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Payment Innovations Offered by Banks and PayTechs – Which of Them Better Meet Consumer Needs?[*]

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Abstract

Theoretical background: The motivation behind research into perceptions of the quality of payment services provided by banks and PayTech companies was the observed increasing competition between banks and FinTech players resulting from technological (cryptography, decentralised finance) and regulatory (PSD2) changes.

Purpose of the article: The aim of this article is to assess how demographic and socio-economic characteristics, as well as cultural backgrounds influence consumers' perceptions of the quality of services provided by both banks and non-bank payment services providers.

Research methods: The study used the results of a survey carried out under National Science Centre grant No. 2017/26/E/HS4/00858. It was conducted using the CAWI method among internet users from 22 European countries between July and August 2020, with a sample size of 5,504 respondents. In the paper, 4,879 responses were included due to some people omitting non-obligatory questions. Quality variables models were also used to assess the impact of consumer characteristics on the evaluation of the quality of services provided.

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Main findings: The analysis carried out shows that for 41.1% of the respondents banks were better as providers of in-store mobile payments and for as many as 58.9% as providers of online payments. The research also allowed the author to assess how consumer characteristics such as age, gender, level of education, level of income, and country of residence affect their perception of the quality of payment services provided by the entities in question. The characteristic that most strongly influenced respondents' opinion that there are companies that can provide them with better payment solutions than those offered by banks is age. This opinion was most often expressed by respondents under the age of 34. The results of the research indicate that banks need to compete more intensively with PayTech companies for young customers if they want to remain competitive.

Introduction

This research is motivated by dynamic technological (cryptography, decentralised finance) as well as regulatory developments (PSD2), which have contributed to, among other things (Instytut Finansów, 2022, p. 39):

– the development of APIs in the "open banking" concept,

– the rising use of the Internet of Things technology (e.g. in the automotive sector in the area of remote payments),

– the development of sharing economy services (Uber, Airbnb),

– the growth in popularity of subscription services (Spotify, Netflix) and in-app payments or payments "in the background", i.e. made automatically, invisible to the user of the app or device connected to the Internet of Things (e.g. fridge, TV, car),

– the popularisation of the trend moving from "platform as a service" to "platform as infrastructure" (Amazon).

The aforementioned changes and, in particular, the solutions introduced by the PSD2 directive were associated with the development of FinTechs, including PayTechs defined as "companies with innovative activities in the payments sector" (Polasik et al., 2020), which use technology to enable the electronic transfer of value (Korzeniowska et al., 2023, p. 77). In addition, also BigTechs have started to expand in the financial sector through the "overlay" model (Apple Pay, Google Pay, Pay Pal in countries with a developed payment system infrastructure) and the "native" model (Alipay, M-Pesa, WePay). The aforementioned changes resulted in intensifying competition between banks and FinTech players, including PayTechs.

The article consists of five parts. The first part contains a literature review focused on the importance of open banking for the development of FinTech and PayTech business, their impact on the transformation of the financial sector, demographic and non-demographic factors shaping consumer intentions to use FinTech services, digital financial inclusion and also on competition between PayTechs and banks. The second part presents the survey method and the method of analysis carried out. Part three contains a description of the data used in the study. The fourth part describes the results of the study of the relationship between the variables discussed and the likelihood that the respondent would think that one or more companies offering payment solutions would better meet their needs than banks. The last part contains the conclusions.

Literature review

The literature on FinTechs and their variant specialized in payments called PayTechs has become extensive in recent years. The following literature review is not exhaustive and is based on examples of publications related to the subject of research described in this article.

Important topics included: the importance of open banking as an environment for FinTechs, the transformative impact of FinTechs on the financial system, demographic and non-demographic factors shaping consumer intentions to use FinTech services, digital financial inclusion and FinTechs, and finally, competition between FinTechs.

Open banking as an environment for FinTech and PayTech companies

The literature on the development of FinTech companies, including PayTechs specialized in payments, points to the important role of implementing the open banking concept, especially in the European Union (Colangelo, 2024; Peon & Sun, 2024), but not only there.

As described by the Central Bank of Brazil, open banking is defined by the sharing of data, products, and services by banks and other financial institutions, at the discretion of their customers, with regard to those customers' data, through the opening and integration of information systems platforms and infrastructures, in a safe, agile, and convenient way (Golçalves & de Araujo, 2023). In particular, peer-to-peer (P2P) payments within non-bank services are becoming more and more common and will soon be codified in European Union regulations (the expected new version of the Payment Services Directive, known as PSD3). Banks will be obliged to provide access to consumer data to external application developers and service providers. This is a key element in implementing the open banking concept. Three main mobile financial systems – mobile banking, mobile payments, and branchless banking – currently dominate the electronic retail banking sector; banks thus attempt to make a technological leap and limit the outflow of customers from banks to FinTechs (Shaikh & Karjaluoto, 2019; Peon & Sun, 2024).

The digital revolution has had a profound impact on financial regulation because it has radically changed the behaviour of markets. One particularly relevant example concerns how digitalization has changed the way consumers manage their finances (Sugarda & Wicaksono, 2023). These types of issues also raise Lynn et al. (2020).

The transformative impact of FinTechs and PayTechs on the financial system

According to Alt et al. (2018), the four driving forces of the transformation of the financial industry under the influence of FinTech technologies are: the growing pace of diffusion of innovative downstream IT solutions, the emergence of non-banks and new start-up businesses offering focused financial services, changing behaviour

of banking customers towards online banking and multi-bank-relations, and also regulatory and competitive consequences of the financial crisis that occurred in 2007. The emergence of FinTech solutions is impressive, but it did not happen out of the blue and is based on a long legacy of subsequent financial technologies. The changing behavior of banking customers is especially important for the research described by the author in this article.

