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# THE INFLUENCE OF DISTRIBUTION CHANNELS ON THE PROFITABILITY OF BANKS

Uticaj kanala distribucije na profitabilnost banaka

## Abstract

The introduction of digital channels for the distribution of banking services has become a necessity in the conditions of growing digitization and changed customer requirements. Without denying the importance of other marketing mix instruments, banks are increasingly basing their strategic competitive advantage on digital distribution channels. This regularity is especially emphasized given the emergence of digital technology companies (fintech and bigtech) which, owing to the development of digital distribution channels, are gradually taking over numerous financial services from banks. Nevertheless, for certain forms of banking services, traditional distribution channels and personal contact with the banker remain indispensable. The aim of the paper is to examine the impact of the introduction of digital distribution channels on the profitability of banks. The analysis covers the banking sector of the European Union member states in the period 2015-2020. In order to examine the influence of distribution channels (number of branches, number of ATMs, number of POS terminals and number of internet banking users) on the profitability of banks, measured by the return on assets (ROA) and return on equity (ROE), panel regression is used. The results confirm the significant and positive impact of digital distribution channels on bank profitability.

**Keywords:** *banking service, digital distribution channel, ROA, ROE*

## Sažetak

Uvođenje digitalnih kanala distribucije bankarskih usluga nametnulo se kao nužnost u uslovima rastuće digitalizacije i promjenjenih zahteva klijenata. Ne sporeći značaj ostalih instrumenata marketing miksa, banke sve više svoju stratešku konkurentsku prednost baziraju upravo na digitalnim kanalima distribucije. Ovakva pravilnost je posebno naglašena sa pojavom organizacija iz oblasti digitalnih tehnologija (fintech i bigtech) koje zahvaljujući upravo razvoju digitalnih kanala distribucije postepeno preuzimaju brojne finansijske usluge od banaka. Ipak, za pojedine oblike bankarskih usluga, tradicionalni kanali distribucije i lični kontakt sa bankarom ostaju nezaobilazni. Cilj rada je da ispita uticaj uvođenja digitalnih kanala distribucije na profitabilnost banaka. Analizom je obuhvaćen bankarski sektor država članica Evropske unije u periodu od 2015-2020. godine. Da bi se ispitao uticaj kanala distribucije (broja filijala, broja bankomata, broja POS terminala i broja korisnika internet bankarstva) na profitabilnost banaka, merene putem stope prinosa na ukupnu aktivu (ROA) i stope prinosa na akcijski kapital (ROE), korišćena je panel regresija. Rezultati su potvrdili značajan i pozitivan uticaj digitalnih kanala distribucije na profitabilnost banaka.

**Ključne reči:** *bankarske usluge, digitalni kanali distribucije, ROA, ROE*

## Introduction

The dominant role of banks in the market of financial services has long resulted in insufficient customization of banking services. After financial deregulation and increased competition from non-banking financial institutions, banks integrated the marketing concept into their business processes in order to adapt their services as much as possible to customer requirements. By implementing marketing mix instruments, i.e. product, price, place, promotion and distribution channels, banks can more easily define and monitor customer requirements. The rapid technological development and the globalization of financial services have given special importance to the distribution channels of banking services. While other marketing mix instruments are mostly used as a source of competitive advantage, the distribution channels of banking services are still unexplored in terms of their effects on banking operations. Certainly, they have a synergistic effect with information and communication technologies. Today, banking activities are carried out in an extremely globalized environment, so the role of technology is of crucial importance. In the context of the distribution channels themselves, technology plays a very important role as it enables a high degree of flexibility. In this sense, the basic research question is the correlation between the profitability of banks and the specific distribution channels through which banks provide their services. The paper tests this correlation based on an example of the banking sector of the European Union member states. The starting hypothesis is that the application of digital distribution channels of banking services increases the profitability of banks. The structure of the paper consists of two units. In the first one, the evolution of the distribution channels of banking services will be presented in the context of applied banking strategies, together with the review of literature on previous research on the influence of distribution channels on the profitability of banks. In the second part of the paper, an empirical examination of the impact of digital distribution channels on the profitability of the banking sector in EU member states will be conducted.

