

# Chapter 5

## The Transformation of Payment Systems in Eastern Europe: Past Trends and Future Innovation

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## 5.1. Introduction

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The advancement of payment technologies is crucial for the economic development of any country. Traditional paper currency no longer meets the full spectrum of demands posed by the diverse and complex nature of global business relations and citizen transactions. Consequently, there is an increasing need for alternative payment methods. The evolution of the payment system in Eastern Europe over the past decade warrants particular attention. This is not only due to the rise in online payments, especially during the 2019-2020 period in response to the COVID-19 pandemic, but also because of the region's high levels of labour migration to Western Europe. This migration has spurred the creation and expansion of numerous alternative payment systems, allowing citizens to transfer funds between countries quickly and conveniently, as well as to conduct instant currency exchanges and payments.

The purpose of this research was to study the recent development of payment systems in East-European countries in terms of their structural characteristics and importance for the national economy and to develop recommendations for improvement of the organisation and legal regulation of payment transactions with electronic money and cryptocurrency.

For this research, the authors selected six Eastern European countries (including the V4) and three post-Soviet Eastern European countries. It was appropriate to emphasise that in the last decade in these countries there has been a sharp increase in the development of payment systems. However, the ‘leapfrogging’ path in each country had its own characteristics. The gaps in existing services create huge opportunities for innovation, especially in low and middle-income countries.

The growth of non-cash payments is a key driver of economic growth in any country. On the one hand, it enhances the level of oversight and control over financial transactions, while on the other hand, it stimulates increased consumer spending. This, in turn, leads to higher consumption levels and contributes to GDP growth. However, current trends in e-commerce, particularly in the context of COVID-19, necessitate a focused examination of the factors influencing the development of payment systems in emerging markets. Such an analysis is essential for shaping effective financial innovation policies that can drive economic recovery and establish sustainable economic growth trajectories.

The rapid digitalisation of the economy has become an objective and irreversible process, raising important debates about changing traditional payment systems managed or regulated by central banks. The use of FinTech innovations and solutions has the potential to transform the conventional concept of cash payment systems, elevating them to a qualitatively new level. Meanwhile, non-bank payment systems, which leverage FinTech innovations, are increasingly becoming the dominant players in the modern payment systems market.

The construction of a new payment system architecture must adhere to principles of operational legality, user safety, transaction guarantees, minimisation of shadow operations, and transparency for regulators and supervisors.

Technological innovations are continuously reshaping payment systems to meet the evolving needs of users. Entities providing payment services, central banks, and international financial institutions are striving to collaborate at various levels – from the technical organisation of money transfers to the harmonisation of legislation and regulation of the payment market. Such efforts are crucial to ensure the reliable and uninterrupted operation of payment systems both within individual countries and at the interstate level.

In this era of rapid change and transformation, driven by the digitalisation of society, the world is becoming more globalised and requires new approaches to its development, particularly in the sphere of payment services. Payment service providers must be modern, competitive, and continuously innovative, offering new systems and convenient services that meet the ever-growing demands of customers.

Over the past decade there has been a significant shift in the needs of payment system customers, driven by increased travel, online shopping, and changes in professions. Labour migration at international level has also risen significantly, leading to the emergence of many new payment systems.

Current trends in e-commerce necessitate the development of new technological solutions, such as electronic payment systems capable of legally handling transactions with electronic money and cryptocurrency.

The authors selected six Eastern European countries that are members of the European Union, along with three post-Soviet Eastern European countries. It is important to note that, over the past decade, these countries have experienced rapid advancements in payment systems, although each country’s ‘leapfrogging’ path had distinct characteristics. The gaps in existing

services present significant opportunities for innovation, particularly in low and middle-income countries. Most Eastern European nations utilise FinTech innovations in developing payment systems, particularly through mobile apps, although in this region, mobile payments are often linked to the banking system.

Given the rapid growth of transactions through non-bank electronic payment systems, it is crucial to identify the obstacles to their development, especially concerning the need for effective supervision of cash settlements and the reduction of shadow payments.

The study also examined the trends in the development of various types of payment systems, analysing the dynamics of growth in payments through both banking and non-bank payment systems. The authors discuss the advantages and disadvantages of non-bank payment systems that utilise e-commerce and blockchain technology, considering both user and regulatory perspectives.

The research employed a comparative case analysis of Eastern European countries, with results compared to three developed Western European countries. The use of non-bank payments is growing significantly in several countries relative to bank payments. This suggests the specific institutional, market and regulatory situation in individual jurisdictions and how they shape adoption of payments innovations. A key aspect of the study was identifying and understanding the correlation between the development of payment systems and changes in the share of cash payments in Eastern Europe.

The authors also investigated the impact of high-tech payment innovations on the functioning and development of payment systems, analysing specific financial technologies and justifying their application in the development of payment systems in Eastern Europe. The objective was to present supporting evidence and analysis that address these critical issues.

The principal findings concerned the main opportunities for innovation in payments and in the closing of gaps in existing services. In Eastern Europe, in contrast to many other middle-income countries elsewhere in the world, the proportion of the population with bank accounts is high. The provision of mobile payments for example has been bank-based, it has not emerged through non-bank e-money solutions. The implication is that developments in domestic payments technologies in Eastern Europe will be bank rather than non-bank based.

This case can be of broad interest, not just to bankers, regulators and payments professionals in Eastern Europe. It highlights the path dependence of payments innovations and provides broader insight into the challenges of payments innovation.

The chapter is structured as follows. Section 5.2 is a brief review of the literature on innovation in payments. Section 5.3 reviews some of the relevant features of the economy and of the organisation of banking and payments in the selected nine countries, drawing some comparisons with three high-income European countries. Section 5.4 analyses payment infrastructure and payment innovations in these countries. Section 5.5 concludes.

## **5.2. The Opportunities for and Impact of Payments Innovations**

This section reviews the literature on payments innovation, distinguishing: 1) the adoption of payment innovations and its dependence on the specificities of the use of banking services and financial technologies by households and corporations; 2) the impact of payment innovations and cashless payments on the economy.

For a long time, payment systems did not attract significant in-depth interest from scientists for research and analysis. This lack of interest was largely due to the fact that, until the end of the 20th century, payments were predominantly made in paper form (European Central Bank [ECB], 2022). Payment processing could take several days, depending on the nature of the transaction – whether international, domestic, or intrabank (Schenk, 2024). Consequently, payment systems were categorised accordingly.