Putrevu and Mertzanis (2023) stated that the emergence and growing economic importance of digital payments and PayTech business is a significant challenge to the competitiveness of other financial sector institutions, especially banks, which requires appropriate policies from regulators. In their opinion, the development of digital payments brings new benefits to both their users and service providers. Putrevu and Mertzanis (2023) emphasized the importance of responsible implementation and protection of end-user welfare to fully realize the benefits of adopting digital payments. Understanding the inherent risks and establishing effective risk mitigation mechanisms are crucial. This requires the development of appropriate infrastructure supporting the provision of digital payment services.

According to Luo et al. (2022), FinTech innovation effectively improves the total factor productivity of real enterprises, promotes transformation, and upgrades the sustainable development of the real economy. The influence of FinTech development on the transformation of activities of enterprises is mainly through two mechanisms: information effect and resource allocation effect.

Research conducted on households by Agarwal and Chua (2020) suggests that FinTechs have benefited households by increasing consumption, but also debt. Thanks to this, they can better spread their consumption over time and improve portfolio diversification. However, the facilities, including payment facilities, offered by FinTechs contribute to the fact that some households overconsume and take out loans beyond their means. As a result, ease of payment often comes with ease of debt. In this context, digital financial inclusion can therefore also have negative side effects. Other works in this field include Deepak (2019), Kukreja (2020) and Braido et al. (2021).

Demographic and non-demographic factors shaping consumer intentions to use FinTech services

Saputra et al. (2023) published a vast systematic literature review on consumer behavior and acceptance in FinTech adoption, including digital payment services providers. Many publications on this topic discuss both demographic and non-demographic factors of consumers' intention to use services of FinTechs/PayTechs. These factors are also the starting point for FinTechs to construct solutions that are competitive with banks, but also for banks to look for ways to maintain their position among customers. Generally, more attention in the literature is paid to non-demographic factors than to the impact of respondent characteristics on decisions to use new digital financial services.

Typical demographic factors as gender, education, and income were discussed by Alshari and Lokhande (2022) and Perea-Khalifi et al. (2024). Song et al. (2023) also examined income, age, domicile, and influence of neighbours. Domicile as key aspect is raised also by Alyakoob et al. (2021). Nam et al. (2023) added specific feature to this catalogue, i.e. racial/ethnic differences in mobile payment use. It is worth noting a specific conclusion of Tan (2022) that there is a limited impact of FinTechs in shaping consumer financial behaviours because respondents use FinTech services mainly for basic transactional purposes like making mobile payments and account management, but not so much for more complex matters like savings, investing, and credit. In such circumstances, the characteristics of respondents prove irrelevant.

The literature on FinTechs often raises the aspect of generational cohorts, especially Millennials, Generations X, Y, and Z. Singh and Sharma (2023) examined the effects of factors influencing Generation X and Millennials' motivations to use FinTech (PayTech) payment services in India in the context of the impact of COVID-19. In India, perceived COVID-19 risk, perceived COVID severity, individual mobility, subjective norms, perceived ease of use, and perceived usefulness have a statistically significant impact on FinTech payment services during the COVID-19 pandemic.

Dospinescu et al. (2021) examined the levels of significance for various factors that influence the degree of consumer satisfaction with using FinTech technologies and services by surveying Millennials and Generation Z. In addition to mobile payment options and international transfers, the most important factors that were influencing the level of satisfaction with using FinTech services included convenience and ease of use, legal regulations, ease of opening accounts, crowdfunding opportunities, reduced costs associated with transactions, peer social lending, insurance options, online intermediation, cryptocurrency options, and currency exchange options. The generational approach was also used in the works of Abu Daqar et al. (2020), Srivastava et al. (2023) and Mainardes et al. (2023). Chen et al. (2023) investigated the relationship between mobile payment use and payment satisfaction. The results indicate that the use of mobile payments is positively associated with payment satisfaction. Moreover, mediation analyses indicate that the use of mobile payments can help increase the availability of credit to consumers, which ultimately improves payment satisfaction. The three moderators of this association are financial knowledge, spending level, and portfolio diversification, which strengthen the positive relationship between the use of mobile payments and payment satisfaction.

The results of a 22-country panel study conducted by Mustafa et al. (2023) showed a significant impact of digital money transfers and debit and credit cards on financial inclusion. Macroeconomic indicators of financial inclusion in high- and middle-income countries indicate that financial inclusion has been accelerated by the development of FinTech payment instruments, and influenced to varying degrees by differences in technological development and financial literacy across countries.

Gupta et al. (2023) examined the factors that significantly shape the intention to use FinTech (including PayTech), i.e. perceived risks, benefits and trust, treating the

perceived impact of COVID-19 as a moderator mediating the effects of the studied factors. The intention to use FinTech services is positively influenced by perceived benefits and trust, while perceived risk has a significant negative impact. This is a signal that competing service providers must pay attention to these factors when motivating their consumers to use financial technologies. This suggests that banks can leverage their existing customer trust to compete with PayTech.

Meiryani et al. (2022) empirically investigated the influence of ease of use, security, economic benefits, and financial opportunities on the intention to continue using payments with new financial technologies in Indonesia. The results of this study show that the factors that have a positive and significant impact on respondents' intention to continue using payment technologies include ease of use, security, economic benefits, and financial opportunities. The ease of use of a given technology turns out to be correlated with the safety of its use, positively influencing the intention to continue using it.

Alhajjaj and Ahmad (2022) showed on the example of Jordan that there is a positive influence of both environmental (external) drivers and trust as predictors of consumer intention to use FinTech services. It also asserted the positive mediating effect of trust on the relationship between environmental drivers and consumer usage intent. Since external factors can shape customers' openness to FinTech, this connection can be used by banks, FinTechs, and authorities, each in their own way.