## Review of literature

The development of banking in the last few hundred years can be analyzed by looking at three development phases. The first phase, marked as rural banking, completed its formation in the last decades of the 19th century. The second phase, designated as the phase of structural and market consolidation, marked the end of the 19th century and lasted until the 1960s [14, p. 46]. The last stage in the development of banking covers the period after the second half of the 20<sup>th</sup> century and authors mostly associate it with the process of globalization. In this phase, banks reorganized their operations, with powerful global financial institutions standing out among them. The development process of banks largely modified the distribution channels of banking services. In the initial stages of development, the insufficient connection of banks made it difficult for them to provide a higher level of services. Since the economic conditions were also insufficiently developed, such banking infrastructure met the client needs of the time. In the mid-20<sup>th</sup> century, banking operations changed, primarily their business orientation, to abandon the previous production or sales orientation of banks [31, p. 94]. After that, the marketing concept found its path, entailing a detailed assessment of the needs of existing and potential clients, and the creation of an offer in accordance with their requirements. In such business conditions, marketing played one of the leading roles [32, p. 108]. Producing satisfied clients became a long-term strategy of banks [33, p. 36]. To this end, banks applied new technologies and applications, optimized their products and services, developed adequate financial infrastructure and enabled the exchange of information about clients and their behavior in all distribution channels [33, p. 36]. In that process, technology played the key role, influencing the formation of complex distribution channels and increasing the banks' chances to meet the complex needs of their clients in an international framework.

The marketing orientation of financial institutions implies their connection to the needs of clients and continuous market analysis, with a carefully selected performance strategy [32, p. 108]. The last century was marked by a drop in the number of banks, caused by

the process of consolidation and the creation of new organizational forms, such as holdings, within which banks operate today [16, p. 27]. Tinnila [29, p. 13] systematizes trends in modern distribution channels in banking and singles out the following: change in the population age structure; availability of banking services 24/7/365; increasing application of information and communication technologies; increasingly demanding clients; growth in the share of e-commerce; globalization of business. The aforementioned factors represent the general framework in which the banks redesigned, among other things, their distribution channels, in order to apply the marketing concept to the greatest extent possible. Today, banks distribute their products and services within complex systems, where close relationships with clients greatly facilitate that process and make it more flexible. The constant availability of services is a factor that clients especially value in the era of digitalization. The active role of clients in creating an offer of banking services has imposed the need to develop distribution channels that would respond to the changed client demands. In this sense, the following text will give an account of the evolution of the distribution channels, conditioned by the intensive technological development, with an analysis of the impact of this trend on the profitability of banks.

#### Evolution of distribution channels and selection of appropriate strategy for providing banking services

In a general sense, distribution channels represent the path by which goods or services move from producers through marketing intermediaries (wholesalers, distributors and retailers) to the end user [21, p. 788]. Applied to banks, the supply chain implies the dual role of banks: as production centers and intermediaries to the end users of banking services. In banking, distribution channels mean mechanisms for establishing contacts with clients in order to provide services. In this sense, there are traditional distribution channels that assume personal contact with the client and modern distribution channels, where personal contact with clients practically does not exist.

Marketing channels have changed dramatically due to numerous technological solutions and innovations

during the last century [10, p. 27]. Their inclusion in the competitive strategy and consideration of optimization opportunities has a great advantage for the banks themselves, which is reflected not only in lower operating costs, but also in the impact on the overall performance and improvement of the bank's reputation. When looking at the distribution channels of banking services, there are those that assume the physical presence of the client, the so-called off-line systems, and those that rely on the application of information systems, the so-called online systems. Traditional banking systems imply personal contact with clients and physical presence, which in a globalized environment can be a barrier to meeting specific client requirements. Online banking, on the other hand, enables a high degree of flexibility in meeting the needs of clients, without territorial and time limitations in communication with clients. Internet banking has, at least to some extent, become the norm for many simple banking transactions [12, p. 54].

In traditional systems, the branch is a preferred channel for the distribution of banking services when personal contact with the banker is particularly valued. In direct contact with bank employees, information about the client needs is obtained and an offer is created accordingly. The Accenture research shows that this channel is most preferred when delivering more complex banking products to clients, non-standardized deposit-credit contracts, obtaining financial advice, and solving specific client requests [19, p. 1086]. The psychological effect of contracting certain activities with the bank is in focus here. In order to respond to the specific client requests, banks often form specialized branches, adapted to work with a certain group of clients. Most often, these are branches for working with legal or natural persons. Another interesting model of distribution of banking services is the so-called banking cafés. This model emerged as a result of a fast and busy lifestyle, so banks used an unusual place to connect with their clients. On the American market, *Capital One* is a pioneer in this type of banking. In 2017, this company owned about 30 facilities, which were particularly interesting to clients in terms of bank account opening services. The following text gives an analysis of the distribution channels of banking

services in the EU countries for a ten-year period, in order to observe the trend in the representation of individual distribution channels on the EU market, but also by individual countries (Figures 1-5).

The number of branches operating on the territory of the European Union has been constantly decreasing in the last decade (see Figure 1). The number of branches per 100,000 inhabitants fell from 34.2 in 2010 to 20.9 in 2020. Some of the factors that could influence the trend of the decline in the number of branches are the change in the user demands for financial services, cost reduction and the general trend of increasing digitization in the banking industry. Among the EU countries, in 2020 this type of distribution of banking services is most represented in Bulgaria (60.3 bank branches per 100,000 adults), as well as Luxembourg (59 bank branches per 100,000 adults) and Spain (45.5 bank branches per 100,000 adults) and it is the smallest in Finland (4 bank branches per 100,000 adults) [27].

