

# Financial Law Review

No. 34 [2]/2024

UNIVERSITY OF GDAŃSK • MASARYK UNIVERSITY • PAVEL JOZEF ŠAFÁRIK UNIVERSITY  
<http://www.ejournals.eu/FLR>

MICHAŁ POLASIK\*  
AGNIESZKA BUTOR-KELER\*\*  
PAWEŁ WIDAWSKI\*\*\*  
GRZEGORZ KELER\*\*\*\*

## EVALUATING THE REGULATORY APPROACH TO OPEN BANKING IN EUROPE: AN EMPIRICAL STUDY<sup>1</sup>

---

\* Associate professor at the Faculty of Economic Sciences and Management at the Nicolaus Copernicus University in Torun, Poland and director of the Centre for Digital Economy and Finance NCU. He is the author of over a hundred academic publications on retail payments and digital finance. He is also a team member of the evaluation project for the European Commission under the “Study on the application and impact of Directive (EU) 2015/2366 on Payment Services (PSD2)”. Contact email: [Michal.Polasik@umk.pl](mailto:Michal.Polasik@umk.pl), <https://orcid.org/0000-0002-7790-4839>.

\*\* Assistant professor at the Warsaw School of Economics and author of several publications related to the development of FinTech financial innovations. She specialises in the area of new technologies in the financial services market, fraud prevention and the development of cryptocurrencies. Contact email: [abutor@sgh.waw.pl](mailto:abutor@sgh.waw.pl), <https://orcid.org/0000-0002-2761-3144>

\*\*\* Assistant professor at the University of Warsaw, Faculty of Law and Administration, Head of Centre for Regulation of Financial Services and Technologies, Poland. Specialising in financial market law, in particular payment services and legal aspects of digital finance. Contact email: [p.widawski@wpia.uw.edu.pl](mailto:p.widawski@wpia.uw.edu.pl), <https://orcid.org/0000-0003-0457-360X>

\*\*\*\* Assistant professor at the University of Warsaw, Faculty of Management, Department of Business Law, Doctor of law and advocate. Specialising in financial law, in particular tax law and regulations of the financial market. Contact email: [gkeler@wz.uw.edu.pl](mailto:gkeler@wz.uw.edu.pl), <https://orcid.org/0000-0003-2655-4135>

<sup>1</sup> Funding: This research was supported by the National Science Centre of Poland under grant no. 2017/26/E/HS4/00858 (PayTechImpact.EU). We would like to thank Dominik Sadłakowski and Natalia Tetkowska, members of the Centre for Digital Economy and Finance of the Nicolaus Copernicus University in Torun, for their work in the PayTechImpact.EU research project.

## Abstract

This paper assesses the impact of the regulatory approach to open banking in Europe. The evaluation is based on a review of the revised Payment Services Directive (PSD2), Regulatory Technical Standards (RTS) and the studies of experts from 30 countries as part of the PayTechImpact.EU project. The study aims to examine the effects of the introduction of the PSD2 regulation in the EU. The results of the study reveal that PSD2 is an example of an effective lawmaking process. It focuses on stimulating innovation and creating new value for customers, while concurrently developing the competitiveness of the payment services market. EU regulation has proved to be an effective instrument for creating an open technical infrastructure in the payment services market. Infrastructure development within the European Community regulatory framework has lowered the entry barrier for payment services. Open banking has strengthened consumer security and resulted in fraud reduction. However, the high financial costs incurred in implementing PSD2 has limited its positive impact. The most important issues identified include inconsistent regulatory requirements for non-bank financial companies, the imperfect development of API-based open banking infrastructure, and problems with lost transactions. An analysis of the PSD3, PSR1, and FIDA regulatory proposals indicates that they adequately address the identified outcomes of PSD2 and expectations of financial sector stakeholders.

**Keywords:** payment services, open banking, European Union regulations, PSD2, PSD3, PSR, FIDA, banks, FinTech

**JEL Classification:** E42, G21, G23, K23, K24, O33

## 1. Introduction

*“Open Banking can be very useful – to consumers, but also to companies that want to offer different kinds of financial services. (...) The EU saw the potential and we put rules in place for Open Banking with the second Payment Services Directive. (...) By 2021, less than 5 percent of consumers in the European Union were using Open Banking. So, to say that hasn’t reached its potential is rather an understatement. (...) It will be made up of a revision, [...] of the Payment Services Directive – which will include addressing some of the problems with Open Banking – and then a new proposal on Open Finance. (...) Open Finance also links into the EU’s broader Data Strategy by ensuring a level playing field, no matter what sector.”*

Commissioner Mairead McGuinness, Keynote speech, the European Parliament Brussels, 21 March 2023

This statement by the EU Commissioner indicates the perception of the development of open banking as an important component of the EU Community's digital economy strategy. It also stresses the use of dedicated EU Community regulations to stimulate this process. At the same time, dissatisfaction with the current state of implementation of economic policy objectives is expressed and further regulatory action is announced. Therefore, investigating these processes through the lens of the financial sector becomes an important scientific challenge accepted by the authors of this paper.

The concept of open banking has been defined, *inter alia*, by the European Banking Authority (EBA) – Working Group on Electronic Alternative Payments, thus: “Open Banking is about how banks share their own products (i.e. services, functionality and data) and how they enable their customers to share their data and account functionality with third party (e.g. FinTech) applications in a secure and resilient fashion” [EBA 2016: 15]. Open banking enables customers to benefit from both innovators and traditional banks through the use of new infrastructure [EBA 2016]. The literature indicates that open banking (OB) is “a special kind of financial ecosystem governed by certain security profiles, application interfaces, and guidelines with the objective of improving customer choices and experiences” [Kassab, Laplante 2022: 54]. A legal and technical infrastructure is therefore required for its operation, enabling the automation of open banking, which is also referred to as the API economy [Zachariadis, Ozcan 2016: 3-5].

Open banking was implemented in the European Economic Area to enable customers to securely share their bank account data with other financial institutions, including FinTechs. Moreover, the implementation result of open banking was to stimulate cooperation between traditional payment service providers and the FinTech sector. Open banking was expected to improve the services offered, including opening up innovative and personalised solutions with high-quality services, as well as boosting competitiveness [Jagodzińska-Komar, Grzywacz 2019: 42]. The concept of open banking was therefore a response to the need for intensive digital development. It provided a mechanism which lowers the entry barriers into the financial sector for newly established FinTech financial market players, stimulating competitiveness and meeting the growing expectations of customers [Polasik, Huterska, Iftikhar, Mikula 2020: 385]. The authors investigated whether these assumptions were achieved in practice.

This article aims principally to assess the immediate and long-term effects of the introduction of the revised Payment Services Directive (PSD2) regulation in the European Economic Area [Directive (EU) 2015/2366]. The secondary aim is to examine whether the planned directions of regulatory change, including the PSD3, PSR1 and Financial Data Access (FIDA) regulatory proposals, adequately address the identified outcomes of PSD2 and the expectations of financial sector stakeholders.

This paper sets out three research hypotheses:

- H1. EU Community regulation has proved to be an effective instrument for creating an open technical infrastructure in the payment services market in Europe.
- H2. The European Community regulation of open banking has proved to be an effective instrument for increasing innovation in the financial sector in Europe.
- H3. The development of the legal and technical infrastructure within the European Community regulatory framework results in lowering the entry barrier for payment services.

This paper employs an analysis of the EU Community acts, draft legislation and statistical data available on open banking in the EU. An evaluation study conducted for the European Commission titled “Study on the application and impact of Directive (EU) 2015/2366 on Payment Services (PSD2)” [FISMA 2023] was also analysed, summarising the results obtained by 2022. In contrast, an analysis of the results of the pan-European expert study of PayTechImpact.EU’s was conducted to gain insight into the possible long-term impact of the PSD2 regulation.

## **2. The regulatory approach to the introduction of innovation by the European Commission using the example of PSD2**

Innovation can be defined as the creation of new (or the efficient reallocation of existing) resources that contribute to progress [Granieri, Renda 2012: 3]. Regulation is one of the activities that governments can engage in, which can exert a profound impact on the level and direction of innovation, both in specific sectors and the economy as a whole. [Granieri, Renda 2014: 11]. In practice, the relationship between regulation and innovation starts with the definition of the problem and of policy objectives, and proceeds with the decision to use the regulatory framework to achieve this, rather than other

instruments such as tax incentives or the status quo ('do-nothing') approach. Regulation may be economy-wide or sectorial and focused on specific innovation aspects such as the level of competition [BERR 2008: 21-22].