Ikhsan et al. (2023) claimed that perceived security significantly affects confirmation, satisfaction, and continuance intention. Confirmation significantly affects satisfaction, and satisfaction significantly affects the intention to continue mobile FinTech payments. Irimia-Diéguez et al. (2023) identified the factors that could explain the intention to use PayTech services within an Islamic banking context. The results show that perceived trust has a highly significant direct effect on the intention to use Islamic PayTech services, whereas perceived risk has a significant indirect effect on intention to use. Touching on the topic of further expansion of FinTech activity in an area that has not been recently explored by banks, i.e. the use of blockchain technology with particular emphasis on cryptocurrencies, Albayati et al. (2020) introduced new external variables regarding blockchain adoption characteristics such as trust, regulatory support, social influence, design, and experience, with an emphasis on trust. Therefore, among the non-demographic factors of intention to use FinTech services, including payments, trust in the provider, security, and ease of use of the innovation occupy the key positions. Various factors, mainly non-demographic, shaping consumers' intentions to use FinTech are also dealt with by Barbu et al. (2021), Rajan et al. (2022), Abdul-Rahim et al. (2022), Mahmud et al. (2023), Mainardes et al. (2023) and Laksamana et al. (2023).

Digital financial inclusion and FinTechs/PayTechs

According to Pawlowska and Staniszewska (2023), the impact of innovative financial technology (FinTech) on EU banking performance is noticeable. The influ-

ence of the COVID-19 pandemic on traditional banking sector and FinTech sector is also visible. It forced the banking sector to accelerate the implementation of innovations and catch up with emerging advanced IT solutions to allow banks to compete with FinTech companies. This means that the concept of open banking is starting to bear fruit for the benefit of bank customers and their digital financial inclusion.

Morgan (2022) states that financial inclusion, i.e. access of excluded households and small businesses to financial products and services, is seen as a way to promote more inclusive economic growth by providing previously unbanked people with access to funds for savings, investment, smoothing consumption, and insurance. As Buckley et al. (2021) argue, an important aspect of financial inclusion is access to credit for vulnerable groups in society. PayTech offers new opportunities, for example, thanks to "buy now, pay later" solutions, but at the same time it generates new types of risks for customers, and potentially also systemic risks for the stability of the financial sector.

It is worth emphasizing that support for the development of FinTechs from the authorities of many countries is significantly motivated by the desire to increase digital financial inclusion accompanying technical progress. Suhrab et al. (2024) explore the cause-and-effect relationship between digital financial inclusions and income inequality measured by GINI index in the context of BRICS countries. They focus exactly on the moderate impacts of technological innovation and infrastructure development.

However, Abdul Aziz and Naima (2021) point out that the implementation of new financial technologies requires something more than the current individualistic adopter/non-adopter binary framework and "supply-oriented" financial infrastructure. Although the current development of digital financial services has reduced problems with access to such services, there are significant limitations in developing countries caused not only by the lack of basic connectivity, but also by insufficient financial literacy and social awareness. The following works are also devoted to aspects of financial inclusion through FinTech services: Ding et al. (2018), Arner et al. (2020) and El Amri et al. (2021).

Competition between PayTechs and banks

The advances in IT typical for FinTech/PayTech business (e.g. artificial intelligence, big data, platforms, social media), the adoption of a customer-oriented perspective and the start-up mentality may represent aspects that lead to discontinuities in activities of existing classical financial institutions, mainly banks (Alt et al., 2018). In addition, banks are increasingly entering various other types of activities beyond classic banking and there they may also encounter competition from FinTechs/PayTechs (McKinsey & Company, 2019). Saksonova and Kuzmina-Merlino (2017) found that increasing competition between banks and FinTechs occurs not only in developed economies but also in emerging markets.

Parlour et al. (2022) studied the impact of FinTech competition on payment services when a bank, as a monopoly in this sphere, uses payment data to understand consumers' credit quality. Research shows that competition from FinTech payment service providers disrupts this flow of information. This affects both the price of payment services offered by the bank and its loan offer. PayTech competition with banks promotes financial inclusion, but may harm consumers with strong banking preferences and has an ambiguous impact on the lending market. Both the sale of data to banks by PayTechs and the transfer of data to banks by consumers increase bank lending, but the impact on consumer welfare is ambiguous. Typically, consumer welfare is higher when PayTechs sell data to banks than when it is transferred to banks by consumers themselves (Parlour et al., 2022). Importantly, consumers +65 do not realize the usefulness of data on consumer payments handled by FinTechs for monitoring the quality of borrowers by banks.

As Elsaid (2023) points out, although FinTech companies will take away some market share from banks, they should not be expected to replace banks. However, in order to remain competitive with FinTech companies, banks must accelerate the implementation of innovations and advanced technologies. This prompts them to seek mutually beneficial symbiosis through strategic partnerships and collaborations between banks and financial technology companies.

Competition between FinTechs/PayTechs and banks is the subject of numerous studies, including those by Li et al. (2017), Omarini (2018), Golubic (2019), Söylemez (2019), Wewege and Thomsett (2019), Hadad and Bratianu (2019), Sadiku et al. (2022), or Ngo and Nguyen (2022). In a detailed thread, Ismail et al. (2020) and Cullen (2022) write about a potential future innovation that may affect competition between FinTechs/PayTechs and banks, i.e. central bank digital currencies (CBDC). Ismail et al. (2020) and Cullen (2022) write about a potential future innovation that may affect competition between FinTechs/PayTechs and banks, i.e. central bank digital currencies (CBDC). In the context of the author's own research presented in this article, one should remember about the factor that is difficult to measure and influences the choices made by customers between banks and FinTechs. This factor is the detailed state of development of both competing groups of financial entities at the time of examining the preferences of their customers.

A review of existing research has identified a research gap – the lack of comprehensive research on how consumers assess their satisfaction with how their needs are met with regard to payment services provided by PayTechs and banks. Therefore, the aim of the analyses carried out is to assess how socio-demographic, socio-economic characteristics and the use of digital solutions influence consumers' perceptions of the ability of PayTechs to provide payment services that meet their needs better than banks.