Numerous technological solutions have made it possible to reduce direct contact between the bank and clients, in order to achieve a greater degree of flexibility. All these innovative solutions led to the digital transformation of banks, [9, p. 48], which caused the transition to digital channels of distribution of banking services. Shaikh et al. single out the basic models of digital banking, namely [22]: ATMs; POS terminals; Telephone banking; Internet and mobile banking; Branchless banking; Banking through social networks.

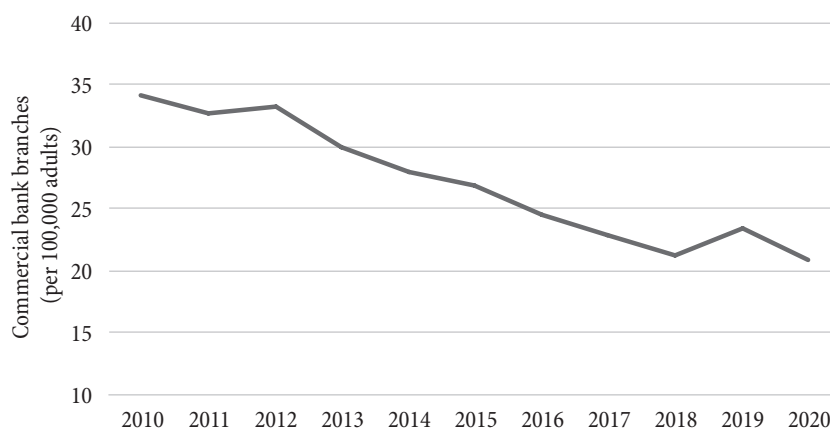
ATMs (Automatic teller machines) represent the first automated distribution channel in retail banking, which

enables a greater degree of flexibility and reduces personal contact with clients [3, p. 43]. As the main advantages of this channel, Mwatsika states the following [18, p. 27]: adaptation of the system to users; speed of operations; cash availability; transaction accuracy; shorter customer service time. Historically, ATMs were the first place to provide services, excluding branches, and were first used by Barclays Bank in England in 1967 [11, p. 374]. ATMs enable basic financial transactions, such as checking account balances or withdrawing cash. More complex ATM devices also offer the possibility of depositing money. Access to funds is provided by debit or credit card.

The number of ATMs per 100,000 people has decreased in the European Union in the last decade (see Figure 2), but the trends regarding changes in the number of ATMs differ from country to country. In some countries, the value of this indicator decreases in the period from 2010 to 2020, as is the case in Austria, Belgium, Cyprus, Estonia, Spain, France, Sweden and Italy, while in some countries it records growth (for example, in Germany, Finland, Greece, Croatia and the Czech Republic) [26]. The decline in the number of ATMs may indicate an increasing acceptance of cashless payments, while the maintenance of the size of the ATM network, and even its increase in certain countries, may be related to the greater use of more modern ATM devices, which to a greater extent represent a substitute for services that can be obtained in bank branches.

Point of sale terminals (POS terminals) are designed to enable cashless payments in retail. These devices enable easy transactions in real time. On the territory of the EU,

**Figure 1: Commercial bank branches (per 100,000 adults) in the EU from 2010 to 2020**



Source: [27]

the number of POS terminals is constantly increasing, so there were 12.54 million POS terminals in 2015, and 14.65 million in 2020 [24]. The number of transactions performed through POS terminals also increased, together with the increase in their value (see Figure 3).

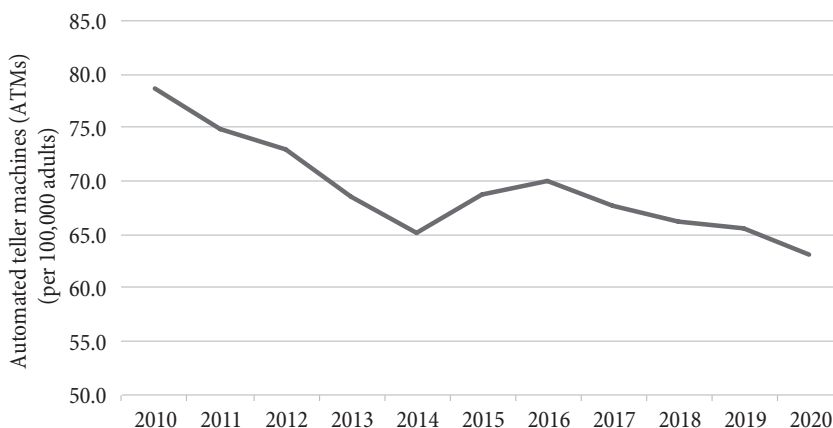
Compared to 2019, in 2020 the number and value of transactions at POS terminals decreased. The reason for this can be found in the COVID-19 pandemic outbreak and the restriction of movement in order to prevent the spread of the coronavirus (lockdowns). Also, in the conditions of the pandemic, the demand for contactless payments increased, and thus POS terminals, equipped with technologies that support contactless payments, gained importance.