The acceleration of financial technology development, the rise of cryptocurrencies, and the growth of international settlements have spurred increased scholarly interest in the study of payment systems (Kou et al., 2024). Concurrently, the growing virtualisation and digitalisation of payments have led to a narrowing of the concept of the ‘payment system’ which is a critical term in both the financial market and the banking system. Most scholars now equate payment systems with interbank non-cash payment systems or clearing settlement systems involving non-bank financial and credit intermediaries.

As monetary settlements become increasingly digitalised, the concept of a payment system is often conflated with, or reduced to, a system of electronic or non-cash payments. Consequently, international and national financial market regulators have focused on creating regulations that primarily govern non-cash payments, often neglecting the oversight of cash payments, which still constitute 20-30% of the total payments in many developing countries (James, 2024).

However, since 2012, with the advent of cryptocurrencies and blockchain technology, the concept of the payment system has undergone radical changes (Benson et al., 2024). Modern interpretations which typically describe a system of cashless payments through bank accounts or accounts managed by various clearing companies – where a banking institution is a mandatory infrastructural component – fail to acknowledge that cashless payments in the economy can occur without direct participation from traditional banking institutions.

### 5.2.1. The Drivers of Payment Innovation

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Haddad (2018) investigating the development of financial innovations and cashless payments in developed countries found that these depend on the development of the Internet, the use of mobile phones and computers. Goldfinch (2019) also found that the development of mobile technologies have a significant impact on the future of payments.

Bossone et al. (2020) emphasised the feasibility of ensuring the same competitive conditions for banking and non-bank payment systems. In particular, they proposed that the central banks of the countries provide access to the real-time gross settlement (RTGS) system for non-bank payment operators, which would give retail payment service providers (PSPs) other than commercial banks the same possibilities and benefits, including emerging companies that apply technology to the provision of payment or payment-related services.

Sadlakowski (2017) suggested that the introduction of RTGS technology into the cashless payment system has a positive impact on the development of the Polish economy. However, the main share of non-cash transactions through the instant payment system is interbank payments, which reduces the usefulness of this technology for business customers and households. One of the obstacles to the spread of RTGS technologies to the retail market segment is the need to ensure a high level of cyber defence of payments, as well as the habits of customers who are accustomed to using card accounts for payments on the Internet and at points of sale.

Arango-Arango and Suarez-Ariza (2020) examined the use of cash and non-cash payments in different countries, finding that the development of digital technology and advanced cashless payments do not always reduce the demand for cash.

Hasan et al. (2012), based on market analysis from 27 European countries, concluded that the introduction of electronic payment instruments and non-cash retail payments has a positive impact on overall economic growth, consumption and trade. The greatest effect on economic growth is from the increase in operations on credit and debit payment cards. The growth of the share of non-cash payments contributes to a decrease in the level of the shadow economy, and at the same time increases consumption costs due to an increase in the limit of available funds for the client.

Technological innovations are constantly changing payment systems, meeting the modern needs of users. Sumedrea (2019) studied the development of fintech innovations, including digital payments, in Eastern European countries, assessing the development trends of financial innovations in the financial sector with a low level of development by analysing economic and social drivers. The research allowed to analyse the experience of financial innovation development in the countries of the former socialist countries, which, after gaining independence, have gone a short way in the development of the financial sector. It was the introduction of innovations that allowed to adapt payment systems to the standards of the European Union.

### **5.2.2. The Economic Impact of Payment Innovation**

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The growth of the share of financial innovations in Eastern Europe is also an important driver of economic development due to the increase in Internet trade, banking liquidity and business lending.

Merrouche and Nier (2010), in exploring the development of payment systems in Eastern Europe, concluded that the reforms of payment systems in the early 2000s led to a credit boom. The introduction of card payments contributed to a decrease in cash out of banks and led to an increase in demand deposits, and in turn to an increase in liquidity of commercial banks and retail lending.

In this case, the unregulated increase in the number of non-cash payment instruments and the development of a large number of payment systems could be one of the factors of the financial crisis. One can observe such trends in Ukraine, Belarus, the Russian Federation, where uncontrolled growth of lending led to the loss of liquidity by banks during even a slight deterioration in the world financial markets.

Gogoski (2012) made it possible to expand understanding of the role of payment systems in the economy by studying the trends in their impact on the effectiveness of monetary regulation of the economy by the central bank. The study concluded that it is impossible to effectively operate payment systems without the participation of the central bank as a regulator of non-cash payments by establishing risk control.

Aprigliano et al. (2019) suggested that the development of payment systems is important not only for economic growth, but also for effective business and control over the movement of financial flows in the country. The use of data received from the payment system allows enterprises and the central bank to analyse the trends of non-cash payments and make

forecasts for the future. Increasing non-cash payments in this context will allow studying the behaviour of companies and households in the payment market.

Beck et al. (2018) investigated the impact of innovative payment technologies on entrepreneurship and economic development using a quantitative dynamic model of general equilibrium. The authors, by building economic and mathematical models, proved that the introduction of innovative technology 'mobile money' in Kenya had a positive impact on the development of entrepreneurship and the economy, as companies gained access to simplified lending and increased sales, resulting in increasing demand from customers who own mobile apps for 'mobile money'. Despite the fact that the results of the study of Beck et al. (2018) described the positive impact of innovative mobile money technology on the development of emerging markets economies, the authors noted that such an impact is not so great, because despite its introduction, the growth of lending to small and medium-sized businesses will have restrictions on the part of regulators of payment systems and banking. Therefore, the study found that the mobile money innovation has a positive impact on the development of the economy, but not large enough to increase GDP and final consumption.

Research of the technological component of financial innovations and their impact on the behaviour of consumers of financial and banking services is also quite widespread. Bounie and Camara (2020), based on the analysis of empirical data, suggest that the introduction of contactless payments increases the sale of payment cards by an average of 15.3% per year. This conclusion indicates that financial innovations are the driver of the development of cashless payments and the growth of the retail banking business. Similar research on determining the effects of financial innovations on the development of cashless payments was carried out by Yeh (2020), who investigated the growth of non-cash payments under the influence of the development of mobile payment technologies.

Leibbrandt and de Terán (2021) examined the future possible architecture of payments, and discussed the different payment innovations, showing the opportunities for cryptocurrencies and also the advantages of central bank digital currencies.

Taufiq et al. (2018) explored the issues of introducing blockchain technologies into Indonesia's national payment system, which made it possible to distinguish key conditions for the introduction of blockchain technologies not only in highly developed countries, but in those with a lower level of development. The authors substantiated their version of the payment system based on blockchain technology.