In 2010, the European Commission adopted the "policy cycle" concept consisting of several phases from the (a) design of a piece of legislation (including impact assessment), to (b) implementation, (c) enforcement, (d) evaluation and (e) revision. This approach enables the constant optimisation of regulations, including innovation. The core of this philosophy is based on two pillars: (a) strategic problem definition and (b) conducting a deep analysis of the costs and benefits of a given regulation through the so-called RIAs – regulatory impact assessments. In this context, the strategic document for the design of PSD2 was the Commission Green Paper of 11 January 2012 titled "Towards an integrated European market for card, internet and mobile payments", which pointed out that new, innovative solutions in the area of payments have generated significant challenges from a regulatory viewpoint. It has proved difficult for payment service providers to launch innovative, safe and easy-to-use digital payment services and to provide consumers and retailers with effective, convenient and secure payment methods in the Union. The existence of a large potential in need of more consistent exploration was inescapable [European Commission, Green Paper 2012].

In the regulatory impact assessment as a part of the PSD2 Commission's proposal [Commission Staff Working Document Impact Assessment 2013], the problem definition was specified. The European Commission identified restricted access to key components of the payment infrastructure as a possible source of market distortion, which often flowed from incumbent payment service providers (mostly banks) taking advantage of their market position in comparison to new entrants, such as new card schemes or new service providers of internet and mobile payments.

Another identified problem was regulatory and supervisory gaps in the PSD as the development of the payments market – in particular the rapid emergence of e- and m-payments – gave rise to important challenges from a regulatory perspective. Many innovative payment products or services, including online banking-based Payment Initiation Services (PIS) provided by Third Party Providers (TPPs), did not fall under the previous scope of the PSD. This led to legal uncertainty, potential security risks in the payment chain

and a lack of consumer protection [Isaacs, Vargas-Silva, Hugo 2012: 27; London Economics 2013: 9].

To stimulate innovation, the European Commission then decided to create a legal framework for new services, under the umbrella name “open banking”. The scope of PSD was extended with two new regulated payment services: Payment Initiation Services (PIS) and Account Information Services (AIS). It also identified two new types of regulated TPPs that will be granted direct access to customer accounts: a Payment Initiation Service Provider (PISP) and an Account Information Service Provider (AISP). Institutions that hold customers’ accounts (mainly banks) are called Account Servicing Payment Service Providers (ASPSPs). To ensure effective and secure communication between the relevant actors in the context of AIS and PIS, it was necessary to specify the requirements of these common and safe open standards of communication to be met by all relevant payment service providers. This is specified in Commission Delegated Regulation (EU) 2018/389, supplementing Directive (EU) 2015/2366 of the European Parliament and the Council concerning Regulatory Technical Standards (RTS) for Strong Customer Authentication (SCA) and the communication standards mentioned above. Based on the provisions of this legal act, standards for the implementation of new open banking payment services were created.

The creation of the legal framework for open banking has opened a new chapter in the development of the financial sector in two parallel paths, which, although described by one common term and based on a common communication interface, are completely different.

The PIS opened the bank’s transaction layer to innovations created by third party providers. Thanks to this transformative technical and business development, new market players can innovate in the banking payment environment, creating new alternative payment solutions without the need to build expensive and technically complex infrastructure.

However, the AIS has opened up a layer of data previously treated almost as bank property. Open banking at the data layer means that the customer decides how their data can be used by other financial and non-financial institutions. The final beneficiary is their owner, i.e. the customer, because by using data about them in the bank’s possession, many processes can be optimised and accelerated, thus generating significant savings.

The technical solution enabling the implementation of these two services is the Open Application Programming Interface (Open API), which enables quick integration with the bank's infrastructure without the need for a contractual relationship and direct transaction costs for a third party, which are prohibited by PSD2. The functioning of the above interfaces is specified in detail in RTS on SCA and secure communication under PSD2 [Commission Delegated Regulation 2018]. RTS, in certain situations, allow the implementation of these services based on mechanisms other than Open API; however, such an approach deepens market fragmentation and works to the detriment of the final beneficiaries, i.e. customers.

### **3. Literature review on open banking research**

The financial crisis of 2008 and modern technological development were among the factors behind the development of innovative players providing their services to the financial market. FinTech, an entirely new category, is a combination of the words technology and finance [Douglas, Barberis, Buckley 2015: 1]. Although the term was first used in 1972 [Bettinger 1972: 62], it was after 2008 that the real flowering of innovative solutions emerged. FinTech activity has put pressure on traditional financial institutions and their operations [Bilotta, Romano 2019: 2]. Innovators have endeavoured to provide faster, cheaper and more competitive services tailored to customer expectations, also creating new business models [Davradakis, Santos 2019: 3]. One of the most rapidly growing FinTech subsectors is PayTech, which focuses on payment services, and is strongly linked to open banking. Consequently, open banking is within FinTech's area of consideration and can be considered one of its new strands of research, central to the sector.

Open banking research focuses on the economic, legal, technological and consumer levels. When analysing publications concerning the economic aspect of open banking and PSD2 research, it is worth pointing out studies related to the impact of the implementation of PSD2 regulations on the development of start-ups in Europe [Polasik, Huterska, Iftikhar, Mikula 2020: 385]. Research shows that PSD2 has had a positive impact on market stimulation and on the emergence of new PayTech players. The development of such entities was also stimulated by the open business environment and the implementation of regulatory sandboxes [Butor-Keler, Polasik 2020: 621]. Research indicates that immediately after the implementation of PSD2,

a rapid but transient growth of the entities referred to as PayTech ensued. In contrast, in 2018, i.e. after the national implementation of PSD2, a decrease in the number of start-ups followed. The overall number of PayTech players has remained higher than before the implementation of PSD2. Contrarily, other authors highlight the positive impact of PSD2 on the use of APIs in building new business models and on the opportunities that open APIs bring to the banking sector in the EU and the UK [Zachariadis, Ozcan 2016: 2]. Another study was dedicated to technological transformation and the role of open banking in building new business models, including in the context of traditional financial institutions such as banks. The authors indicate that the new legal framework influences the digital transformation of European banks, supporting new business models, partnerships and API infrastructure [Stefanelli, Manta, Toma 2022: 1]. One noteworthy study concerns the analysis of the Retail Payments Strategy as part of the Digital Finance Package. The authors assessed the Retail Payments Strategy, the challenges facing the European payments market and the European Commission's approach to the development of the PayTech sector [Polasik, Widawski, Keler, Butor-Keler 2022: 617-621]. The researchers also assessed the impact of the PSD2 regulation on the elimination of some payment methods or the reduction of service costs. The publication also refers to the challenges for traditional financial institutions such as banks and the opportunities associated with FinTech and Big Tech start-ups. According to the authors, the full benefits of PSD2 implementation will be achieved when customers trust the new players and see the benefits of the new services [Brener 2018: 103].

Another sphere of open banking research is the **regulatory** perspective. One of the papers assesses the challenges faced by TPPs<sup>2</sup> from the perspective of the fees that banks impose on the activities of such entities, resulting in discrimination against them in the market [Blocher 2022: 1026]. Regulatory requirements concerning the operation of APIs for AIS entities for open banking under PSD2 were also examined in the context of the implementation of PSD2 into the Polish legal system [Byrski, Synowiec 2023]. The rapid technological development of FinTech players clearly inclined policymakers to change their regulatory approach. The legal framework

---

<sup>2</sup> TPPs or Third Party Providers are a new type of payment service providers, introduced under PSD2. The following three categories of suppliers can be distinguished within TPP: AIS – in the scope of the account information access service, PIS – authorised to initiate a payment transaction, CAF (Confirmation of the Availability of Funds) – in respect of the confirmation of the availability of funds service.



should focus primarily on the entities and the risks of their activities. Ensuring compliance with international standards and additional regulatory requirements is desired in the payments market. It has been proposed that the analytical framework for payment market-related regulation should be based on a four-step process: “(i) identifying payment activities; (ii) licensing entities and designating systems; (iii) analysing and managing risks, and (iv) promoting legal certainty” [Khiaonarong, Goh 2020: 2].

There are also numerous studies dedicated to the **technological** perspective. Some authors [Wolters, Jacobs 2019: 29] also indicate weaknesses in the implementation of PSD2, which may include insufficient protection of users’ personal data. The researchers draw attention to the “Account Information Service”, which is defined too broadly and covers an extensive range of services. The problem identified is, firstly, the ability of payment service providers to circumvent account access restrictions. Secondly, there is too much leeway for payment service providers in the authentication process, making it difficult for banks to authenticate (“do not demand that a bank is able to verify the authentication or the integrity of the payment order”) [Wolters, Jacobs 2019: 41]. Thirdly, payment service providers can use “screen scraping” when the relevant interface is not working properly [Wolters, Jacobs 2019: 29]. Publications have covered, for example, a proposal for open API ecosystem models that support the expansion of open banking APIs beyond current regulations [Farrow 2020: 75], one where the standard of open banking is unified. According to some of the authors, ensuring the security of the API infrastructure may involve developing a set of tests to be performed and maintained in each API. Efforts should be made to develop automated tests that can be adapted as a solution to test PSD2 in different financial institutions, to ensure the security of the services provided [Coste, Miclea 2019: 7].

