bartkowiak, 2019). Nonetheless, new regulatory initiatives for the FinTech sector are particularly important, although the rapidly growing financial sector compounds the difficulty with creating new legislation.

Given the significant challenge in implementing financial sector regulation, the EBA has proposed that existing laws/directives on regulatory requirements should also include guidelines and recommendations for the financial sector that could provide a basis for changes in subsequent implemented regulatory requirements. Therefore, the regulation index contains not only „hard regulations” such as the PSD 2 Directive but also „soft regulations” which are based on guidelines and recommendations issued by regulatory authorities. National regulators, noting the dynamic digitalisation process in society and the difficulty with clear identification and classification of digital innovations in the banking sector, target their regulatory activities at the areas of modern technology, innovation and cybersecurity. An example might be the Polish Financial Supervision Authority, which decided to publish in 2019 the Digital Supervision Agenda, which contains a roadmap for its digital innovation activities and initiatives. The document presents four thematic areas and directions of the FSA’s activities in terms of new technological and business phenomena in the financial market and the need for digital transformation (KNF, 2019). These areas include:

- new developments in the financial market,
- supporting FinTech,
- cybersecurity,
- electronic government.

Regulating the FinTech sector is a significant challenge. Constant changes in its business models and significant innovativeness hinder the implementation of effective legal regulations. National regulatory authorities implement financial regulations related to the dynamic development of new technologies to a varying degree and extent. When analysing the level of FinTech regulation in EU countries, segments like payments and open banking can be assessed as significantly regulated ones. On the other hand, the direction and scale of regulation in other segments of digital finance – e.g. cryptocurrencies and CBDCs – have not yet been clearly defined by EU countries. This indicates the need for significant changes in the approach of national regulators to the dynamics of implementing regulatory changes and the necessity to accelerate work in this area.

The paper proposed and analysed the FinTech Regulation Index for the EU countries, based on the World Bank data. The index allowed for researching the relationship between the regulatory attitude and the development of the FinTech sector in the EU countries. The empirical analysis allowed for detecting a significant correlation between these variables, which may contribute to the discussion on the impact of the level of regulation on the development of digital innovation and, more broadly, on financial market stability and growth. Moreover, an additional problem has been identified. The objective of the EU regulators to set the same rules for the same activity in the EU single market may not be implementable due to different approaches of national regulators to their FinTech sectors.

The significant relationship between the FinTech Development Index and the FinTech Regulation Index illustrates the important role of supervisors and regulators in ensuring safety of the rapidly growing FinTech sector. The research shows a special role of Baltic states (Estonia and Lithuania) in the digitalisation of the banking sector. The increasing number of players and innovative solutions being implemented in these countries and the level of financial market regulation may set the future direction of change for other countries. It should be noted that the context of the single financial market within the EU plays an important role in the development of this market. Therefore, the FinTech Regulation Index proposed by the authors allows for analysing the level of regulatory advancement in a country and indicates its relationship with the level of FinTech sector development. The FinTech Regulation Index and the FinTech Development Index are significantly correlated. This indicates a very high level of regulation due to the rapid development of the FinTech sector in the EU countries. Nevertheless, it is also possible to identify countries that have a high level of FinTech regulation and a relatively low FinTech Development Index (Malta, Belgium and Portugal) and countries that have a low level of FinTech regulation and a relatively high FinTech Development Index (Finland, Ireland, Luxembourg).

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## ANNEX

	Anti-money laundering	CBDC	CDD	Cryptocurrency	Cybersecurity	Equity crowdfunding	P2P	Data protection	Digital banking	Digital ID	Electronic money	Electronic payments/ transactions	Innovation facilitators	Open banking
Austria	1	0	1	0	1	1	1	1	1	1	1	1	1	1
Belgium	1	0	1	0	1	1	1	1	1	1	1	1	1	1
Bulgaria	1	0	1	0	1	0.5	0.5	1	1	1	0	1	1	1
Croatia	1	0	1	1	1	0.5	0.5	1	1	1	1	1	0	1
Cyprus	1	0	1	0	1	0.5	0.5	1	1	1	1	1	1	1
Czech Republic	1	0	1	0	1	1	0.5	1	1	1	1	1	0	1
Denmark	1	1	1	0	1	1	1	1	1	0	1	1	1	1
Estonia	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Finland	1	0	1	0	1	1	1	1	1	1	0	1	1	1
France	1	1	1	0	1	1	1	1	1	1	0	1	1	1
Greece	1	0	1	0	1	1	0	1	1	1	0	1	1	1
Spain	1	1	1	0	1	1	1	1	1	1	0	1	1	1
Netherlands	1	1	1	0	1	1	1	1	1	1	0	1	1	1
Ireland	1	0	1	0	1	0.5	0.5	1	1	0	1	1	1	1
Lithuania	1	1	1	0	1	1	1	1	1	1	1	1	1	1
Latvia	1	0	1	0	1	0.5	0.5	1	1	1	1	1	1	1
Luxemburg	1	0	1	0	1	0.5	0.5	1	1	1	0	1	1	1
Malta	1	0	1	1	1	1	0.5	1	1	1	1	1	1	1
Germany	1	1	1	0	1	1	1	1	1	1	0	1	1	1
Poland	1	0	1	0	1	0.5	0.5	1	1	1	1	1	1	1
Portugal	1	0	1	0	1	1	1	1	1	1	1	1	1	1
Romania	1	0	1	0	1	0.5	0.5	1	1	1	0	1	1	1
Slovak Republic	1	0	1	0	1	1	1	1	1	1	1	1	0	1
Slovenia	1	0	1	0	1	0	0	1	1	1	1	1	0	1
Sweden	1	1	1	0	1	0	1	1	1	1	1	1	1	1
Hungary	1	0	1	0	1	1	1	1	1	1	0	1	1	1
Italy	1	1	1	0	1	1	0	1	1	1	0	1	1	1
Total	27	9	27	3	27	21	19	27	27	25	16	27	23	27
					legislation	1								
					unregulated but not prohibited	0.5								
					no legislation identified	0								