From the analysis of available literature in the field of payment systems development, cashless payments and financial innovations in Eastern European countries, it was possible to distinguish several gaps in research, in particular:

- 1) most of the research is aimed at studying the experience of highly developed countries in the field of payment systems development and financial innovations, which narrows the range of analysis of problems associated with the peculiarity of the financial sector of some countries with emerging markets;
- 2) research of payment systems of emerging markets is not comprehensive; in some emerging markets, economic and political features that have an impact on the trends of non-cash payments are not always taken into account and may be of key importance;
- 3) the analysis of payment infrastructure and institutional support of payment systems, cashless payments, and financial innovations in some emerging markets is limited.



### 5.3. The Rise of Non-Cash Payments in Eastern Europe

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This section examines the increase of non-cash payments in Eastern Europe and the reasons for this growth, utilising data collected before Russia's invasion in Ukraine in 2022, to ensure a consistent and accurate analysis of trends in non-cash payments in Eastern Europe. The Russia-Ukrainian war has introduced significant economic disruptions and shifts in financial behaviour, which would not provide a stable basis for comparison with other EU countries. By focusing on pre-war data, it was possible to examine more effectively the underlying trends and factors driving the increase in non-cash payments, without the confounding effects of the ongoing war.

A characteristic feature of Eastern European countries is the high level of labour migration to Western Europe. This has led to the development of a significant number of alternative payment systems through which citizens can conveniently and quickly transfer funds between countries and make instant currency exchange transactions.

Modern trends in e-commerce require the emergence of new technological solutions in the form of electronic payment systems that can legally serve transactions with electronic money and cryptocurrency. The widespread use of smartphones and mobile apps in the countries of Eastern Europe allows e-commerce to develop much faster.

In conducting this study of the drivers of the development of non-cash payments, the authors chose the following indicators: the country's GDP, GDP *per capita*, proxy measures of the shadow economy, the number of POS terminals, the number of Internet subscribers, the volume of e-commerce and the share of cash in the total monetary supply. The study carried out correlation analysis of these drivers of the development of non-cash payments with the main indicators of non-cash payments: the volume of non-cash payments using bank payment cards, the share of non-cash transactions in payment transactions in the country.

#### 5.3.1. Non-Cash Payments

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The results of the analysis provide mixed evidence of the positive impact of the development of non-cash payments on economic growth in Eastern Europe. Thus, analysing the nature of the correlation between the country's GDP and GDP *per capita* with the dynamics of non-cash payments in Ukraine, Belarus, the Russian Federation, Poland, and Romania, the slight connection of these indicators in countries such as Ukraine, Belarus, and the Russian Federation (Tables 5.1 and 5.2) was noted. Shaded cells in the tables highlight the most meaningful relationships and identify which variables are most strongly related. The data of the correlation analysis show that the development of non-cash payments does not affect the economic development of Ukraine, Belarus, and the Russian Federation, and vice versa, economic growth does not contribute to the development of non-cash payments.

Such a conclusion may be wrong, because the analysis does not consider the national peculiarities of economic development during the studied period of 2009-2020. The fact is that unlike Poland and Romania, where there is a rather close relation between economic development and the development of non-cash payments (Table 5.2), in Ukraine and the Russian Federation after the financial and economic crisis, there was another phase of the economic crisis associated with the war in the Donetsk and Luhansk regions of Ukraine, as well as the annexation of Crimea.

**Table 5.1.** Correlation analysis of drivers for the development of non-cash payments in Eastern Europe (non-EU countries)

Country	Indicators of the development of non-cash payments and economic development	GDP (billions USD)	GDP <i>per capita</i> (USD)	Level of shadow economy (%)	Number of POS terminals (payment infrastructure), units	The share of internet subscribers, in % of the total population	Average salary (USD)	E-commerce, in billions. USD or in % of sales of goods and services	Cash share (M0) in cash (%)
Ukraine	Non-cash transactions with payment cards, billions USD	-0.0850	0.3424	0.1206	0.9547	0.8958	0.2246	0.8907	-0.5938
	Cash withdrawal from payment cards, billions USD	0.8858	0.9525	0.3224	0.9403	0.9194	0.5467	0.7057	-0.4068
	Non-cash transactions with payment cards, millions items	-0.2835	0.1449	0.0361	0.8905	0.8615	0.0054	0.9976	-0.7857
	Cash withdrawal from payment cards, millions items	0.2863	0.6654	0.3680	0.4322	0.3370	0.9640	-0.2183	0.7950
	Share of non-cash transactions in payment transactions, %	-0.2893	0.1576	0.2104	0.9290	0.9377	0.0037	0.9936	-0.7928
Belarus	Non-cash transactions with payment cards, billions USD	-0.1862	-0.1770	-0.4386	0.9062	0.9144	N/A	N/A	0.1785
	Cash withdrawal from payment cards, billions USD	0.6424	0.6412	-0.2779	-0.2761	-0.1491	N/A	N/A	-0.4134
	Non-cash transactions with payment cards, millions items	-0.2655	-0.2567	-0.5712	0.9333	0.9463	N/A	N/A	0.2135
	Cash withdrawal from payment cards, millions items	0.2908	0.2797	-0.1175	-0.8344	-0.8768	N/A	N/A	-0.3020
	Share of non-cash transactions in payment transactions, %	-0.3356	-0.3284	-0.5475	0.9759	0.9708	N/A	N/A	0.1050
Russian Federation	Non-cash transactions with payment cards, billions USD	-0.2339	-0.2759	0.1077	0.9791	0.8041	0.9578	0.9807	-0.7506
	Cash withdrawal from payment cards, billions USD	0.7558	0.7343	-0.3740	0.0197	0.4657	0.1628	-0.1952	-0.3620
	Non-cash transactions with payment cards, millions items	-0.3155	-0.3550	0.1595	0.9859	0.7740	0.9517	0.9782	-0.7139
	Cash withdrawal from payment cards, millions items	0.0771	0.0300	0.3222	0.5051	0.8564	0.6411	0.1937	-0.8781
	Share of non-cash transactions in payment transactions, %	-0.3087	-0.3554	0.2737	0.9889	0.8805	0.9884	0.9459	-0.8513

Source: compiled based on: (ECB, 2024; World Bank, 2023; National Bank of Belarus, 2022; Central Bank of the Russian Federation, 2022; National Bank of Ukraine, 2024).