The article also poses the following research hypothesis: PayTechs are better able to meet consumers' payment service needs than banks.

Research methods

The paper uses statistical inference methods to analyse the structure and relationship between selected consumer characteristics and the digital services they use and consumers' assessment of the ability of banks and PayTechs to meet their payment service needs.

To examine the relationship between explanatory variables and the dichotomous dependent variable Y – the respondent believes that there is a company or there are companies offering payment solutions that will better meet their needs than banks – logit models were estimated, which are described by the formula:

$$logit\ (p_i) = Z_i\ =\ x_i'\beta\ =\ \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \beta_n X_{ni}$$

where $logit(p_i)$ means $ln\frac{p_i}{1-p_i}$ (Maddala, 1992, p. 331).

The parameters $\beta_0, \beta_1, \ldots \beta_n$ which are elements of the β vector were estimated using maximum likelihood estimation. The logit model serves to determine what factors, and in what way, influence the studied phenomenon expressed as numbers in a dependent variable (Kochaniak & Ulman, 2020).

Stratification by age, gender, and size of respondent's locality of residence was used to select the sample. As respondents came from 22 European countries and the number of responses obtained from each country was not proportional to the population of internet users in that country, the approach presented by Moro et al. (2020) was followed. The actual proportions of internet users in each country were calculated. Each observation was then weighted by the inverse of its probability of being sampled.

The data used in the analysis comes from a survey based on computer-assisted web interviewing (CAWI) among internet users living in 22 European countries. The survey, funded by a research grant from the Polish National Science Centre, was conducted between July and August 2020 by the research agency Interactive Research Center Sp. z o.o. Internet users were recruited through the pan-European Dynata online panel. They were invited to register their interest in taking part in the survey via email and advertising campaigns. Survey respondents were then selected by stratified random sampling from a pool of registered individuals.

The sampling of respondents was stratified so that the sample reflected the distribution of characteristics such as age, gender and size of the respondent's locality of residence in each country. This ensured that the distribution of the above population characteristics was reflected in the sample. The samples in each country were therefore representative in terms of age, gender and size of the respondent's locality of residence. This made it possible to draw conclusions from the analyses for the whole population.

The survey received responses from 5,504 respondents from 22 European countries, including 20 of the 27 European Union Member States (Austria, Belgium, Bul-

garia, Czechia, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Lithuania, the Netherlands, Poland, Portugal, Romania, Slovakia, Spain, Sweden), the United Kingdom and Norway. The survey proper was preceded by a pilot study with 230 respondents from all countries surveyed. The pilot study was designed to verify the validity of the questions asked, i.e. to check that the questions were understood and correctly interpreted by the respondents.

For the sake of completeness (e.g. the question about the respondent's income bracket), 4,879 responses from the survey proper were used in the article. The definitions and description of the variables are presented in Table 1–3.

Table 1. Dependent variable and socio-demographic and socio-economic independent variables used in the models

Name of the variable	Definition of the variable	
Dependent variable		Percentage of responses
Y	The respondent believes that there is a company or there are companies offering payment solutions that will better meet their needs than banks. Dichotomous variable, where:	
	1 – yes	41.1
	0 – no	58.9
	Independent variables – socio-demographic and socio-economic	
gender	Respondent's gender (dummy variable):	
	1 – female	51.7
	0 – otherwise	48.3
age	Age of respondent in ranges (dummy variable). The age range of 18–24 years was taken as the reference interval	
	18–24	10.5
	25–34	16.5
	35–44	18.4
	45–54	17.6
	55–64	16.1
	65+	20.9
size of locality of residence	Response to a question regarding size of the location where the respondent lives. Responses are coded on a 6-point scale:	
	1 – rural area	25.9
	2 – city with less than 50,000 inhabitants (including suburbs)	25.7
	3 – city between 50,000 and 100,000 inhabitants (including suburbs)	16.9
	4 – city between 100,000 and 500,000 inhabitants (including suburbs)	15.8
	5 – city between 500,000 and 1,000,000 inhabitants (including suburbs)	6.3
	6 – city over 1,000,000 inhabitants (including suburbs)	9.4
level of education	Educational level of the respondent according to ISCED	
	1 – ISED 1	3.6
	2 – ISED 2	7.1
	3 – ISED 3	36.8
	4 – ISED 4	5.6
	5 – ISED 5	44.9
	6 – ISED 6	2.2

Name of the variable	Definition of the variable	
working	The respondent is employed on the basis of an employment contract, management contract, contract of mandate, or contract for specific work, is self-employed or is an entrepreneur. Dichotomous variable, where:	
	1 – yes	56.7
	0 – no	43.3
farmer	The respondent's main source of income is farming. Dichotomous variable, where:	
	1 – yes	0.7
	0 – no	99.3
pensioner	The respondent is a pensioner. Dichotomous variable, where:	
	1 – yes	22.4
	0 – no	77.6
unemployed	The respondent is unemployed. Dichotomous variable, where:	
	1 – yes	6.6
	0 – no	93.4
pupil/student	The respondent is a pupil or student. Dichotomous variable, where:	
	1 – yes	93.4
	0 – no	6.6
net income	Monthly average net income of the respondent's household in 12 brackets taking into account the subsistence level and the average wage level, where 1 means no income	
country of residence	Respondent's country of residence (dummy variable): Austria, Belgium, Bulgaria, Czechia, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Lithuania, the Netherlands, Poland, Portugal, Romania, Slovakia, Spain, Sweden, the United Kingdom, Norway. The reference country is Poland	
	Austria	5.1
	Belgium	3.1
	Bulgaria	4.1
	Czechia	3.1
	Denmark	4.1
	Finland	4.1
	France	7.2
	Germany	8.2
	Greece	3.1
	Hungary	3.1
	Ireland	3.1
	Italy	6.1
	Lithuania	3.1
	the Netherlands	5.1
	Poland	7.9
	Portugal	3.1
	Romania	3.1
	Slovakia	3.1
	Spain	5.1
	Sweden	5.1
	the United Kingdom	6.1
	Norway	4.1