Banking by phone, mobile center or interactive voice response involves either an automated telecommunications machine, i.e. IVR, or an agent. The IVR can talk to

clients, give them access to their banking information and help them complete their service. This is a significant step forward in the development of digital banking, where the role of the clerk is taken over by a machine. Special programs, which in their essence mark artificial intelligence in its infancy, process client requests at a higher level and help satisfy client needs.

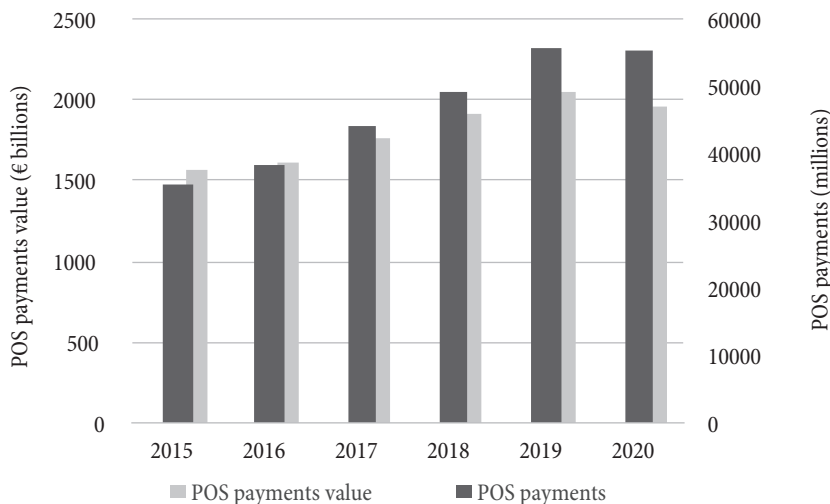
Internet banking enables the bank’s clients to access banking information and carry out transactions using a computer or laptop at any time and at any place. The introduction of the Internet as a channel for the distribution of banking services represents a revolution in the provision of banking services and changes the very position of clients, because they get an active role in that process. In this way, clients can independently carry out banking transactions: make payments, convert currencies, submit loan applications and get other

Figure 2: ATMs per 100,000 population in the EU from 2010 to 2020



Source: [26]

Figure 3: Number and value of transactions at POS terminals in the EU in the period from 2015 to 2020



Source: [7]

banking products. This allows for the full application of the marketing concept, given that clients can create personalized requests. The increasing importance of the Internet as a channel for the distribution of banking services is shown in Figure 4.

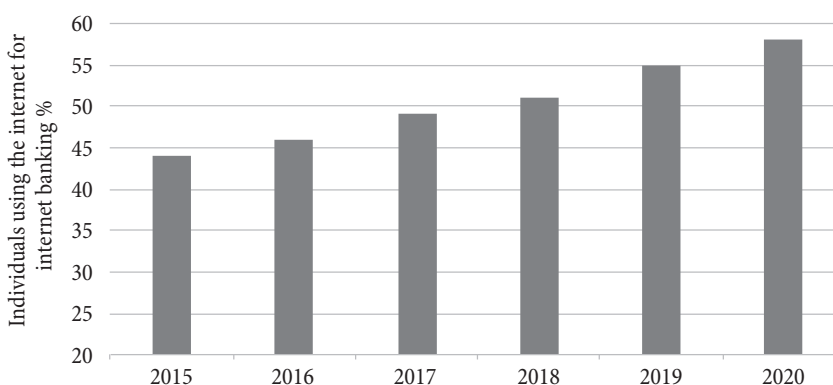
On a country basis, there is a noticeable difference in the use of the Internet as a channel for accessing banking services (see Figure 5). In 2020, 94 percent of the Danish population accessed online banking sites, followed by Finland with 92% and the Netherlands with 89%. Individuals use the internet for internet banking the least in Bulgaria (13%) and Romania (12%).

Even greater comfort and better customization come from mobile banking, in which clients can use banking services using their mobile phones and tablets [13, p. 1042]. Banks are investing significant resources in creating applications through which clients can satisfy an increasing number of banking services.

Branchless banking means a concept in which a bank or microfinance institution, in cooperation with a mobile telecommunications company or a mobile network operator, gives clients an opportunity to transfer and pay relatively small amounts. It is primarily intended for a group of clients with low incomes and remote areas. This distribution channel is of particular importance, because in this way banks expand their network of clients, overcoming territorial limitations. In addition, this way even low-income clients can effectively use banking services.