Analysing the correlation links and their significance between GDP and the volume of non-cash payments of all other, more developed countries of Eastern Europe, it was noted that non-cash payments have a positive effect on economic development, while in the Czech Republic and Slovakia the significance of correlation coefficients is somewhat lower than in other countries (Table 5.2).



**Table 5.2.** Correlation analysis of drivers for the development of non-cash payments in Eastern Europe (EU countries)

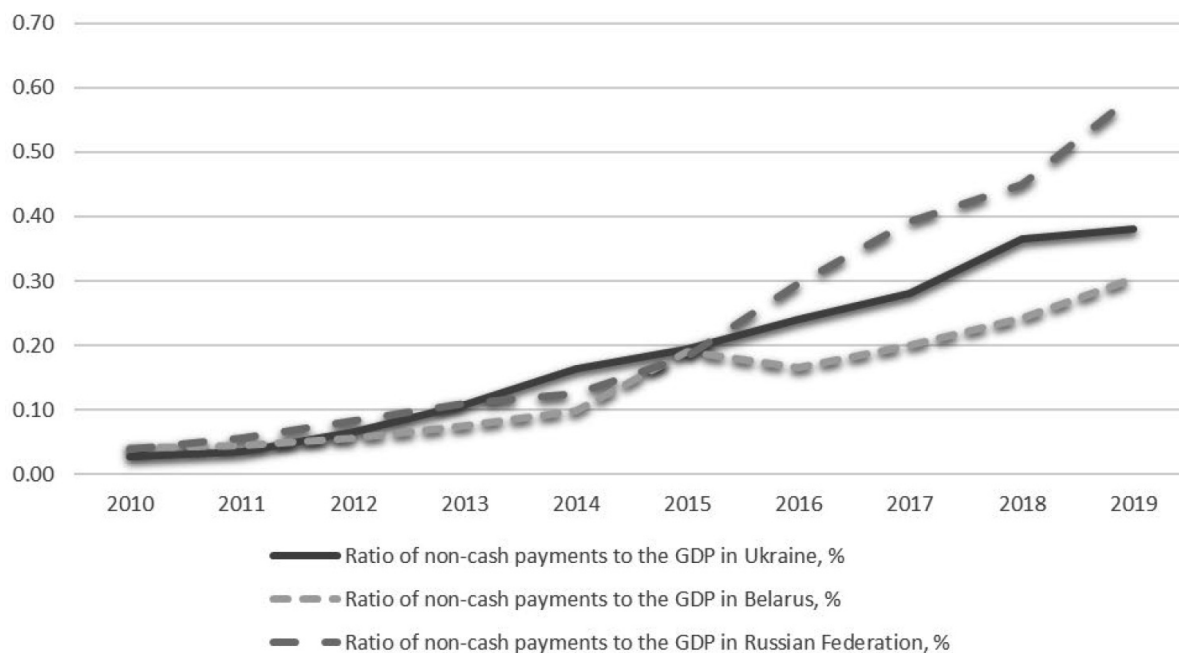
Country	Indicators of the development of non-cash payments and economic development	GDP (billions USD)	GDP per capita (USD)	Level of shadow economy (%)	Number of POS terminals (payment infrastructure), units	The share of Internet subscribers, in % of the total population	Average salary (USD)	E-commerce, in billions. USD or in % of sales of goods and services	Cash share (M0) in cash (%)
Poland	Non-cash transactions with payment cards, billions USD	0.7930	0.7288	-0.9518	0.9799	0.9517	0.7653	0.9773	-0.1154
	Cash withdrawal from payment cards, billions USD	0.9651	0.8311	-0.7087	0.6970	0.8937	0.9687	0.7358	0.0539
	Non-cash transactions with payment cards, millions items	0.6790	0.5989	-0.9723	0.9988	0.9039	0.6473	0.9707	-0.1778
	Cash withdrawal from payment cards, millions items	0.4475	0.7790	-0.0143	0.2351	0.5966	0.4066	0.0713	0.2924
	Share of non-cash transactions in payment transactions, %	0.7846	0.7142	-0.9591	0.9573	0.9616	0.7365	0.9898	-0.1018
Romania	Non-cash transactions with payment cards, billions USD	0.8584	0.9044	-0.7971	0.9827	0.9378	0.9648	0.7945	0.8399
	Cash withdrawal from payment cards, billions USD	0.9132	0.9490	-0.8042	0.9646	0.9239	0.9755	0.7855	0.8475
	Non-cash transactions with payment cards, millions items	0.8297	0.8784	-0.7603	0.9788	0.9245	0.9557	0.8073	0.8224
	Cash withdrawal from payment cards, millions items	0.8312	0.8813	-0.8474	0.8942	0.9274	0.8631	0.5544	0.8465
	Share of non-cash transactions in payment transactions, %	0.7018	0.7674	-0.8940	0.9844	0.9906	0.8874	0.8390	0.9054
Bulgaria	Non-cash transactions with payment cards, billions USD	0.8528	0.8992	-0.3435	0.9097	0.8931	0.9263	0.7455	0.3876
	Cash withdrawal from payment cards, billions USD	0.8072	0.8683	-0.5141	0.9321	0.9386	0.9602	0.7860	0.3790
	Non-cash transactions with payment cards, millions items	0.8548	0.9108	-0.8838	0.9929	0.9321	0.9764	0.7804	0.5250
	Cash withdrawal from payment cards, millions items	0.6012	0.6766	-0.2302	0.8117	0.8558	0.8696	0.6405	0.2870
	Share of non-cash transactions in payment transactions, %	0.5704	0.4861	0.7857	-0.0693	-0.0693	0.0593	0.1949	0.1836