Source: Author's own study

Table 2. Independent variables connected with use of digital devices and services used in the models

Name of the variable	Definition of the variable	
	Independent variables – use of digital devices and services	
laptop	The respondent uses a laptop. Dichotomous variable, where:	
	1 – yes	52.7
	0 – no	47.3
smartphone	The respondent uses a smartphone. Dichotomous variable, where:	
	1 – yes	87.3
	0 – no	12.7
card	The respondent uses a payment card (debit, credit, or prepaid). Dichotomous variable, where:	
	1 – yes	84.2
	0 – no	15.8
public e-services	The respondent uses public services via the internet e.g. e-government, e-health. Dichotomous variable, where:	
	1 – yes	29.6
	0 – no	70.4
smart home	The respondent uses smart home solutions (operating lights, gate, temperature, etc. from a mobile app). Dichotomous variable, where:	
	1 – yes	9.3
	0 – no	90.7
fitness application	The respondent uses fitness/health apps (e.g. MyFitnessPal, Garmin, Endomondo, Huawei Health, Samsung Health, Polar, Apple Health). Dichotomous variable, where:	
	1 – yes	33.6
	0 – no	66.4
transport application	The respondent uses transport apps (e.g. Uber/Bolt/FREE NOW). Dichotomous variable, where:	
	1 – yes	23.0
	0 – no	77.0
food application	The respondent uses a food ordering app (e.g. Uber Eats/Just Eat). Dichotomous variable, where:	
	1 – yes	31.6
	0 – no	68.4
ticket application	The respondent uses the app to buy tickets on public transport and/or make parking payments. Dichotomous variable, where:	
	1 – yes	26.1
	0 – no	73.9
mobile payment application	The respondent uses payments such as Apple Pay, Ali Pay, Google Pay, Amazon Pay, AliPay, MoneyGram, WeChat Pay, SamsungPay, PayPal. Dichotomous variable, where:	
	1 – yes	
	0 – no	
Western Union	The respondent uses Western Union. Dichotomous variable, where:	
	1 – yes	94.1
	0 – no	5.9

Name of the variable	Definition of the variable	
Revolut	The respondent uses Revolut payments. Dichotomous variable, where:	
	1 – yes	6.3
	0 – no	93.7
Cryptocurrencies	The respondent uses cryptocurrency payments (e.g. Bitcoin, Etherum). Dichotomous variable, where:	
	1 – yes	5.0
	0 – no	95.0

Source: Author's own study.

Table 3. Summary statistics

Variable	Mean	Min.	Max.	25th percentile	Median	75th percentile	Std. Dev.	Skewness	Kurtosis
Y	0.41	0	1	0.00	0.00	1.00	1.00	0.007	0.361
gender	0.52	0	1	0.00	1.00	1.00	1.00	0.007	-0.068
age	3.75	1	6	2.00	4.00	5.00	5.00	0.024	-0.101
size of locality of residence	2.79	1	6	1.00	2.00	4.00	4.00	0.023	0.618
level of education	3.86	0	6	3.00	4.00	5.00	5.00	0.018	-0.658
working	0.57	0	1	0.00	1.00	1.00	1.00	0.007	-0.271
farmer	0.01	0	1	0.00	0.00	0.00	0.00	0.001	11.516
pensioner	0.22	0	1	0.00	0.00	0.00	0.00	0.006	1.321
unemployed	0.07	0	1	0.00	0.00	0.00	0.00	0.004	3.491
pupil/student	0.08	0	1	0.00	0.00	0.00	0.00	0.004	3.211
net income	8.46	1	12	7.00	8.00	10.00	10.00	0.042	-0.005
laptop	0.53	0	1	0.00	1.00	1.00	1.00	0.007	-0.108
smartphone	0.87	0	1	1.00	1.00	1.00	1.00	0.005	-2.243
card	0.84	0	1	1.00	1.00	1.00	1.00	0.005	-1.874
public e-services	0.30	0	1	0.00	0.00	1.00	1.00	0.007	0.894
smart home	0.09	0	1	0.00	0.00	0.00	0.00	0.004	2.803
fitness application	0.34	0	1	0.00	0.00	1.00	1.00	0.007	0.694
transport application	0.23	0	1	0.00	0.00	0.00	0.00	0.006	1.285
food application	0.32	0	1	0.00	0.00	1.00	1.00	0.007	0.790
ticket application	0.26	0	1	0.00	0.00	1.00	1.00	0.006	1.090
Western Union	0.06	0	1	0.00	0.00	0.00	0.00	0.003	3.759
Revolut	0.06	0	1	0.00	0.00	0.00	0.00	0.003	3.601
Cryptocurrencies	0.05	0	1	0.00	0.00	0.00	0.00	0.003	4.120

Source: Author's own study.

The correlation matrices between the variables used in Model 1 and Model 2 are shown in Table 6 and Table 7, respectively in the Appendix.

Results

The results of estimating a logit model describing the relationship between socio-demographic and socio-economic factors and the likelihood that a respondent

would consider that there is a company or there are companies offering payment solutions that better meet their needs than banks is presented in Model 1 (Table 4).