Open banking also focuses on improving competitiveness and creating new, cheaper services for consumers. Some scholars have devoted their research precisely to the consumer perspective, analysing the behavioural intention of customers related to the implementation of open banking [Briones de Araluze, Cassinello Plaza 2023: 1]. The survey conducted in Spain had 553 respondents. Its results indicate that service usability and trust are crucial to establishing behavioural intentions when creating open banking. Of little importance, on the other hand, is the ease of such services. The study

also suggests that focusing on the benefits of open banking, with regulatory support, can sustain customer confidence. Open banking can affect financial inclusion, especially in developing countries. Additional benefits include the promotion of innovation and a reduction in the cost of services provided [Plaitakis, Staschen 2020: 1].

#### **4. The immediate and long-term effects of the PSD2 regulation on the European financial sector**

##### **4.1. An evaluation of the direct impact of PSD2**

###### **4.1.1. The methodology of the evaluation study of the European Commission**

Good lawmaking practices require an assessment of the impact of regulations introduced on different stakeholder groups as well as their economic impact on the economy. This is also the approach of the European Commission, which, in its Retail Payments Strategy of 24 September 2020, planned, inter alia, a review of the Payment Services Directive [Polasik, Widawski, Keler, Butor-Keler 2022: 617]. Accordingly, in 2021, the Commission launched an Open Public Consultation and a tender for an evaluation study titled “Study on the application and impact of Directive (EU) 2015/2366 on Payment Services (PSD2)”. The research was conducted by a consortium of VVA Brussels and the Centre of European Policy Studies (CEPS), along with the Nicolaus Copernicus University in Toruń, as an academic contributor, with the participation of Michał Polasik’s team.

This study aimed to gather legal and economic evidence on the application and impact of PSD2 on the payments market and any benefits and challenges stemming from PSD2. In addition, the study planned to identify areas where modification of some of PSD2’s provisions is warranted and to propose changes to this regulation in the final report.

This empirical study was based on an extensive programme of data collection across the EU. Two research methods were applied: the first, an online questionnaire launched in all EU Member States, and the second method comprised one-on-one interviews with stakeholders, which focused on 10 countries with the highest relevance to the payment services market: Belgium, Germany, France, Ireland, Italy, Lithuania, the Netherlands,

Poland, Spain and Sweden [Polasik, Huterska, Iftikhar, Mikula 2020: 385]<sup>3</sup>. The main stakeholders of the study, covered by individual interviews, were national authorities, EU institutions, payment service providers and users, and consumer associations. The survey was conducted in 2022 and the final report titled *A study on the application and impact of Directive (EU) 2015/2366 on Payment Services (PSD2)* was published on the European Commission's website in February 2023 [FISMA 2023].

#### **4.1.2. The impact of regulation on the development of non-bank financial companies and competition**

In particular, the study examined the problems associated with the licensing of payment institutions. The majority of stakeholders interviewed considered the licensing regime appropriate, reconciling the requirements of ensuring financial stability and consumer protection while accelerating the development of open banking. The surveys produced similar results.

However, some respondents pointed to the issue of redundancy in licensing requirements, particularly for AISP and PISP, associated with the high cost of the licensing process. The problem of inconsistent application of the rules across member states was also highlighted, citing Lithuania and Luxembourg as examples of countries with a less stringent approach. In contrast, Sweden is an example of a country where the licensing process is complex and costly.

The number of entities operating as ASPSPs varies from one EU country to another, due to several factors (e.g. size of the economy, national interpretation of registration requirements, licensing process regime). Undoubtedly, the supervisory approach, including the licensing process, affects the attractiveness of individual jurisdictions. Although regulation at the EU level is harmonised, some member states are attempting to foster innovation in the financial market through individual, less stringent regulatory requirements or other types of supervisory facilitation. An example is Lithuania, which has implemented special RegTech tools, including in the area of licensing – the entire process is done online [Bank of Lithuania, RegTech]. This is attractive for foreign entities because, thanks to the licence granted by the Bank of Lithuania for the operation of, for example, e-money institutions,

<sup>3</sup> Besides the largest countries in the EU in terms of population and GDP, the inclusion of Lithuania and Ireland in the study stemmed from the high activity levels in these countries as a place to register the seat of FinTech entities, including those using licences for open banking services [Polasik, Huterska, Iftikhar, Mikula 2020: 391].

they can benefit from the single passport rule [European Parliament 2017], which paves the way to operate throughout the EU.

The powers for both licensing and supervising ASPSPs are vested in the competent, national financial market supervisory authorities. They can act using a risk-based approach. National authorities may issue guidelines, instructions, interpretations and recommendations, and require appropriate changes to ASPSP internal regulations. An interesting example of supervisory activity is the Lithuanian supervisory authority, which formulates its position on (or concern about) the application of regulations in the form of a letter to the company CEOs [Bank of Lithuania 2022].

A consequence of the varying approaches to supervision is the differences in the number of TPP licences granted by individual EU countries between 2014 and 2020. During this period, the number of licensed entities across the EU increased by 190, with Lithuania adding 90 such entities [European Central Bank, List of financial institutions] – accounting for nearly half the increase in the number of licensed operators. According to the report's authors, one reason for this is its simplified licensing procedure.

The differences between Member States are also apparent in the share of Payment Service Providers (PSPs) in the total number of payment institutions. In Lithuania, this proportion was 62.50% in 2020, while in Germany, for example, it was only 5.71% [European Central Bank, Payments statistics]. This echoes the phenomenon of jurisdictional arbitrage, which involves regulated entities taking advantage of differences in the treatment of identical activities between states [Draganidis 2022: 179]. Such entities may be inclined to choose a country of operation with less stringent regulations [Peszeko 2021: 155]. This phenomenon is assessed negatively in the report.

Considering the above, the report calls for harmonisation of the rules and the licensing and supervision process. Establishing standing committees is identified as a means of achieving this: (i) bringing together the EBA and national authorities and (ii) bringing together banks belonging to the European System of Central Banks (ESCB).

### **4.1.3. Benefits in terms of reducing fraudulent transactions versus the cost of lost payments**

The report also covers the prevention of fraud in payment transactions, paying attention to increasing the security of payment transactions through the introduction of SCA. This was one element of the overall requirements for access to the account by non-bank financing companies [Petrović 2020: 3]. Simultaneously, it was pointed out that the implementation of the SCA by entities involved significant costs, estimated at five billion euros, to which should be added approximately 33.5 billion in costs related to the increase in failed transactions. In contrast, the benefits in terms of fraud reduction are estimated at only around 900 million euros per annum. For instance, there has been a 20-30% decrease in fraud in e-commerce transactions.

The report also reveals that under the PSD, the level of consumer protection has been increased by limiting their liability for unauthorised transactions and an unconditional right to a refund for transactions made in Euros. Excessive complexity for consumers has been identified as a negative consequence of the introduction of the SCA, resulting in the observed uncompleted e-commerce transactions. On top of this, the ASPSP interfaces for authentication are different from the interfaces customers are familiar with through online or mobile banking systems, resulting in a lack of customer trust and in cancelled transactions.

At the same time, the authors of the report recognise existing loopholes in the SCA that allow the circumvention of PSD2 provisions to improve security. The fragmentation of the EU market was cited as one of the reasons for this, considering that most fraud involves cross-border transactions. The authors do not mention the information function of banks warning customers about the risks of sharing sensitive data with others. Under PSD2, this function is limited in practice, making it easier for criminals to impersonate payment service providers, manipulating users to share their data with fraudsters [Wolters, Jacob 2019: 37]. Further, the EBA's Discussion Paper notes that the most common type of card payment transaction fraud is the execution of payment orders by fraudsters, accounting for more than 90% of fraudulent card transactions, both in terms of volume and value [EBA 2022: 22.] Another finding of the EBA is that the share of fraud in the total number of remote credit transfers confirmed using the SCA is four times

higher than the share of fraud in the total number of such transfers that are not confirmed using the SCA [EBA 2022: 24].

At the same time, the report does not provide specific recommendations to negotiate the problems identified, going no further than to call for the harmonisation of supervisory practices and an increased level of consumer protection. It also ignores the issue of the disproportionate cost of implementing SCA vis-a-vis the benefits of reducing fraud.