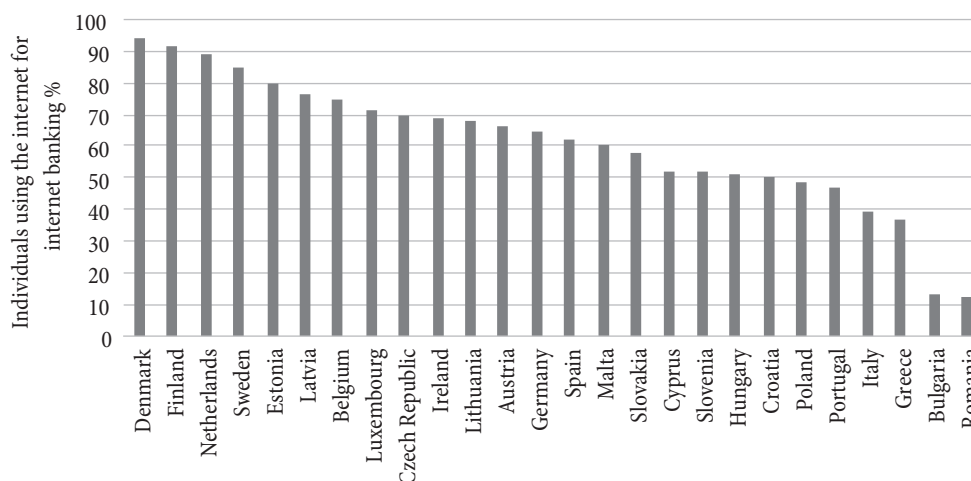
In recent years, social networks are increasingly replacing traditional media, so banking through social networks has established itself as a special type of digital banking [4, p. 770]. Parusheva singles out the following as the main advantages of this distribution channel [20, p. 127]: offering up-to-date information; quick response to changed client requirements; greater coverage, in terms of providing banking services to a wider circle of clients.

Figure 4: Individuals using the internet for internet banking (%) in the EU



Source: [8]

Figure 5: Individuals using the internet for internet banking (%) in selected European markets in 2020



Source: [8]

Practice shows that this way of distributing banking services has a positive effect on the bank's performance. More modern models of communication between banks and clients enable a greater degree of flexibility and personalization. A Deutsche Bank Research study shows that social media users have a greater demand for financial information and that personal contact with a bank employee is less important to such users [28].

The list of possible models through which banks achieve the goals of the digital agenda does not end here. There are a large number of hybrid models, because banks in the constant battle with the competition come up with new solutions through which they achieve higher levels of satisfaction for their clients. Bearing in mind the aforementioned systems for the distribution of banking services, the bank must choose an appropriate strategy for serving clients. Viewed from the perspective of distribution channels, there are three types of banks today [15, p. 54]:

- Banks that operate solely through branches;
- Banks that operate through branches and the Internet (dual strategy);

- Banks that operate solely through digital platforms, the so-called digital banks.

The first strategy belongs to the group of traditional strategies and is effective when banks can control operating costs. However, the globalization of the financial market, competition from non-banking financial institutions, as well as digital technology companies, require large investments by banks, which in conditions of saturated markets can not only reduce the profitability of banks, but also call into question their market position. In this sense, banks are forced to switch to a dual strategy, and some to digital channels only. The paper aims to empirically verify the influence of distribution channels on the profitability of the banking sector of EU member states.

### The influence of distribution channels on bank performance

Numerous authors have researched the impact of banking service distribution channels on bank performance. Table 1 summarizes the conclusions of individual research