Table 4. The results of the estimated logit model 1

	a priori				*a posteriori*			
	coeff.	stand. error	marginal effect	*p*	coeff.	stand. error	marginal effect	*p*
Const.	0.2855	0.1943		0.1417	**0.4574**	**0.1319**		**0.0005**
gender	**-0.3135**	**0.0607**	**-0.0757**	**<0.0001**	**-0.3139**	**0.0605**	**-0.0758**	**<0.0001**
a_25_34	0.0148	0.1296	0.0036	0.9089	0.0180	0.1180	0.0044	0.8788
a_35_44	-0.1181	0.1332	-0.0283	0.3750	-0.1256	0.1166	-0.0301	0.2814
a_45_54	**-0.5396**	**0.1361**	**-0.1247**	**0.0001**	**-0.5512**	**0.1185**	**-0.1272**	**<0.0001**
a_55_64	**-0.6434**	**0.1401**	**-0.1467**	**<0.0001**	**-0.6514**	**0.1182**	**-0.1484**	**<0.0001**
a_65	**-0.7618**	**0.1612**	**-0.1730**	**<0.0001**	**-0.7476**	**0.1150**	**-0.1701**	**<0.0001**
size of locality	0.0059	0.0189	0.0014	0.7546				
level of education	0.0421	0.0312	0.0102	0.1777				
working	**0.1922**	**0.1089**	**0.0463**	**0.0776**	**0.1726**	**0.0774**	**0.0416**	**0.0257**
farmer	**0.6588**	**0.3488**	**0.1631**	**0.0589**	**0.6441**	**0.3463**	**0.1595**	**0.0629**
pensioner	0.0576	0.1400	0.0139	0.6810	**-0.2375**	**0.1346**	**-0.0561**	**0.0775**
unemployed	-0.2062	0.1526	-0.0489	0.1764	**0.1726**	**0.0774**	**0.0416**	**0.0257**
pupil/student	0.0566	0.1603	0.0137	0.7238				
net income	**-0.0454**	**0.0104**	**-0.0110**	**<0.0001**	**-0.0444**	**0.0104**	**-0.0107**	**<0.0001**
McFadden R-square			0.028				0.028	
Number of cases of correct prediction			61.40%				61.20%	

Variables that are statistically significant are shown in bold.

Source: Author's own study.

One factor influencing the likelihood of the dependent variable taking the value 1 (answer yes) is gender. Men are more likely than women to answer yes to the question that there are entities that will provide payment services that better meet their needs than banks.

Another explanatory variable with a significant impact on the likelihood of a positive response is the age of the respondent. The likelihood of a positive response is highest for respondents in the 25 to 34 age range, i.e. those at the beginning of their career. Compared to a person in the 18–24 age bracket, the probability of a positive response for a person in the 25–34 age bracket is on average 0.004 higher, while that of a person in the 35–44 age bracket is on average 0.03 lower, that of a person in the 45–54 age bracket is on average 0.13 lower, that of a person in the 55–64 age bracket is on average 0.15 lower, and that of a person over 65 is on average 0.17 lower.

The analyses carried out indicated that neither the size of the respondent's locality of residence nor the education (level of education) acquired by the respondent affect the likelihood that they will believe entities other than banks can provide them with a better product offering.

The variable influencing it is the respondent's main source of income. Farmers are, on average, 0.15 more likely to respond positively than those earning their main

income from other sources. In the case of persons employed on the basis of an employment contract, managerial contract, contract of mandate, or contract for specific work, self-employed, or entrepreneurs as well as the unemployed by 0.44 in relation to persons obtaining their main income from sources other than those indicated. In contrast, pensioners are on average 0.06 less likely to respond positively.

The respondent's income level also influences the selected response option. Changing the net income bracket, where bracket 1 means no income and bracket 12 means the bracket with the highest income, increases the probability of a negative response by an average of 0.01.

The results of estimating the logit model describing the relationship between a respondent's country of residence and their use of digital devices and services and the likelihood that they would consider that there is a company or there are companies offering payment solutions that better meet their needs than banks is presented in Model 2 (Table 5).