#### **4.1.4. The state of development of API infrastructure and barriers to effective open banking**

The report stresses the development of payment infrastructure, considering it a crucial element in the integration of the economies of the EU. At the same time, it notes that national payment infrastructures are not designed for cross-border payments, leading to such payments not being instantaneous. The cost of implementing open banking, including in terms of APIs, is estimated to be around 2.2 billion euros.

API is an important element of the payment infrastructure. In this respect, the authors of the report highlight the problems caused by the legal fragmentation in this area. Respondents denote problems with accessing APIs and the poor quality of APIs in some member states, hindering cross-border activity. In the interviews, allegations took aim at ASPSPs of acting contrary to regulation and restricting market access. The majority of respondents favour the creation of an API standard. Instead, the authors of the report call for the creation of a Single Euro Payments Area (SEPA)-like mechanism that would encourage businesses to use common regulatory and technical standards, including APIs. Indeed, in the current environment, banks have no incentive to create high-quality and uniform APIs. The standardisation of APIs should be considered a key requirement for the further development of open banking [Nanaeva, Aysan, Shirazi 2021-2022: 444].

The development of API aggregators is highlighted as one of the most important issues in this regard. As the report's findings depict, API aggregators are a tool to address the lack of an API standard. On the other hand, they pose a risk to the protection of consumers' rights and, paradoxically, may constitute an additional entry barrier for new entities by having to bear the costs of aggregator services.

Of similar importance is the development of “license as a service”, which is part of the wider phenomenon of “open banking as a service” [Farrow 2020: 137]. This service opens up the market to unlicensed operators, however, which puts consumers at risk and raises the risk of data being transferred to unsupervised entities and beyond the control of the ASPSP and TPP.

The report highlights the role of the premium API, which is also an instrument that enables unlicensed operators to provide services. The report stresses the withdrawal from licences by EU member state operators and their reliance solely on premium API services, which creates the impression that obtaining a licence is not a condition for the offering of AIS and PIS services. The authors of the report therefore recommend, for each of the above issues, clarifying the legal aspects of the status of all payment service providers, increasing competition in certain areas of the payments market and increasing the level of consumer protection.

## **4.2. Expected long-term effects of the PSD2 regulation**

### **4.2.1. The research methodology of PayTechImpact.EU**

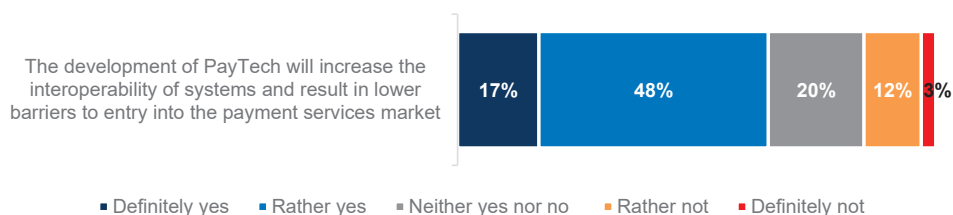
The basis for assessing the long-term impact of regulations constituting open banking in the European Economic Area are the conclusions of an empirical study conducted under National Science Centre grant No. 2017/26/E/HS4/00858 in the second half of 2020. This project aimed to investigate the impact of FinTech development and regulation on innovation in the payment services market in the EU, considering financial sector strategies and consumer needs. The core, exploratory part of the study was conducted in cooperation with the chambers of commerce of the European payments sector – the European Banking Federation (EBF), the European Payment Institutions Federation (EPIF), the Polish Bank Association (ZBP) and the Febelfin – the Federation of the Belgian Financial Sector. The recruitment of experts for the study was conducted in two stages. In the first stage, the partners provided recommendations to experts from the institutions and independent experts in working groups at the chambers of commerce. The call was then announced through electronic industry media, such as popular portals and newsletters, reaching a wide range of market experts.

The survey was conducted through an online questionnaire, after verification of the identity of the experts to maximise the reliability of the results obtained.

The survey elicited responses from 202 experts from 30 countries, including all EU countries plus the UK, Norway and Switzerland. The sample obtained includes experts employed in all institutional groups of market stakeholders: banks, non-bank payment institutions, payment schemes and clearing houses, FinTech entities, payment technology providers, as well as experienced consultants and representatives of central bank financial supervisors. Analytical weights were employed to ensure a balanced distribution of the responses of the PayTech experts participating in the survey, in terms of their countries of operation. The entire recruitment and data collection procedure, and data analysis methods produced results representative of the opinions and predictions of experts in the PayTech community in Europe.

#### 4.2.2. Entry barriers and competition in the payment services market

The PSD2 regulation has not only contributed to the development of a new category of TPPs, but with the *single passport rule*, it has allowed the provision of PayTech services in the pan-European market. The *real novum*, however, has been the introduction of the concept of open banking, based on APIs, which influenced the way data were accessed and the nature of the services provided. There is a consensus among the experts participating in the survey regarding the positive impact of the development of PayTech technology, through increased interoperability of systems, on the lowering of the entry barrier for payment services in the long term (Graph 1). This can be interpreted as one of the main reasons why PayTech companies are seen as key competitors to those operating under traditional business models, such as banks.

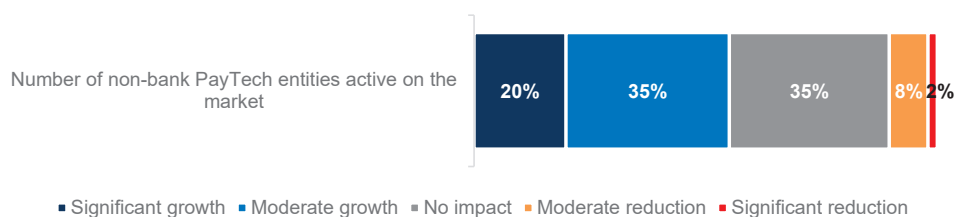


**Graph 1. Future scenarios of the EEA payment market development until 2025**

Source: the PayTechImpact.EU expert study; N=201.



Evidence of this scenario materialising is the steadily increasing number of entities operating as TPPs with a PIS or AIS licence. Between 2014 and 2020, as many as 1,072 such non-bank TPP entities emerged, against a backdrop of 3931 credit institutions, mainly banks, operating in the European Economic Area [EBA register]. This indicates the high growth dynamics and attractiveness of the European payment services market for innovative entities. In this dimension, the PSD2 regulation has fulfilled its objectives, creating an institutional basis – in terms of an increase in the number of market players – for the increased competitiveness of the European financial sector. Further, the experts participating in the survey predicted a continuation of this favourable trend in the long term (Graph 2), as more than half of them indicated a significant or moderate increase in the number of non-bank PayTech players operating in the European market by 2025.

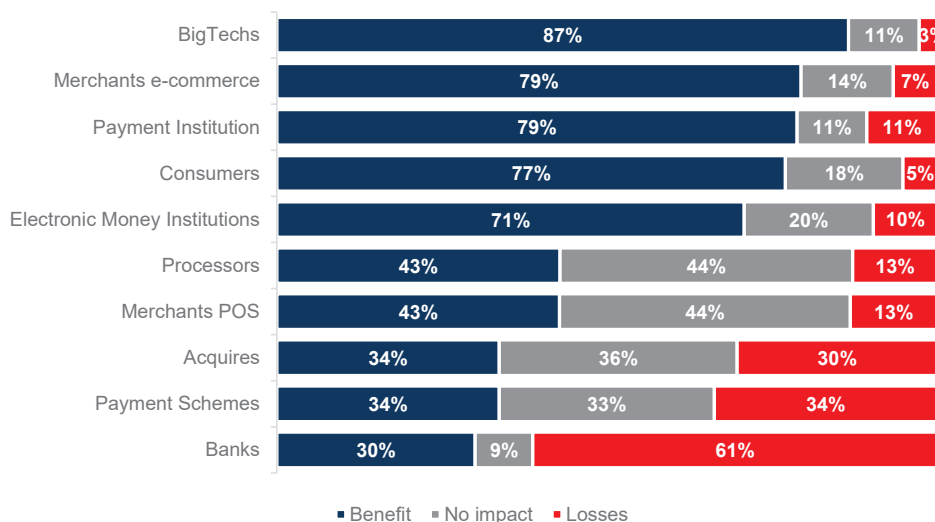


**Graph 2. Future scenarios of the EEA payment market development until 2025**

Source: The PayTechImpact.EU expert study; N=175.

### 4.2.3. Costs and benefits of PSD2 implementation

The direct financial impact of implementing the PSD2 regulations (cf. 4.1.3.) does not reflect its strategic impact on the payment services market, which will become fully apparent only over a multi-year horizon. Therefore, as part of the PayTechImpact.EU study, experts were asked to assess the long-term impact of the introduction of open banking based on the PSD2 regulation, through the lens of the benefits and losses for the different market participants, in terms of their position in the payment services market (Graph 3).