**Table 1: Review of the literature on the influence of distribution channels on bank performance**

Author/-s	Year	Title of the paper	Research subject	Research result
Campebell, D. Frei, F.	2009	Cost Structure, Customer Profitability, and Retention Implications of Self-Service Distribution Channels: Evidence from Customer Behavior in an Online Banking Channel	Change in clients' habits in using online banking services and assessment of the degree of adoption of new electronic models	The degree of adoption depends on: costs, increased use of services through more expensive distribution channels, and increased volume of transactions
Auta, E.	2010	E-banking in developing economy: Empirical evidence from Nigeria	Effects of e-banking on bank performance in Nigeria	E-business is a key element of banks' development strategy
Chavan, J.	2013	Internet banking - benefits and challenges in an emerging economy	Advantages and challenges in electronic banking, business models	Multichannel approach proved to be the most desirable for bank performance
Stoica, O., Mehdian, S. & Sargu, A.	2015	The impact of internet banking on the performance of Romanian banks: DEA and PCA approach	Analysis of financial innovations and their contribution to the efficiency of Romanian banks	Multichannel approach proved to be the most desirable for bank performance
Akhisar, I., Tunay, B. & Tunay, N.	2015	The Effects of Innovations on Bank Performance: The Case of Electronic Banking Services	The impact of electronic distribution channels on bank performance on a sample of 23 developed and developing countries	Due to differences in the infrastructure of electronic distribution channels, the legal framework, as well as client habits, the impact of electronic distribution channels on bank performance is not positive in all observed countries
Sindani, M., Muturi, W. & Ngumi, P.	2019	Effect of financial distribution channels- Evolution on financial inclusion in Kenya	Looking at the effects of modern distribution channels on banking in Kenya	Internet banking had a positive impact on bank performance
Motondi, F.	2020	A research project report submitted in partial fulfilment of the requirement of Master of Business Administration in Strategic management of Kenyatta University	Assessment of the impact of distribution channels on the performance of commercial banks in Nairobi City District, Kenya	Electronic distribution channels have a positive impact on the financial performance of banks
Uche, D. Anene, J. Nnabgwuc, E.	2022	Effect of Distribution Channel Strategies on the Performance of Banks	Determination of distribution channel strategies applied by banks in Nigeria and effects on profitability	1. Commercial banks use different marketing strategies to gain competitive advantage. 2. Strategies that use a multi-channel approach with reliance on electronic distribution channels significantly increase the profitability of banks

Source: [5], [2], [6], [25], [1], [23], [17], [30]

dealing with this topic, which will be taken as a starting point for examining the impact of electronic distribution channels on the profitability of the banking sector of EU member states.

Analyzing the influence of distribution channels on the profitability of banks, most authors confirm the positive influence of electronic channels on the profitability of banks [1, p. 372]. Auta [2] observes a sample of 25 commercial banks to prove that banks in Nigeria achieved positive effects after the introduction of digital channels, not only through greater client satisfaction, but also better financial performance. Frei and Campbell [5] study the factors that depend on the level of acceptance of online banking systems, observing the clients of an American bank over a period of 30 months. The analysis shows that the effects of innovations in modern distribution channels can only be seen in the long run, through the influence on the growth of the bank's profit through the retention rate of clients. Most authors confirm the dominant presence of multichannel systems for the distribution of banking services. Chavan [6] rates the mixed approach as the most desirable model for increasing profitability in the Indian banking sector. Stoica et al. [25] come to the same conclusion observing the performance of Romanian banks. Motondi [17] proves that the positive impact on the performance of banks comes first with the use of ATMs, and then with the increasing use of mobile and internet banking. He also points out that accelerated interoperability among different distribution channels would have a positive impact on the entire banking system. For the success of commercial banks in Nigeria, Uche et al. [30] highlights the need to combine traditional and digital distribution channels, more specifically branch network and electronic banking. The subject of this paper is the influence of distribution channels on the profitability of the banking sector of EU member states.

## Research methodology

The paper analyzes the influence of the distribution channel of banking services on the profitability of the banking sector of EU member states. Basic indicators of bank profitability, return on assets (ROA) and return on equity

(ROE) are dependent variables. Independent variables are: Number of branches per 100,000 adults, Number of ATMs per 100,000 adults, Number of POS terminals, Individuals using the internet for internet banking. In order to examine the influence of the number of branches, the number of ATMs, the number of POS terminals and the number of internet banking users, while controlling the amount of loans, deposits, assets and equity on the profitability of banks, measured by ROA and ROE indicators, a panel regression is used.

### Data collection and sample

This research focuses on data on the banking sector of EU member states in the period from 2015-2020. The data is taken from the website of the European Central Bank. Descriptive statistics of the variables used is shown in Table 2.

**Table 2: Descriptive statistics**

Variable	Result variation	M	SD	Minimum	Maximum	N
branches	Total	27.222	15.726	4	76.8	161
	between		15.554	5.933	69.517	27
	within		3.426	16.373	39.406	5.923
atm	Total	81.240	37.511	28.3	183.27	165
	between		37.745	32.847	170.083	28
	within		5.144	60.417	98.695	5.893
pos	Total	497,590.4	715,085.5	18,123	361,709.8	142
	between		674,551.1	18,123	284,106.9	27
	within		162,694.3	-364,054.6	127,361.9	5.259
internet	Total	54.114	22.638	4	94	167
	between		22.205	7.167	89.5	28
	within		5.625	40.447	72.447	5.964
loans	Total	866,754.7	143,727.8	15,167	569,679.1	167
	between		147,321.7	18,281.5	513,221.2	28
	within		112,023.2	199,857.7	143,133.4	5.964
deposit	Total	831,194.2	140,299.5	13,180	596,758.7	166
	between		142,869.4	15,362.33	489,434.3	28
	within		150,604.7	193,244.8	209,319.3	5.929
assets	Total	154,237.1	258,551.4	22,719	1.05e+07	167
	between		267,746.3	26,541.83	9141028	28
	within		185,945.9	766,262.6	310,693.4	5.964
equity	Total	125,147.9	195,189.8	2,736	818,316	140
	between		197,002.5	3,067	00501.2	28
	within		20146.38	40,442.67	242,962.7	5
ROA	Total	0.599	0.571	-2.823	1.614	167
	between		0.468	-6.769	11.679	28
	within		0.335	-1.456	1.444	5.964
ROE	Total	6.349	5.304	-24.217	14.685	167
	between		4.228	-6.769	11.679	28
	within		3.275	-11.099	15.175	5.964

Source: Results of authors' research.