Slovakia	Non-cash transactions with payment cards, billions USD	0.5589	0.5032	0.4369	0.9300	0.8225	0.9668	0.2154	N/A
	Cash withdrawal from payment cards, billions USD	0.6706	0.6324	0.5737	0.6467	0.6634	0.7377	0.3997	N/A
	Non-cash transactions with payment cards, millions items	0.4762	0.4175	0.1512	0.9724	0.8158	0.9894	0.1498	N/A
	Cash withdrawal from payment cards, millions items	0.1171	0.0749	-0.3418	0.7051	0.3193	0.6587	0.0919	N/A
	Share of non-cash transactions in payment transactions, %	0.4519	0.3915	0.3918	0.9673	0.8890	0.9852	0.2261	N/A
The Czech Republic	Non-cash transactions with payment cards, billions USD	0.5220	0.4498	-0.6154	0.8938	0.9032	0.9208	0.3938	0.5238
	Cash withdrawal from payment cards, billions USD	0.8165	0.8357	0.3648	-0.0260	-0.0687	0.3479	0.2027	-0.0008
	Non-cash transactions with payment cards, millions items	0.4900	0.4152	-0.6775	0.9630	0.8778	0.9400	0.1286	0.3727
	Cash withdrawal from payment cards, millions items	-0.1876	-0.2612	-0.6456	0.6866	0.8806	0.4707	0.5709	0.6135
	Share of non-cash transactions in payment transactions, %	0.2220	0.1409	-0.6784	0.9154	0.9669	0.8049	0.4171	0.5779
Hungary	Non-cash transactions with payment cards, billions USD	0.8166	0.8213	0.3452	0.4646	0.1502	0.8535	0.5304	N/A
	Cash withdrawal from payment cards, billions USD	0.5660	0.6115	-0.8597	0.6768	0.5160	0.5940	0.6895	N/A
	Non-cash transactions with payment cards, millions items	0.5164	0.5966	-0.5355	0.9761	0.8462	0.8757	0.9191	N/A
	Cash withdrawal from payment cards, millions items	-0.3689	-0.4456	0.6428	-0.8388	-0.8106	-0.6046	-0.7141	N/A
	Share of non-cash transactions in payment transactions, %	0.6847	0.6702	0.5397	0.2393	-0.0624	0.7007	0.3436	N/A

Source: compiled based on: (ECB, 2024; World Bank, 2023).

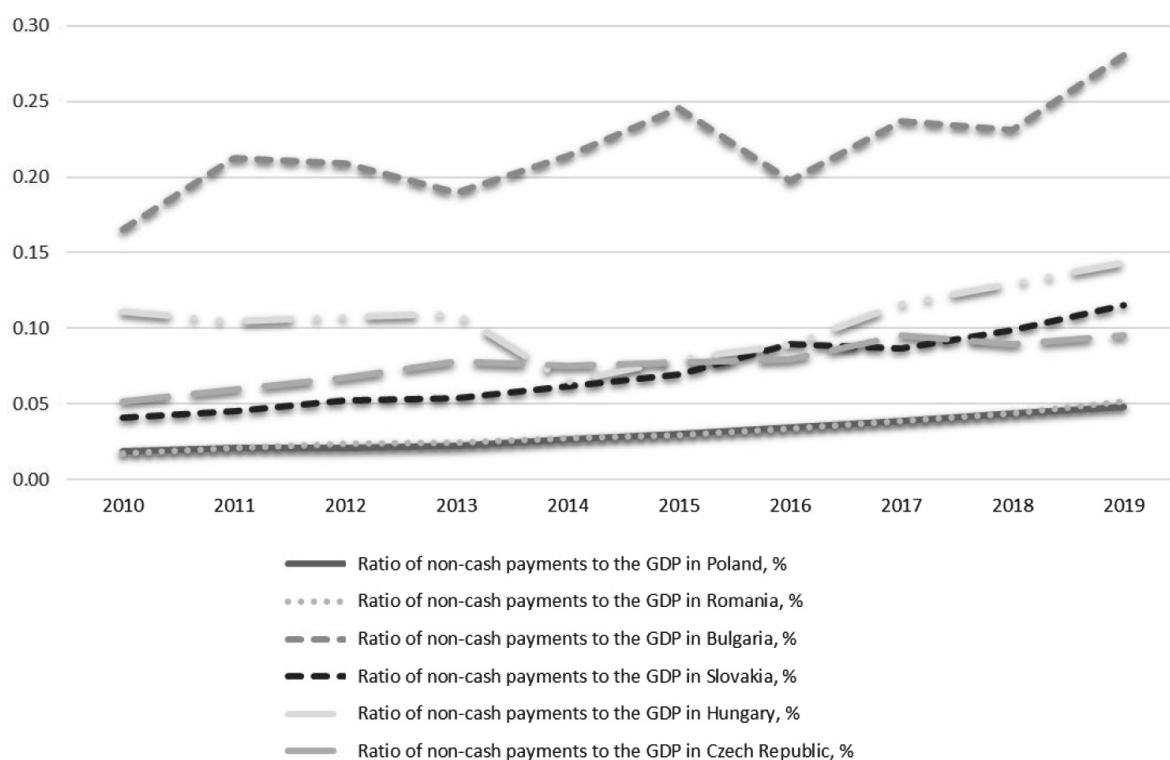
There is a notably large increase and higher share of non-cash payments in GDP in the former Soviet countries of Eastern Europe (Figure 5.1) when compared with the six Eastern European countries of the EU (Figure 5.2).

In Ukraine, the volume of non-cash payments increased 14 times over the ten years, in Belarus – 8 times, in the Russian Federation – 15 times, in Romania – 4.5 times, and in all other countries 1-2 times (Figures 5.1-5.3). Thus, the potential for the development of non-cash payments in Ukraine, Belarus and the Russian Federation is still very high.



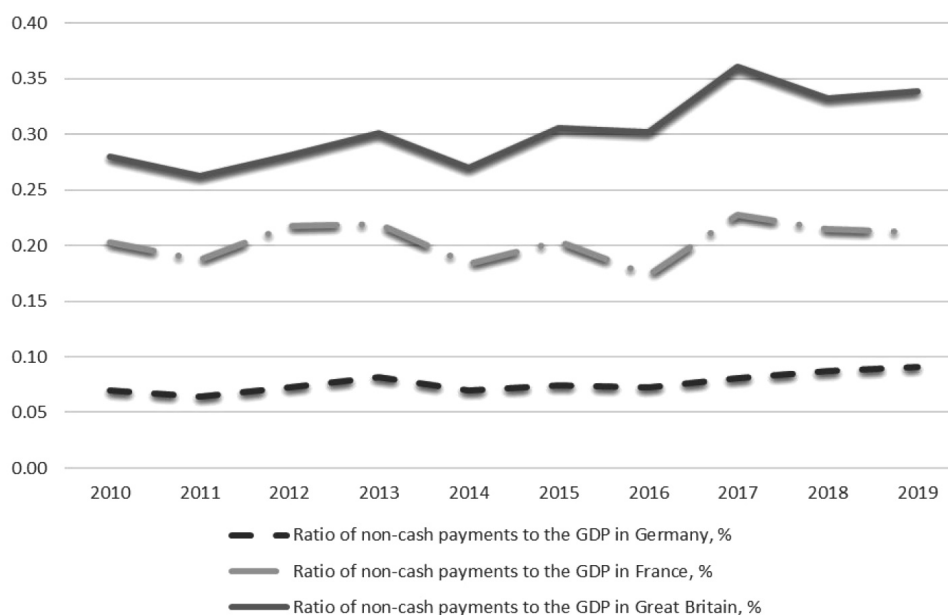
**Fig. 5.1.** The ratio of non-cash payments to the GDP in selected former Soviet Union countries (%)

Source: compiled based on: (Central Bank of the Russian Federation, 2022; National Bank of Belarus, 2022; National Bank of Ukraine, 2024; World Bank, 2023).