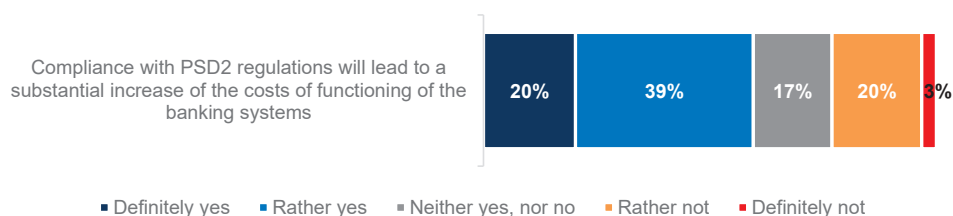
**Graph 3. Evaluation of the long-term perspective 2025 for benefits\* of particular payment market participants due to the implementation of open banking under PSD2**

Source: The PayTechImpact.EU expert study; N=185; \*the market position perspective.

According to experts, there will be profound changes in the market position of most stakeholders in the payment services market in Europe by 2025. The main effect, predicted by the vast majority of market experts, is that the banking sector will incur long-term losses. Besides the increasing level of competition in the payment services market (cf. 4.2.2.), an additional reason for the unfavourable situation of banks will be the increase in the operating costs of the banking system predicted by most experts as a result of the implementation of the PSD2 regulation (Graph 4). In contrast, non-bank payment service providers, whether technology companies operating under Payment Institution and Electronic Money Institution licences or companies in the Big Tech<sup>4</sup>category, will be clear beneficiaries of the implementation of open banking. This applies in particular to Big Tech companies, about which 87% of experts agree, and is one of the reasons for the emerging concerns about their potential future dominance in the payment services market in Europe [Polasik, Widawski, Keler, Butor-Keler 2022: 617-621].

<sup>4</sup> Big Tech, or “tech giants”, is the term used to describe a group of internationally dominant IT companies that own extensive digital platforms. The Big Tech group typically includes US companies such as Alphabet (Google), Amazon, Apple, Meta (formerly Facebook) and Microsoft, and occasionally China’s Baidu, Alibaba and iTencent.

Notably, the experts identify numerous beneficiaries of PSD2 implementation outside the financial sector (Graph 3). More than three-quarters of experts are convinced of the long-term benefits to e-commerce sellers and consumers. In contrast, opinions on the benefits for other institutions, such as payment processors and especially clearing agents and payment schemes, are strongly divided, while merchants in physical distribution channels will not be too strongly affected by open banking through 2025. In conclusion, non-bank financing companies directly involved in the development of the e-commerce market will benefit most from the development of open banking and API infrastructure.



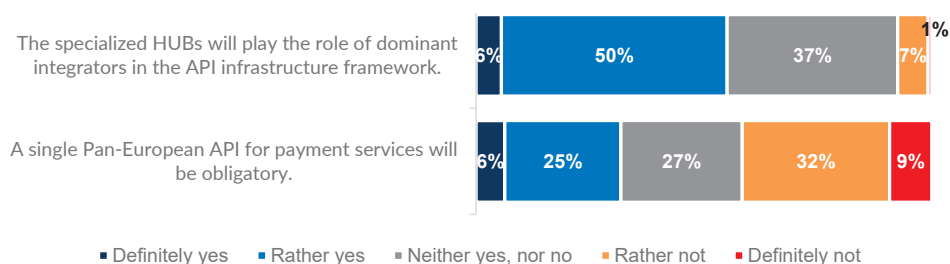
**Graph 4. Evaluation of the long-term impact of open banking under PSD2 until 2025**

Source: The PayTechImpact.EU expert study; N=201.

#### 4.2.4. Anticipated trends in open banking infrastructure development

The development of open banking requires the standardisation and effective development of PIS and AIS message exchange infrastructure. The results of the evaluation study identified several limitations and inefficiencies in the API infrastructure for open banking services (cf. 4.1.4.). They result in an unfavourable fragmentation of the open banking infrastructure and, consequently, of the market as a whole, and in high costs of failed payment transactions (cf. 4.1.3.). This is probably one of the reasons that experts foresee a dominant role for specialised hubs as integrators of API infrastructure in the 2025 horizon (Graph 5). This is supported by opportunities for cost optimisation, simultaneously on the ASPSP and TPP side. Such aggregation and optimisation have worked well in the e-commerce payment processing segment, although the platforms in operation have so far tended to be national in scope. Despite several initiatives, such as the sectoral standards for open payment APIs within the Berlin Group or the PolishAPI, the standardisation

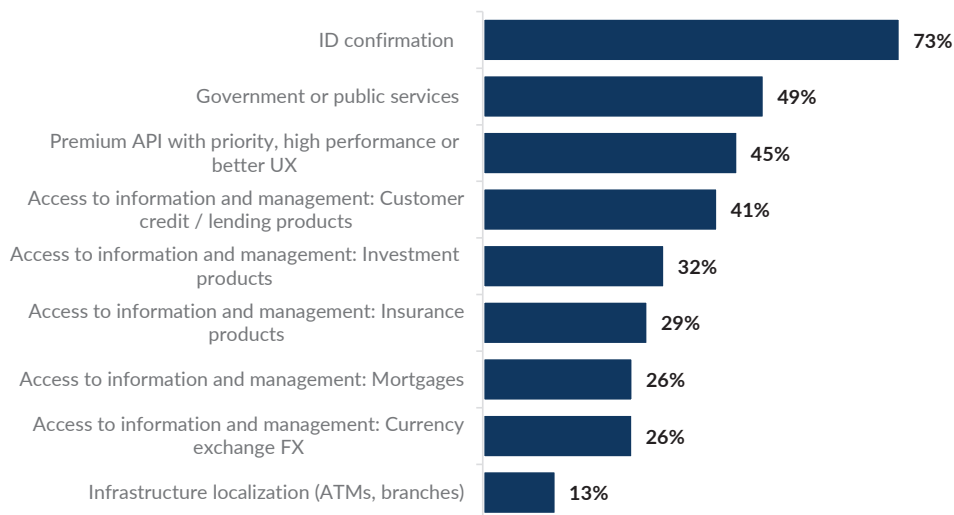
of the open banking infrastructure is not sufficient. The expert participants in the study refer to two courses of action for addressing this problem (Graph 5.). The first is the introduction of a single pan-European API standard for payment services, imposed on the market by the European regulator, the implementation of which would be mandatory. On the feasibility of such a scenario, the experts cannot agree. This poses questions about the success of initiatives such as the SEPA Payment Account Access (SPAA) scheme [EPC 2023]. Nonetheless, the proposals for these new regulations are likely to be decisive in this respect (cf. 5.1.).



**Graph 5. Future scenarios of the EEA payment market development until 2025**

Source: The PayTechImpact.EU expert study; N=201.

The study verifies experts' expectations of the benefits of using APIs to provide services beyond PIS and AIS (Graph 6). By far, the most requested service is ID confirmation (73% of respondents' indications), i.e. confirmation of the user's identity to external parties, e.g. for making and entering into contracts or use of digital providers by consumers. Almost half the respondents cite a service to provide access to public services through an API (49%) and the implementation of a so-called premium API (45%), designed to offer better performance or user experience (UX), with premium APIs being indicated (Graph 6) primarily by payment service providers and technology providers (more than half) and least by bank representatives (29%). Location-based services, however, are marginal, indicated by only 13% of respondents. This means that market experts so far do not see the potential for integrating financial services with the Internet of Things to benefit from.



**Graph 6. Additional functionalities – apart from PIS and AIS – to be implemented in the API of ASPSPs to allow them to gain a competitive advantage**

Source: The PayTechImpact.EU expert study; N=199.

Notably, the services that are potentially the nucleus of the so-called open finance ecosystem are investment products (32%), insurance (29%) and mortgages (26%). Belief in the competitive capabilities of such services, from an ASPSP perspective, is significantly higher in the banking sector (45%) and among market environment experts (54%). The fairly high level of indications suggests that, within a few years, a significant part of the financial industry will be ready to operate under an open finance model, even without a formal legal framework. However, with the proposed Regulation on FIDA, which will apply for instance to investment, savings and insurance services, the development of open finance should be expected to accelerate (more on this in 5.2.).

## 5. Development of the EU's regulatory approach to financial innovation

Considering the conclusions of the PSD2 evaluation and the identified problems and challenges related to some of the shortcomings of PSD2, the EU legislator has undertaken comprehensive work to revise the regulation of the payment services market. The result is the European Commission's proposal from 28 June 2023 of a package of Payment Services Regulation

(PSR), including the PSD3 Directive and the PSR to replace the PSD2- and the draft FIDA Regulation.