The table shows the average values of all variables, where the variation of results between countries is greater than by year within one country. Therefore, Table 3 shows the average values of the observed variables in EU member states.

In order to examine the influence of the number of branches, the number of ATMs, the number of POS terminals and the number of internet banking users,

while controlling the amount of loans, deposits, assets and equity, a panel regression is used (see Table 4).

The fixed effects model (FEM) is adequate for assessing the impact of the number of branches, the number of ATMs, the number of POS terminals, and the number of internet banking users, while controlling the amount of loans, deposits, assets and equity on ROA (see Table 5). The result of the *Breusch-Pagan*

**Table 3: Arithmetic means of dependent and independent variables in EU member states**

	roa	roe	branches	atm	pos	internet
Austria	0.622	7.326	11.633	170.083	150695.2	58
Belgium	0.612	8.445	34.36	84.394	218945	68
Bulgaria	1.247	9.570	55.133	93.198	173938	7.167
Croatia	0.696	5.099	30.683	139.345	110220.7	40.167
Cyprus	-0.277	-1.759	38.317	45.567	28944.33	33.667
Czech Republic	1.047	11.679	21.267	55.232	181837.7	59.333
Denmark	0.486	8.088	21.517	47.472	138950	89.5
Estonia	1.22875	8.753	9.7	68.09	35337.67	80
Finland	0.465	7.446	5.933	34.62	144678.5	88.5
France	0.383	6.051	35.5	100.335	1794286	61.6
Germany	0.151	2.265	12.033	128.23	1339802	57.5
Greece	-0.767	-6.770	22.1	61.508	567753.5	25.5
Hungary	1.082	10.521	17.567	59.847	171231.3	41
Ireland	0.575	4.079	20.633	80.733	291233.7	59.167
Italy	0.195	2.369	43.283	92.517	2841069	32.833
Latvia	1.077	9.454	13.85	60.538	39458.5	66.833
Lithuania	0.975	10.880	12.267	44.537	53583	59
Luxemburg	0.470	5.911	69.517	111.982	196670.3	70.333
Malta	0.848	5.526	30.683	51.857	18123	51.5
The Netherlands	0.422	6.991	10.917	43.323	486577.8	88
Poland	0.710	6.524	29.283	70.34	723609.2	41.667
Portugal	0.086	0.261	36.683	168.57	324350.8	36
Romania	1.261	11.422	25.883	65.692	198180.2	7.333
Slovakia	0.793	8.620	26.2	61.182	63068.67	49.333
Slovenia	1.028	8.786	28.567	90.085	36259.83	41.5
Spain	0.382	5.003	56.35	109.95	1615622	49
Sweden	0.655	10.907	16.35	32.847	248472.2	83.667

Source: Results of authors' research

**Table 4: Results of the model adequacy test of the dependent variable ROA**

Breusch-Pagan LM	Hausman test	Wooldridge test	Wald test
48.90 (0.000)	13.08 (0.011)	F (1.21) =10.883 (0.003)	$\chi^2(26) = 3.4e+32 (0.000)$

Source: Results of authors' research.

**Table 5: Dependent variable ROA**

Variable	B (95% CI)	p
Number of branches per 100000 adults	0.002 (-0.234; 0.028)	0.885
Number of ATM per 100000 adults	0.021 (0.005; 0.038)*	0.012
Number of POS terminals	5.16e-07 (-8.70e-07; 1.90e-06)	0.451
Individuals using the internet for internet banking	0.028 (0.003; 0.054)*	0.032
Loans	1.28e-06 (-1.03e-06; 3.58e-06)	0.264
Deposits	-1.00e-06 (-4.84e-06; 2.84e-06)	0.595
Assets	-8.92e-07 (-2.10e-06; 3.21e-07)	0.142
Capital and reserves	-7.62e-07 (-4.59e-06; 3.07e-06)	0.685

Note: \* level of significance  $\alpha = 0.05$

Source: Results of authors' research.

$LM (\chi^2(1) = 48.90; p = 0.00)$  and Hausman tests ( $\chi^2(4) = 13.08; p = 0.01$ ) support the panel regression model with fixed effects (*FEM*). The fixed effects model is significant,  $F(8, 25) = 3.34; p = 0.01$ , and explains a total of 5.6% ( $R^2 = 0.0564$ ) of the variation in the dependent variable ROA.