**Fig. 5.2.** The ratio of non-cash payments to the GDP in selected Eastern EU countries (%)

Source: compiled based on: (ECB, 2024; World Bank, 2023).

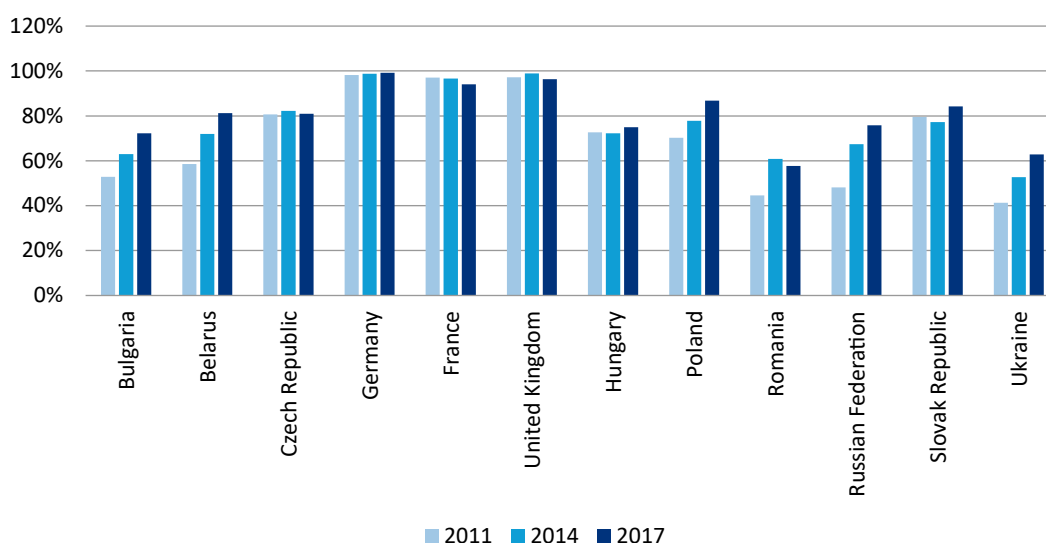


**Fig. 5.3.** Growth of the ratio of non-cash payments to the GDP of selected high-income EU countries (%)

Source: compiled based on: (ECB, 2024; World Bank, 2023).

### 5.3.2. Financial Participation

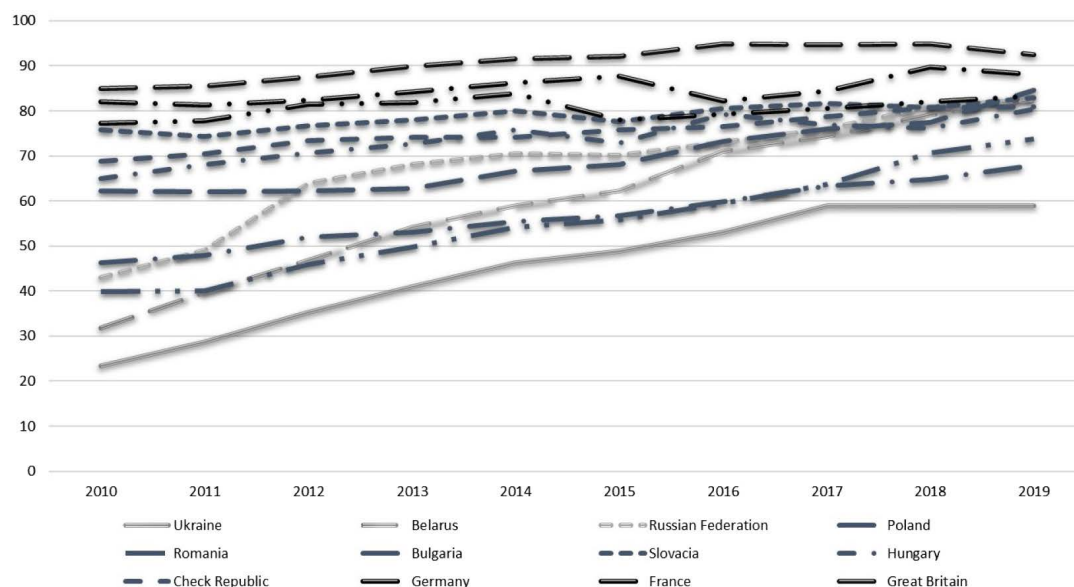
The existence of accounts opened in banking institutions has an important influence on the development of non-cash payments. The share of adult citizens who opened accounts in financial institutions in developed European countries (France, United Kingdom, Germany) over the last 10 years has not changed (Figure 5.4). Their share over the 2010-2019 years was close to 100%. The situation in middle-income countries in Eastern Europe and in the countries of the former Soviet Union is different. These countries significantly increased the share of adults with bank accounts and still have the opportunity to increase this share in the future.



**Fig. 5.4.** Financial institution account (% age 15+) in selected European countries

Source: compiled based on (World Bank, 2023).

A second important influence is access to the Internet, measured by the share of the population with access to the Internet (Figure 5.5).