### **5.1. The proposal for a Payment Services package**

On June 28, 2023, the European Commission released a draft proposal for a Payment Services package, encompassing PSD3 and the Payment Services Regulation (PSR), which are slated to supersede PSD2.

Accompanying this proposal is the EC's impact assessment, which reveals that PSD2's objectives have only been partially met. This document underscores the imperative to refine the regulatory approach, particularly in areas such as open banking, the access of non-bank payment service providers (PSPs) to payment infrastructures and enhancing customer security.

According to the Impact Assessment, the open banking market is operating suboptimally, plagued by numerous complaints about inadequate data exchange interfaces that are impeding market growth. Consequently, PSPs involved in open banking are encountering significant hurdles in providing basic services and driving innovation. The legislative goal, therefore, should be to bolster the competitiveness of open banking services. For this, the proposed regulation mandates the establishment of dedicated data access interfaces and consumer dashboards for more effective data management. It also sets forth new specifications for open banking data access interfaces, detailing minimum standards for ASPSP interfaces.

Regarding access to infrastructure, the Impact Assessment has identified a skewed playing field between banks and non-bank PSPs, especially in accessing payment systems. Non-bank PSPs face challenges in opening accounts with commercial banks and are precluded from directly participating in some of the principal EU payment systems due to the Settlement Finality Directive (SFD, Directive 1998/26). To address these disparities, the assessment suggests augmenting both direct and indirect access for non-bank PSPs to payment systems and bank accounts. This includes reinforcing the rights of non-bank PSPs to indirect access through bank accounts and enabling their direct participation in all payment systems, including those designated by Member States under the Settlement Finality Directive (SFD), which will require subsequent amendments.

In the domain of cybersecurity, although SCA, a PSD2 initiative, has been effective in curbing fraud in SCA-subject transactions, consumers continue to face fraud risks and lack confidence in payment security. The proposal thus focuses on fortifying user rights and fraud protections. Key measures include broadening the application of SCA, establishing a legal framework for PSPs to share fraud-related information, extending the IBAN/name of payee verification systems to encompass all credit transfers, and conditionally shifting fraud liability from users to PSPs.

Lastly, to streamline enforcement and implementation across Member States, the European Commission has opted to replace a substantial portion of PSD2 with a PSR that will be directly applicable.

## **5.2. The proposal of the Regulation on FIDA**

In its proposal dated 28 June 2023, the EU Commission introduced the Regulation on FIDA, establishing the first regulatory framework for open finance. Promotion of data-driven finance was one of the priorities in the Commission 2020 Digital Finance Strategy [Communication of 19 February 2020 (COM (2020) 66 final)].

The Commission's ambition of accelerating data-driven financial services was also confirmed in the 2021 Communication on a Capital Markets Union [Communication of 24 September 2020 (COM/2020/591 final)].

This initiative, as elucidated in the FIDA Impact Assessment, aims to address a critical barrier in the financial sector: the limited control customers have over their financial data beyond the scope of payment accounts, as currently governed by PSD2. This restriction significantly impedes the potential for data-driven innovation, as it hinders the sharing of financial data with providers who could leverage it to offer enhanced financial and information services. The general objective of FIDA is to improve economic outcomes for financial services customers (consumers and businesses) and financial sector firms by promoting digital transformation and speeding up the adoption of data-driven business models in the EU financial sector [Explanatory Memorandum 2023: 2].

The FIDA Regulation proposes to extend the principles of AIS from payment service providers to a broader range of financial service providers with major technical and business modifications. This extension represents a significant

evolution in the approach to FIDA, transitioning from a focus on open banking to a more encompassing open finance model.

Key provisions of the FIDA Regulation include the establishment of mandatory access for data users to select customer data sets across the financial sector. This is complemented by the requirement for market participants to provide customers with interfaces for managing open finance permissions, known as open finance permission dashboards. Additionally, the regulation proposes eligibility rules for accessing customer data, supplemented by guidelines on personal data use perimeters, to be issued by the EBA.

Another notable aspect of the FIDA Regulation is the obligation for market participants to develop common standards for customer data and data interfaces. These standards are particularly relevant for data that fall under the mandatory access requirements for financial data-sharing schemes. Importantly, the FIDA Regulation differs from PSD2 in its approach to data access compensation. While PSD2 requires data holders to provide API interfaces without compensation, FIDA provides reasonable compensation to data holders for providing standardised technical interfaces, to incentivise investment in high-quality interfaces, thereby accelerating the adoption of open finance practices in the industry.

The legislative proposal encompasses a wide range of financial entities, mandating consent-based data sharing. This includes credit and payment institutions, e-money and investment firms, crypto-asset service providers, and issuers of asset-referenced tokens per the Markets in Crypto-Assets (MiCA) Regulation. Also covered are alternative investment fund managers, UCITS management companies, insurance and reinsurance companies, insurance intermediaries, occupational retirement institutions, credit rating agencies, crowdfunding services and pan-European personal pension product providers.

A novel category, Financial Information Service Providers (FISPs), is introduced. These entities will access customer data exclusively for providing financial information services. The proposed Regulation creates an authorisation obligation for FISPs that will be complemented by RTS. The proposal distinguishes between “data holders” (financial entities gathering, storing, and processing customer data) and “data users” (entities legally accessing customer data post-customer consent). Many listed institutions can function as both data holders and users.



Data users, upon customer consent, can request data from data holders, who must promptly comply, albeit for a potential compensation fee. The proposal significantly expands the range of sharable data, surpassing the payment account data scope under the PSD2 framework. It now includes data on mortgages, loans, savings, financial investments, insurance products, crypto-assets, real estate, financial benefits, pension rights, non-life insurance products and creditworthiness assessments. This extended range captures data involved in suitability and appropriateness assessments under MiFID II, as well as occupational pension and solvency data.

Overall, the FIDA Regulation represents a significant advancement in the field of access to financial data, aimed at overcoming existing barriers to innovation and stimulating higher levels of private investment and an uptake of innovative services in the financial sector.

The development of open banking in the EU is directly related to regulatory interference creating the legal framework for this phenomenon. The legislator has not only created but also periodically optimises the legal framework for AIS and PIS services so that their functioning is more efficient both in the technical and business layers. It also aims to counteract market fragmentation that is not conducive to the construction of a common payments market. At the same time, the European Commission decided to revolutionarily expand access to AIS by extending it to other entities operating in the financial market. Consequently, we can talk about a gradual transformation of open banking towards open finance as a critical element of the open economy.

## **6. Conclusions**

This paper examined, using the example of the adoption followed by implementation into national legal orders of PSD2, the regulatory approach to the introduction of innovation by the EU legislator, in particular the European Commission, as the institution with legislative initiative in the EU. Effective regulatory policy in a given area through the creation of appropriate legislation is a challenging process in the EU – it requires policymakers to define the key issues and the policy objectives and adopt relevant legislation. In the case of PSD2, this process was preceded by the identification of several barriers to market development, including limited access to payment infrastructure for non-bank financial service providers, the dynamic development of new payment technologies and services, the regulatory barriers to their

development, insufficient consumer protection and limitations in the level of competition between the existing and new players.

Authors argue that PSD2 is an example of an effective lawmaking process. On the one hand, PSD2 focused on stimulating innovation, creating new value for customers, and on the other, stimulating the competitiveness of the payment services market. The conclusions of the research show that open banking does support the development of innovation in the market and stimulates the development of competitiveness, social inclusion and consumer safety. Notably, open banking has strengthened consumer security and resulted in fraud reduction. Nevertheless, it is important to consider the high financial costs incurred in implementing PSD2 vis-a-vis the small benefits received to date. The cost of implementing SCA solutions was 5 billion euros, the cost of the exponential increase in failed transactions could hover around 33.5 billion euros, and the implementation of open banking alone, including in terms of APIs, amounts to approximately 2.2 billion. In contrast, the benefits, in terms of fraud reduction, are estimated at only around 900 million per year, and those resulting from increased competition and market access at 1.6 billion.

According to the first hypothesis of this paper, EU regulation has proved to be an effective instrument for creating an open technical infrastructure in the payment services market in Europe. This hypothesis proved true. The PSD2 regulation has contributed to the creation of an open API infrastructure. However, compliance with PSD2 by market participants has undoubtedly come at a huge cost. Moreover, there is a lack of a uniform API standard, which involves the creation of alternatives such as API aggregators, licence as a service and premium APIs. This leads to some PSPs operating outside the licence regime and increases risks for customers.