The variation of the criterion variable is significantly affected by the number of ATMs ( $B = 0.021; 95\% \text{ CI} = 0.005 - 0.038; p = 0.01$ ) and the number of internet banking users ( $B = 0.028; 95\% \text{ CI} = 0.003 - 0.054; p = 0.03$ ). Increase in Number of ATMs per 100,000 adults by 1 increases ROA by 0.02. As the number of internet banking users increases by 1, ROA increases by 0.03.

In order to examine the influence of the number of branches, the number of ATMs, the number of POS terminals, the number of internet banking users, while controlling the amount of loans, deposits, assets and equity on ROE, a panel regression is used (see Table 6).

The fixed effects model (*FEM*) is adequate to assess the impact of the number of branches, number of ATMs, number of POS terminals, and number of internet banking users while controlling the amount of loans, deposits, assets, and equity on ROE (see Table 7). The result of the *Breusch-Pagan LM* ( $\chi^2(1) = 46.06; p = 0.00$ ) and Hausman tests ( $\chi^2(4) = 13.40; p = 0.01$ ) support the panel regression model with fixed effects (*FEM*). The fixed effects model is significant,  $F(8, 25) = 5.99; p = 0.00$  and explains a total of 3.3% ( $R^2 = 0.0333$ ) of the variation in the dependent variable ROE.

The variation of the criterion variable is significantly affected by the Number of ATM per 100000 adults ( $B = 0.174; 95\% \text{ CI} = 0.055 - 0.293; p = 0.01$ ) and the number of internet banking users ( $B = 0.286; 95\% \text{ CI} = 0.082 - 0.491; p = 0.01$ ). Increase in the Number of ATM per 100000 adults by 1 increases ROE by 0.17. When the number of Internet users increases by 1, ROE increases by 0.29.

## Conclusion

The trend of digitization and the increasing share of digital channels in the distribution of banking services leads to lower transaction costs. However, the introduction of these channels requires bank investments in the development of digital platforms and adaptation of banking services to new trends. In the entire process of digital transformation of banks, the ultimate goal is to secure a base of loyal clients and improve the bank's overall performance, primarily its profitability. In this sense, the paper analyzes the impact of digital distribution channels on the profitability of the banking sector in EU countries. In order to examine the influence of the number of branches, the number of ATMs, the number of POS terminals and the number of internet banking users, while controlling the amount of loans, deposits, assets and equity on ROA and ROE, a panel regression is used. The results confirm a positive and significant impact on both bank profitability indicators. However, the dilemma about the greater efficiency of traditional or digital distribution channels and their impact, primarily on the

**Table 6: Results of the model adequacy test of the dependent variable ROE**

Breusch-Pagan LM	Hausman test	Wooldridge test	Wald test
46.06 (0.000)	13.40 (0.009)	$F(1, 21) = 5.680 (0.027)$	$\chi^2(26) = 1.3e+28 (0.000)$

Source: Results of authors' research.

**Table 7: Dependent variable ROE**

Variable	B (95% CI)	p
Number of branches per 100000 adults	0.075 (-0.181; 0.331)	0.552
Number of ATM per 100000 adults	0.174 (0.055; 0.293)*	0.006
Number of POS terminals	4.97e-06 (-6.79e-06; 0.000)	0.392
Individuals using the internet for internet banking	0.286 (0.082; 0.491)*	0.008
Loans	0.000 (-9.97e-06; 0.000)	0.275
Deposits	-7.68e-06 (-0.001; 0.000)	0.633
Assets	-9.81e-06 (-0.001; 3.67e-06)	0.146
Capital and reserves	-0.00001 (-0.0001; 0.0000)	0.412

Note: \* level of significance  $\alpha = 0.05$

Source: Results of authors' research.

profitability of banks, can only be analyzed if traditional and online systems are viewed as mutually exclusive. By properly analyzing clients, banks select requests and create a strategy accordingly. There is always a certain number of clients who do not require customization, and they will also accept traditional distribution channels. Sophisticated clients who demand a higher level of service will prefer to turn to modern systems, and the speed of the service will be the dominant performance indicator on the basis of which they will choose a specific bank. Since banks today mainly apply dual strategies in the distribution of their services, it is difficult to make a final judgment as to which form of banking is more prevalent, that is, which distribution channel contributes more significantly to the profitability and overall performance of banks. The fact is that the role of the Internet has largely moved banking services to a new, virtual market. Likewise, a large number of banks, according to the stage of development in a certain market, choose traditional models in the distribution of services. The question is to what extent the penetration of a certain market can be covered by online systems because the issue of trust in the initial phase is crucial. It is considered that these systems are adaptable when trust in the bank's operations already exists, and when the bank already has a significant client base.

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