**Fig. 5.5.** Internet subscribers as a % of the total population in selected European countries

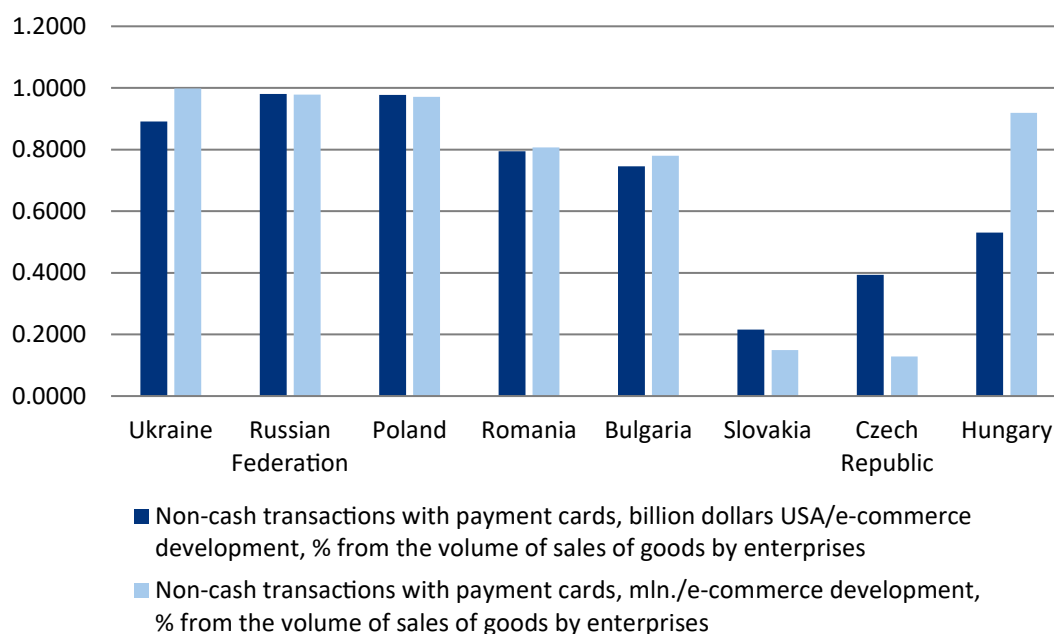
Source: compiled based on: (Central Bank of the Russian Federation, 2022; ECB, 2024; National Bank of Belarus, 2022; National Bank of Ukraine, 2024; World Bank, 2023).

According to Figure 5.5, the growth in the number of Internet subscribers can potentially increase the level of non-cash payments, especially in such high-income countries where the share of Internet subscribers exceeded 80% over the past 10 years. Particular attention can be paid to the growing trends in the share of Internet subscribers in Ukraine. According to the World Bank statistics, during 2017-2019, the number of Internet subscribers did not change and amounted to 58.9%. However, if one considers the data of the State Statistics Service of Ukraine, then the subscribers of the Internet were added to the subscribers of the mobile Internet, which together amounted to 84% of the population. Therefore, the growth trends of Internet subscribers in Ukraine are also accompanied by an increase in non-cash payments.

### 5.3.3. E-commerce

An important driver of stimulating the development of non-cash payments in Eastern Europe is e-commerce. The growth of it automatically leads to an increase in the volume and number of payments using card accounts of households. At the same time, it should be noted that for e-commerce in Eastern Europe there are differences in statistical indicators. In the EU member states, e-commerce development indicators are based on the principle of determining its share in the commodity turnover of enterprises, and in countries such as Ukraine and the Russian Federation, e-commerce volumes are reflected mostly based on the calculation of experts and analysts, namely, in these countries there are no official statistics on e-commerce. As for Belarus, the existing information on the development of e-commerce is not enough to build a dynamic series for comparison.

Comparing the correlation links between the dynamics of e-commerce development and the volume and number of non-cash payments using card accounts of households in Eastern Europe, it can be concluded that in countries such as Ukraine, the Russian Federation and Poland, there is a direct dependence between these indicators (Figure 5.6).



**Fig. 5.6.** Correlation coefficients between e-commerce development indicators and volume and number of non-cash card transactions in selected Eastern European countries (2008-2019)

Compiled based on: (Central Bank of the Russian Federation, 2022; ECB, 2024; National Bank of Belarus, 2022; National Bank of Ukraine, 2024; the European Central Bank: Payments and Settlement Systems Statistics; The National Bank of Belarus: payment system and digital technology; The Central Bank of the Russian Federation: Key indicators of the National Payment System (NPS) development; The National Bank of Ukraine: non-cash payments).

In less developed countries of Eastern Europe, innovation in the retail market of goods and services is one of the main drivers of the development of cashless payments. It should be noted that the increase in the number of non-cash transactions in Ukraine and Russia is also influenced by the size of the population, the number of which is significantly higher than in other countries of Eastern Europe. Therefore, the expansion of opportunities for shopping on the Internet automatically increases the multiplier effect on the number of non-cash transactions.

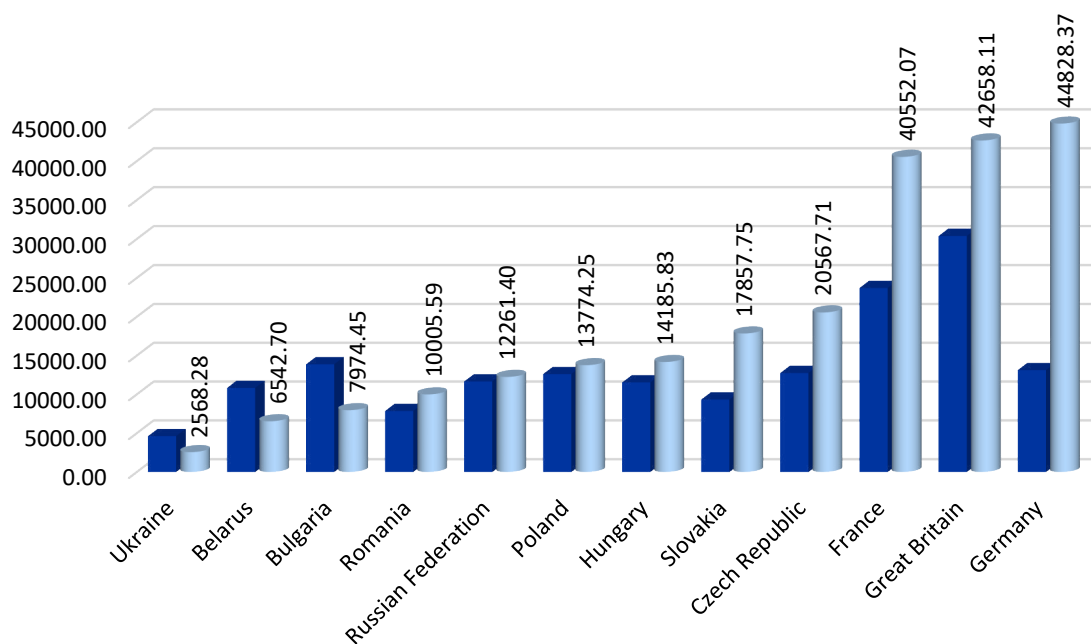
Significant correlations between e-commerce and non-cash payments are observed in Romania and Bulgaria, but in the Czech Republic, Slovakia, and Hungary their values are quite low. Such trends, in the authors opinion, are due to higher dynamics of e-commerce development in Poland, Bulgaria and Romania than in the Czech Republic, Slovakia and Hungary, where e-commerce development is at a stable level.