According to the second hypothesis, the EU Community regulation of open banking has proved to be an effective instrument for increasing innovation in the financial sector in Europe. This hypothesis is also confirmed. The establishment of a new category of TPP entities and the option to use a common infrastructure allowed new actors to enter the market and provide new services. However, PSD2 does have several weaknesses. The objectives of this directive were only partially achieved. In particular, a noted problem is the heterogeneous approach of countries to the licensing of entities that can operate in the pan-European market using the passport principle. A large

section of innovators has licensed their activities in Lithuania, which can cause risk concentration and strong regulatory arbitrage, increasing systemic risk.

According to the third hypothesis, the development of the legal and technical infrastructure within the European Community regulatory framework results in lowering the entry barrier for payment services. This hypothesis is confirmed as well. The uniform requirements for payment service providers and traditional banks, as well as the standardisation of technical infrastructure and SCA rules, make it easier for new market players to operate. However, the development of open banking still necessitates the standardisation and effective development of the infrastructure for the exchange of PIS and AIS messages, as well as the reduction of differences in approach as to the interpretation and application practice by national supervisors.

These proposals should be considered in the proposed PSD3 and PSR, which are planned to replace PSD2, and the draft FIDA Regulation, which established the first regulatory framework for open finance. These proposals contain both evolutionary and, to some extent, revolutionary elements. The evolving nature of these regulations is expressed in the progressive regulatory optimisation of the operation of open banking services known under PSD2 and the move towards uniformity in the operation of these services in the EU, thus countering market fragmentation and regulatory arbitrage. The revolutionary nature, on the other hand, is expressed in the bold extension of access to information services to further categories of financial service providers and in consequence other financial services in the FIDA regulation.

New regulatory directions for the payment services market may also include demands such as clearly distinguishing the payment service from the data access service, e.g. by leaving only the PIS as an open banking service constituting a per se payment service in the PSR/PSD3 regime and moving the AIS service to the FIDA regulation.

## References

Bettinger, A.: FINTECH: A Series of 40 Time Shared Models Used at Manufacturers Hanover Trust Company, *Interfaces*, [4], No. 2 [4], 1972  
Available at: <https://www.jstor.org/stable/25058931>

Bilotta, N., Romano, S.: Tech Giants in Banking: The Implications of a New Market Power, *Instituto Affari Internazionali (IAI)*, IAI Papers 19 [13], June, 201, 2019  
Available at: <https://www.iai.it/sites/default/files/iaip1913.pdf>, accessed: 5<sup>th</sup> November 2023

Blocher, M.: Granice ochrony prawnej dostawców świadczących usługę inicjowania transakcji płatniczej [Limits of legal protection of providers providing the service of initiating payment transactions] (in:) Byrski, J. (ed.): *Prawo innowacji finansowych (FinTech) [Financial innovation law (FinTech)]*, *Monitor Prawniczy*, No. 15, 2022  
Available at: <https://www.ksiegarnia.beck.pl/21834-monitor-prawniczy-nr-9-2023-dodatek-specjalny-prawo-innowacji-finansowych-fintech-2023>, accessed: 15<sup>th</sup> November 2023

Brener, A.: Payment Service Directive II and Its Implications (in:) Lynn, T., Mooney, J., Rosati, P., Cummins, M. (eds.), *Disrupting Finance*, Palgrave Studies in Digital Business & Enabling Technologies book series (PSDBET), Cham: Palgrave Pivot 2018  
Available at: [https://doi.org/10.1007/978-3-030-02330-0\\_7](https://doi.org/10.1007/978-3-030-02330-0_7)

Briones de Araluze, G., Cassinello Plaza, N.: The Relevance of Initial Trust and Social Influence in the Intention to Use Open Banking-Based Services: An Empirical Study, *SAGE Open*, 13 [3], 2023  
Available at: <https://doi.org/10.1177/21582440231187607>, accessed: 27<sup>th</sup> November 2023

Butor-Keler, A., Polasik, M.: The role of regulatory sandboxes in the development of innovations on the financial services market: the case of the United Kingdom. *Ekonomia i Prawo [Economics and Law]*, no. 4 [19], 2020  
Available at: <https://doi.org/10.12775/EiP.2020.041>, accessed: 28<sup>th</sup> November 2023

Byrski, J., Synowiec M.: Wymogi prawne funkcjonowania dedykowanego interfejsu (API) umożliwiającego dostęp do rachunków płatniczych w ramach open banking [Legal requirements for the operation of a dedicated interface (API) enabling access to payment accounts within open banking] (in:) Byrski, J. (ed.) *Prawo innowacji finansowych (FinTech) [Financial innovation law (FinTech)]*, *Monitor Prawniczy*, No. 9, 2023  
Available at: 10.32027/MOP.23.9.1, accessed: 7<sup>th</sup> November 2023

Coste, R., Miclea, L.: Api testing for payment service directive2 and open banking. *International Journal of Modeling and Optimization*, 9 [1], 2019  
Available at: DOI: 10.7763/IJMO.2019.V9.675

Davradakis, E., Santos, R.: Blockchain, FinTechs and their relevance for international financial institutions, *EIB Working Paper No. 1*, 2019  
Available at: [https://www.eib.org/attachments/efs/economics\\_working\\_paper\\_2019\\_01\\_en.pdf](https://www.eib.org/attachments/efs/economics_working_paper_2019_01_en.pdf), accessed: 23<sup>rd</sup> November 2023

Douglas, A. W., Barberis, J. N., Buckley, R.: The Evolution of Fintech: A New Post-Crisis Paradigm? Hong Kong, No. 47, 2015

Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2676553](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2676553), accessed: 23<sup>rd</sup> November 2023

Draganidis, S.: Jurisdictional arbitrage: combatting an inevitable by-product of cryptoasset regulation, *Journal of Financial Regulation and Compliance*, Emerald Group Publishing Limited, [31], No. 2, 2022

Farrow, G.: An application programming interface model for open banking ecosystems, *Journal of Payments Strategy & Systems*, [14], No. 1, 2020

Available at: <https://hstalks.com/article/5437/>, accessed: 23<sup>rd</sup> November 2023

Granieri, M., Renda A.: *Innovation Law and Policy in the European Union, Towards Horizon 2020*, Milano: Springer Milano 2012

Available at: <https://doi.org/10.1007/978-88-470-1917-1>

Kassab, M., Laplante, P. A.: Open Banking: What It Is, Where It's at, and Where It's Going," in *Computer*, [55], No. 1, 2022

Available at: <https://doi.org/10.1109/MC.2021.3108402>, accessed: 25<sup>th</sup> November 2023

Khiaonarong, T., Goh, T.: *Fintech and Payments Regulation: Analytical Framework*, IMF Working Papers, No. 75, 2020

Available at: <https://doi.org/10.5089/9781513531496.001.A001>, accessed: 30<sup>th</sup> November 2023

Jagodzińska-Komar, E. i Grzywacz, J.: Rola interfejsu API w modelu otwartej bankowości [The role of the API in the open banking model], *Studia i Prace Kolegium Zarządzania i Finansów [Studies and Papers of the College of Management and Finance]*, No. 172, 2019

Available at: <https://doi.org/10.33119/SIP.2019.172.3>, accessed: 25<sup>th</sup> November 2023

Nanaeva, Z., Aysan, A. F., Shirazi, N. S.: Open banking in Europe: The impact of the Revised Payments Services Directive on Solarisbank and Insha, *Journal of Payments Strategy & Systems* 2021, [15], No. 4, 2021

Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3967612](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3967612), accessed: 23<sup>th</sup> November 2023

Peszko, A.: *Nauki o organizacji w gospodarce globalnej. Perspektywa społeczna, [Organizational sciences in the global economy. Social perspective]*, Katowice: Górnośląska Wyższa Szkoła Handlowa im. W. Korfantego, 2021

Petrović M.: PSD2 influence on digital banking transformation: Banks' perspective, *Journal of Process Management – New Technologies, International*, [8], No. 4, 2020

Available at: <https://doi.org/10.5937/jouproman8-28153>

Polasik, M., Huterska, A., Iftikhar, R., Mikula Š.: The impact of Payment Services Directive 2 on the PayTech sector development in Europe, *Journal of Economic Behavior & Organization*, [178], 2020

Available at: <https://doi.org/10.1016/j.jebo.2020.07.010>,

Polasik, M., Widawski, P., Keler, G., Butor-Keler, A.: Retail Payments Strategy for the EU versus the challenges of the payment sector, *Ekonomia i Prawo [Economics and Law]*, [20] No. 3, 2021

Available at: <https://doi.org/10.12775/EiP.2021.037>

Stefanelli, V., Manta, F., Toma, P.: Digital financial services and open banking innovation: Are banks becoming invisible?, 2022

Available at: <https://doi.org/10.48550/arXiv.2210.01109>, accessed: 28<sup>th</sup> November 2023