Table 5. The results of the estimated logit model 2

		a priori		*a posteriori*				
	coeff.	stand. error	marginal effect	*p*	coeff.	stand. error	marginal effect	*p*
const.	**-0.7930**	**0.1611**		**<0.0001**	**-0.8216**	**0.1597**		**<0.0001**
Austria	**0.6752**	**0.1813**	**0.1670**	**0.0002**	**0.6883**	**0.1803**	**0.1702**	**0.0001**
Belgium	**0.9015**	**0.2100**	**0.2215**	**<0.0001**	**0.9074**	**0.2091**	**0.2229**	**<0.0001**
Bulgaria	**0.9825**	**0.1906**	**0.2405**	**<0.0001**	**0.9841**	**0.1903**	**0.2409**	**<0.0001**
Czechia	0.3611	0.2211	0.0890	0.1024	**0.3864**	**0.2201**	**0.0954**	**0.0791**
Denmark	**1.6635**	**0.1927**	**0.3815**	**<0.0001**	**1.6638**	**0.1920**	**0.3815**	**<0.0001**
Finland	0.2975	0.2028	0.0731	0.1425	0.2972	0.2021	0.0731	0.1415
France	**1.2991**	**0.1657**	**0.3116**	**<0.0001**	**1.3161**	**0.1652**	**0.3152**	**<0.0001**
Germany	**0.8882**	**0.1631**	**0.2185**	**<0.0001**	**0.8935**	**0.1609**	**0.2197**	**<0.0001**
Greece	**0.9149**	**0.2081**	**0.2247**	**<0.0001**	**0.9009**	**0.2077**	**0.2214**	**<0.0001**
Hungary	**0.8852**	**0.2088**	**0.2177**	**<0.0001**	**0.9071**	**0.2077**	**0.2229**	**<0.0001**
Ireland	**0.9556**	**0.2085**	**0.2342**	**<0.0001**	**0.9516**	**0.2081**	**0.2333**	**<0.0001**
Italy	**0.9911**	**0.1717**	**0.2427**	**<0.0001**	**1.0003**	**0.1704**	**0.2448**	**<0.0001**
Lithuania	-0.0089	0.2293	-0.0021	0.9692	0.0226	0.2287	0.0055	0.9212
Netherlands	**0.6861**	**0.1821**	**0.1697**	**0.0002**	**0.6981**	**0.1810**	**0.1726**	**0.0001**
Portugal	**1.3383**	**0.2067**	**0.3182**	**<0.0001**	**1.3441**	**0.2063**	**0.3194**	**<0.0001**
Romania	**0.6434**	**0.2119**	**0.1592**	**0.0024**	**0.6545**	**0.2109**	**0.1620**	**0.0019**
Slovakia	0.3315	0.2235	0.0817	0.1381	0.3484	0.2228	0.0859	0.1179
Spain	**0.8261**	**0.1804**	**0.2036**	**<0.0001**	**0.8332**	**0.1800**	**0.2053**	**<0.0001**
Sweden	**0.5540**	**0.1849**	**0.1370**	**0.0027**	**0.5826**	**0.1825**	**0.1441**	**0.0014**
United Kingdom	**0.4678**	**0.1752**	**0.1155**	**0.0076**	**0.4816**	**0.1744**	**0.1190**	**0.0058**
Norway	**0.9558**	**0.1924**	**0.2343**	**<0.0001**	**0.9824**	**0.1902**	**0.2405**	**<0.0001**
laptop	**-0.2036**	**0.0656**	**-0.0491**	**0.0019**	**-0.1970**	**0.0652**	**-0.0475**	**0.0025**
smartphone	**-0.4702**	**0.0982**	**-0.1158**	**<0.0001**	**-0.4451**	**0.0967**	**-0.1096**	**<0.0001**
card	**-0.2727**	**0.0858**	**-0.0667**	**0.0015**	**-0.2723**	**0.0852**	**-0.0666**	**0.0014**
public e-services	-0.0543	0.0731	-0.0131	0.4577				
smart home	0.1861	0.1139	0.0454	0.1025	**0.2007**	**0.1133**	**0.0490**	**0.0765**
fitness application	**0.2010**	**0.0739**	**0.0487**	**0.0065**	**0.2192**	**0.0729**	**0.0532**	**0.0026**

		a priori		*a posteriori*				
	coeff.	stand. error	marginal effect	*p*	coeff.	stand. error	marginal effect	*p*
transport application	0.1249	0.0880	0.0303	0.1560				
food application	**0.2811**	**0.0812**	**0.0683**	**0.0005**	**0.3277**	**0.0763**	**0.0797**	**<0.0001**
ticket application	0.0729	0.0786	0.0176	0.3533				
mobile payment application	**0.2377**	**0.0462**	**0.0573**	**<0.0001**	**0.2506**	**0.0455**	**0.0604**	**<0.0001**
Western Union	**0.5232**	**0.1385**	**0.1294**	**0.0002**	**0.5297**	**0.1383**	**0.1310**	**0.0001**
Revolut	**0.5791**	**0.1387**	**0.1432**	**<0.0001**	**0.5989**	**0.1382**	**0.1481**	**<0.0001**
Cryptocurrencies	**0.5656**	**0.1532**	**0.1399**	**0.0002**	**0.5704**	**0.1530**	**0.1411**	**0.0002**
McFadden R-square			0.069				0.069	
Number of cases of correct prediction			65.30%				65.30%	

Variables that are statistically significant are shown in bold.

Source: Author's own study.

The respondent's country of origin was a factor significantly influencing the likelihood that they would claim there were entities that could provide payment services that better met their needs than banks. A respondent from Poland was less likely to do so compared to respondents from most European countries.

The likelihood is also higher for those using apps for: ordering food (by 0.08 on average compared to those not using such apps), fitness/health (by 0.05 on average compared to those not using such apps), and smart home solutions (by 0.05 on average compared to those not using such apps). A large increase in the likelihood of consumers accepting the possibility that other providers, not banks, will have an offer better suited to their needs is for people who use mobile applications such as Apple Pay, Ali Pay, Google Pay, Amazon Pay, Alipay, MoneyGram, WeChat Pay, Samsung Pay, PayPal – by an average of 0.06 compared to those who do not use such applications; those who use currency transfers – by an average of 0.13 compared to those who do not use such applications; people using payments via Revolut – by an average of 0.15 compared to those who do not use such applications; and those who use cryptocurrencies – by an average of 0.14 compared to those who do not use such applications.

Discussions and conclusions

The evaluation of how socio-demographic, socio-economic characteristics and the use of digital solutions influence consumers' perceptions of PayTechs as better meeting their payment service needs than banks, included in the purpose of this article, yielded a number of interesting observations.

The initial research hypothesis of PayTechs meeting consumers' payment service needs better than banks was only confirmed within a set of specific determinants regarding respondents' personal characteristics and their attitudes towards the use of new technologies in payments, as well as other aspects of everyday life. The experiences acquired so far by the respondents significantly shape their openness to PayTech offers that could be an alternative to those of banks.

The results of the research highlight the importance of taking into account the context of the development of banking in a country when assessing the factors that shape respondents' perceptions of the quality of banking and PayTech services. At the same time, the generational aspect highlighted in the article is an important signal that, when interpreting the results of this type of research, it is important to bear in mind the temporary nature of the influence of historically determined factors, which will fade with generational change.

The likelihood of consumers stating that there are entities that will provide payment services that better meet their needs than banks is highest for respondents in the 25 to 34 age range, i.e. those at the beginning of their careers. These results are in line with previous studies on the adoption of new technologies, which suggest that younger people are more likely to use new solutions than older people (Pirhonen et al., 2020).

This is also more likely to be the case for people using apps for: ordering food, fitness/health, making mobile payments, currency transfers or payments via Revolut, using cryptocurrencies, or smart home solutions. Previous research by Kim et al. (2019) and Hino (2015) confirms the role of prior experience with technology-enabled products and services in the willingness to use newer and more technologically advanced digital solutions.