Wolters, P.T.J., Jacobs B.P.F.: The security of access to accounts under the PSD2, *Computer Law & Security Review*, No. 35, 2019

Available at: [10.1016/j.clsr.2018.10.005](https://doi.org/10.1016/j.clsr.2018.10.005)

Zachariadis, M., Ozcan, P.: The API Economy and Digital Transformation in Financial Services: The Case of Open Banking. SWIFT Institute Working Paper, 2016

Available at: <https://doi.org/10.2139/ssrn.2975199>

## **Legal Acts**

Commission Delegated Regulation (EU) 2018/389 of 27 November 2017 supplementing Directive (EU) 2015/2366 of the European Parliament and of the Council with regard to regulatory technical standards for strong customer authentication and common and secure open standards of communication (Text with EEA relevance.) C/2017/7782, OJ L 69, 13.3.2018

Available at: [http://data.europa.eu/eli/reg\\_del/2018/389/oj](http://data.europa.eu/eli/reg_del/2018/389/oj), accessed: 19<sup>th</sup> November 2023

Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market, amending Directives 2002/65/EC, 2009/110/EC and 2013/36/EU and Regulation (EU) No 1093/2010, and repealing Directive 2007/64/EC (Text with EEA relevance), OJ L 337, 23.12.2015

Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32015L2366>, accessed: 30<sup>th</sup> November 2023

## Other Official Documents

Bank of Lithuania: Dear CEO Letter: advice to FinTech institutions on risk management and licensed activities

Available at: <https://www.lb.lt/en/news/dear-ceo-letter-advice-to-fintech-institutions-on-risk-management-and-licensed-activities>, accessed: 30<sup>th</sup> November 2023

Bank of Lithuania: RegTech

Available at: <https://www.lb.lt/en/regtech#ex-1-2>, accessed: 30<sup>th</sup> November 2023

BERR – Department for Business, Enterprise and Regulatory Reform of the UK Government: Regulation and Innovation: Evidence and Policy Implications, BERR Economics Paper No. 4, 2008

Available at: <https://assets.publishing.service.gov.uk/media/5a7c844040f-0b626628ac9d9/0757.pdf>, accessed: 27<sup>th</sup> November 2023

Commission Staff Working Document Impact Assessment Accompanying the document Proposal for a directive of the European parliament and of the Council on payment services in the internal market and amending Directives 2002/65/EC, 2013/36/UE and 2009/110/EC and repealing Directive 2007/64/EC and Proposal for a Regulation of the European Parliament and of the Council on interchange fees for card-based payment transactions /\* SWD/2013/0288 final \*/

Available at: <https://eur-lex.europa.eu/legal-content/GA/TXT/?uri=CELEX:52013SC0288>, accessed: 20<sup>th</sup> November 2023

Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions of 19 February 2020, A European strategy for data (COM (2020) 66 final)

Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0066>, accessed: 19<sup>th</sup> November 2023

Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions of 24 September 2020, on a Digital Finance Strategy for the EU (COM/2020/591 final)

Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0591>, accessed: 9<sup>th</sup> November 2023

European Banking Authority: Discussion Paper on the EBA's preliminary observations on selected payment fraud data under PSD2, as reported by the industry, EBA/DP/2022/01 17 January 2022

Available at: <https://www.eba.europa.eu/publications-and-media/events/discussion-paper-ebas-preliminary-observations-selected-payment-fraud>, accessed: 15<sup>th</sup> November 2023

European Banking Authority: EBA industry working group on APIs under PSD2, Understanding the business relevance of Open APIs and Open Banking for banks Information Paper 2016

Available at: [www.abe-eba.eu/downloads/knowledge-and-research/EBA\\_May2016\\_eAPWG\\_Understanding\\_the\\_business\\_relevance\\_of\\_Open\\_APis\\_and\\_Open\\_Banking\\_for\\_banks.pdf](http://www.abe-eba.eu/downloads/knowledge-and-research/EBA_May2016_eAPWG_Understanding_the_business_relevance_of_Open_APis_and_Open_Banking_for_banks.pdf), accessed: 27<sup>th</sup> November 2023

European Banking Authority: Understanding the business relevance of Open APIs and Open Banking for banks Information Paper EBA Working Group on Electronic Alternative Payments Version 1.0 May 2016

Available at: <https://www.abe-eba.eu/media/azure/production/1380/understanding-the-business-relevance-of-open-apis-and-open-banking-for-banks.pdf>, accessed: 25<sup>th</sup> November 2023

European Central Bank: List of financial institutions

Available at: [www.ecb.europa.eu/stats/financial\\_corporations/list\\_of\\_financial\\_institutions/html/index.en.html](http://www.ecb.europa.eu/stats/financial_corporations/list_of_financial_institutions/html/index.en.html), accessed: 30<sup>th</sup> November 2023

European Central Bank: Payment's statistics

Available at: <https://sdw.ecb.europa.eu/reports.do?node=100000760>, accessed: 30<sup>th</sup> November 2023

European Commission: Towards an integrated European market for card, internet and mobile payments (Text with EEA relevance), GREEN PAPER, Brussels, 11.1.2012 COM(2011) 941 final

Available at: <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A52011DC0941>, accessed: 4<sup>th</sup> October 2023

European Commission, Directorate-General for Financial Stability, Financial Services and Capital Markets Union (FISMA): A study on the application and impact of Directive (EU) 2015/2366 on Payment Services (PSD2), Bosch Chen, I., Fina, D., Hausemer, P., Henžel, A., Neumann, C., Patroclou, N., Wilkinson, C., De Groen, W.P., Kiss-Galfalvi, T., Nagtegaal, J., Oliinyk, I., Gökten, M., Andersson, F., Pozo, B., Korenblit, A., Lannoo, T., Sciarrone, A., Polasik, M. (eds.), Publications Office of the European Union, 2023  
Available at: <https://data.europa.eu/doi/10.2874/996945>, accessed: 27<sup>th</sup> November 2023

European Parliament: Understanding equivalence and the single passport in financial services Third-country access to the single market, Briefing, February 2017

Available at: [https://www.europarl.europa.eu/RegData/etudes/BRIE/2017/599267/EPRS\\_BRI\(2017\)599267\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2017/599267/EPRS_BRI(2017)599267_EN.pdf), accessed: 29<sup>th</sup> November 2023



European Payments Council: The SEPA Payment Account Access (SPAA) scheme rulebook v1.1, 2023

Available at: <https://www.europeanpaymentscouncil.eu/document-library/rulebooks/sepa-payment-account-access-spaa-scheme-rulebook>, accessed: 29<sup>th</sup> November 2023

Explanatory Memorandum 2023: Proposal for a Regulation of the European Parliament and of the Council on a Framework for Financial Data Access and Amending Regulations (EU) No 1093/2010, (EU) No 1094/2010, (EU) No 1095/2010 and (EU) 2022/2554

Available at: <https://data.consilium.europa.eu/doc/document/ST-11220-2023-INIT/en/pdf>, accessed: 29<sup>th</sup> November 2023

Granieri, M., Renda, A.: European Commission – How can EU Legislation Enable and/or Disable Innovation? European Commission 2014

Available at: [https://ec.europa.eu/futurium/en/system/files/ged/39-how\\_can\\_eu\\_legislation\\_enable\\_and-or\\_disable\\_innovation.pdf](https://ec.europa.eu/futurium/en/system/files/ged/39-how_can_eu_legislation_enable_and-or_disable_innovation.pdf), accessed: 29<sup>th</sup> November 2023

Isaacs, L., Vargas-Silva, C., Hugo, S.: EU Remittances for Developing Countries, Remaining Barriers, Challenges and Recommendations, European Commission, EDF Funding, 2012

Available at: <https://paymentinstitutions.eu/wp-content/uploads/2017/08/eu-remittances-for-developing-countries-final-19-11-2012-final.pdf>, accessed: 27<sup>th</sup> November 2023

London Economics and iff in association with PaySys, Study on the impact of Directive 2007/64/EC on payment services in the internal market and on the application of Regulation (EC) NO 924/2009 on cross-border payments in the Community, 2013

Available at: [https://paymentinstitutions.eu/wp-content/uploads/2017/08/130724\\_study-impact-psd\\_en.pdf](https://paymentinstitutions.eu/wp-content/uploads/2017/08/130724_study-impact-psd_en.pdf), accessed: 30<sup>th</sup> November 2023

Plaitakis, A., Staschen, S.: Open Banking: How To Design For Financial Inclusion, CGAP, October 2020

Available at: [https://www.cgap.org/sites/default/files/publications/2020\\_10\\_Working\\_Paper\\_Open\\_Banking.pdf](https://www.cgap.org/sites/default/files/publications/2020_10_Working_Paper_Open_Banking.pdf), accessed: 30<sup>th</sup> November 2023