Consumers in older age groups, who use card payments and e-services are less likely to point to the possibility of PayTechs being superior to banks. This may be due to better offers made to this group of customers by banks (more attractive groups due to higher incomes and greater, already accumulated wealth), as well as banks adapting their offers to their customers' needs.

The likelihood of switching from using services offered by banks to those offered by PayTechs is highest for those in the youngest age groups (Generation Z, Y). This is confirmed by previous research, including by Sahms et al. (2020) and Rodrigues et al. (2023), which showed differences in the approach of Gen X, Gen Y and Gen Z to the adoption of new digital solutions in banking services, the level of satisfaction with the services provided and the expectations regarding the features of the services offered. On the one hand, young people are not yet "attached" to specific banks through the habit resulting from many years of cooperation, while on the other hand, they are looking for offers that best meet their expectations (speed of service, ease of use, low costs, no hidden charges or conditions to be met in order not to incur such charges).

Using a wide range of apps in everyday life, often with built-in payment options, increases the openness to using services that until recently were mainly associated with banks and are now also offered by PayTechs.

The results of the analysis indicate that consumers who have already used the services offered by PayTechs assume that these entities can provide better services than those offered by banks. The above findings confirm the results of a study conducted by Perea-Khalifi et al. (2024) on users of three PayTech apps in the Spanish market. Indeed, their text mining and sentiment analysis showed that online reviews of bank-independent apps showed less negative sentiment than online reviews of bank-related apps (Perea-Khalifi et al., 2024).

The respondent's country of origin was a factor significantly influencing the likelihood that they would claim there were entities that could provide payment services that better met their needs than banks. A respondent from Poland was less likely to do so compared to respondents from most European countries. This demonstrates both the attachment of customers to banks and the very high development of the banking sector in Poland. Indeed, banks in Poland, in an open market and with relatively strong competition, took advantage of "leapfrogging"[1] and, by introducing modern digital solutions, were able to very quickly offer their customers innovative financial solutions, including payment solutions tailored to their needs.

Limitation and future studies

Research on the perception of services provided by banks and PayTechs is limited by the fact that it may be difficult for consumers to determine which entity's services they are using – a bank or a PayTech. This is due to the fact that

– a bank can take over a PayTech and the solutions it has created,
– a bank can expand its offering in cooperation with a PayTech,
– a PayTech can become a bank (e.g. Revolut).

As a result, customers may be unaware of who is actually providing the service they are using.

The findings presented in this paper highlight the complexity of the determinants of PayTechs competing with banks for customers and warrant caution in extrapolating one country's experience in this area to other countries. Given the importance of the generational factor shown in the research, further research is desirable to observe whether and how existing determinants of PayTechs competing with banks for customers are changing. This would be particularly important for countries where banks are well firmly established in the public consciousness, such as Poland.

[1] Economic advantage resulting from skipping certain stages of development, jumping straight to a higher level. An economically backward entity (e.g. a state) thus avoids repeating disadvantageous processes and copies ready-made, proven solutions without incurring higher costs connected with achieving them. An example is the payment market in Poland, where cheque payments have never been widely used, while card payments have developed.

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Appendix

Table 6. Correlation table – Model 1 (Pearson correlation coefficients)

	Y	gender	age	size of locality of residence	level of education	working	farmer	pensioner	unemployed	pupil/ student	net income	country of residence
gender	-.056**											
age	-.144**	-.137**										
size of locality of residence	0.019	-.035*	-.055**									
level of education	.034*	0.027	-.083**	.091**								
working	.080**	-.047**	-.250**	.069**	.198**							
farmer	.030*	-0.017	-0.025	-0.026	0.006	-.050**						
pensioner	-.092**	-.094**	.619**	-.043**	-.115**	-.599**	-.029*					
unemployed	-0.023	.043**	-.092**	-.039**	-.062**	-.298**	-0.004	-.135**				
pupil/student	.040**	.066**	-.418**	.034*	-0.024	-.285**	0.003	-.152**	-.054**			
net income	-.054**	-.031*	0.027	.036*	.111**	.130**	-0.013	-.049**	-.127**	-0.024		
country of residence	-.046**	-0.004	-0.010	.057**	0.023	0.006	0.021	-0.026	0.005	-0.007	.118**	_-

Source: Author's own study.

Table 7. Correlation table – Model 2 (Pearson correlation coefficients)

	Y	laptop	smart-phone	card	public e-ser-vices	smart home	fitness applica-tion	transport applica-tion	food applica-tion	ticket applica-tion	mobile payment applica-tion	Western Union	Revolut	Crypto-curren-cies
gender	-.056**													
laptop	-.054**													
smartphone	-.041**	.138**												
card	-.035*	.149**	.120**											
public e-ser-vices	0.016	.119**	.088**	.156**										
smart home	.095**	.065**	.069**	.075**	.114**									
fitness appli-cation	.093**	.158**	.271**	.100**	.173**	.216**								
transport appli-cation	.098**	.142**	.208**	.103**	.196**	.229**	.329**							
food application	.121**	.144**	.259**	.122**	.200**	.220**	.355**	.463**						
ticket applica-tion	.070**	.129**	.226**	.126**	.247**	.183**	.310**	.390**	.368**					
mobile payment application	.167**	0.024	.044**	.103**	.154**	.347**	.281**	.334**	.330**	.296**				
Western Union	.112**	0.001	0.022	.063**	.087**	.124**	.138**	.150**	.145**	.130**	.273**			
Revolut	.106**	.054**	.063**	.082**	.109**	.132**	.164**	.226**	.207**	.156**	.263**	.108**		
Cryptocurren-cies	.113**	.039**	0.026	.053**	.081**	.143**	.095**	.156**	.150**	.096**	.308**	.190**	.199**	

Source: Author's own study.