Figure 5.6 shows that non-cash payments are higher in countries with a higher share of e-commerce. The exceptions among the Eastern EU countries are Bulgaria and Hungary, and among the high-income countries – France. However, in the example of the Czech Republic, Germany, and the United Kingdom, one can see that the countries of the Eastern EU have quite strong reserves for the development of both e-commerce and non-cash payments.



### 5.3.4. POS-terminals

Exploring the role of innovations in the development of cashless payments and traditional payment systems in Eastern Europe, it is worth paying attention to the developed countries of Europe, namely Germany, France, and Great Britain. While maintaining high standards of banking and having significant financial capabilities, these countries actively invest in expanding the payment infrastructure by installing many POS-terminals (Figure 5.7).



**Fig. 5.7.** GDP *per capita* and number of POS-terminals per 1 million population in selected European countries (average level for 2010-2019)

Source: compiled based on: (ECB, 2024; World Bank, 2023).

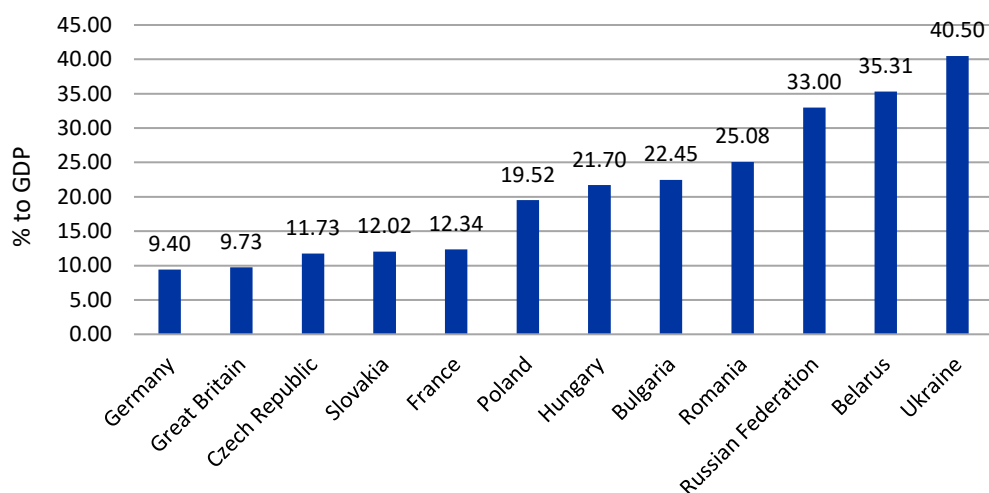
Figure 5.7 shows that the lowest level of payment infrastructure development is seen in Ukraine, Romania, and Slovakia, and the highest – in Bulgaria, France, and the UK. Such dynamics of POS-terminals depend on three main factors: 1) size of the shadow economy; 2) level of tourism development; 3) level of economic development.

The greatest role in the development of non-cash payments is played by the economic development of the country, the level of which is expressed through the GDP indicator *per capita*. The UK outweighs all the studied countries. The number of POS-terminals per 1 million population is also the highest in the UK (Figure 5.7).

According to Figure 5.7, the number of POS-terminals per million of the population corresponds to the level of GDP *per capita* in most of the analysed countries in Europe. However, there are also countries where GDP *per capita* is low, and the number of terminals is high. This indicates that in those countries where the level of GDP *per capita* is lower, innovations are still the main drivers of the development of cashless payments and payment systems.

### 5.3.5. Shadow Economy

One of the biggest barriers to the development of traditional payment systems is the high level of the shadow economy, which maintains a large amount of cash outside banks. At the same time, it should be noted that the statistics that allow comparing the level of the shadow economy in Eastern Europe are quite limited. The latest World Bank study on the level of the shadow economy in the world contains data only up to 2015, but they suffice to obtain general trends in the average level of the shadow economy in Eastern Europe for 2008-2015 (Figure 5.8).



**Fig. 5.8.** Average level of shadow economy in selected European countries (2008-2015)

Source: (Kelmanson et al., 2019).

Figure 5.8 shows that the level of the shadow economy is the highest in Eastern Europe. The presence of unorganised trade, unregistered entrepreneurship activities, concealment of real income – all this hinders the development of non-cash payments in Ukraine, Belarus, the Russian Federation and Romania.

At the same time, the high level of the shadow economy in these countries is one of the main incentives for the development of retail non-cash payments through payment systems based on blockchain technologies.

## 5.4. Future Prospects: Bank or Non-Bank?

### 5.4.1. FinTech Payment Startups

This section analyses the trends in payment technologies in the countries of Eastern Europe, in light of the new FinTech and payment innovations.

The development of FinTech startups of Internet banking, Internet acquiring, payment mobile applications, blockchain technologies, digitalisation of registers, microfinance, lending are other directions of development of non-cash payments in Eastern Europe.

The role of FinTech startups in the popularisation of non-cash payments is quite significant. Their main activity is focused on providing consumers with the highest level of payment

service, not only making payments and taking over the functions of the traditional payment system (Turksen et al., 2024). Therefore, FinTech startups such as ApplePay, GooglePay (mostly in all EU countries), OMG or Curve in the UK, Billon, DotPay/eCard, SkyCash, uPaid in Poland, Portmone.com, iBox.ua, iPay.ua, EasyPay.ua in Ukraine are focused on simplifying the procedure for cashless payments and encouraging customers to make cashless payments by providing cashback for transactions.

However, these platforms are not payment systems, since they are not recognized at the regulatory level as a payment system, and do not have a hierarchical form of construction, their own subsystems, settlement, or service organizations either. At the current level, such Internet platforms are 'Internet payment delivery services', i.e. median banking and non-bank payment systems and their counterparts, even though such Internet services play a rather significant role in terms of convenience and organization of payments in the country.

#### 5.4.2. Mobile Payments

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Important innovations in the development of non-cash payments include mobile payments offered by FinTech companies. Mobile payments in Eastern Europe are not separate payment systems, but payment services that allow the user to pay for goods and services in one or two clicks on the Internet. They are important from the point of view of popularisation of non-cash payments, but today there are no prospects for the formation of a separate payment system based on mobile payments, as existing FinTech companies in the field of mobile payments (e.g. Monobank or Sportbank in Ukraine) choose banks as a base for settlements (i.e. transactions are carried out through the use of bank accounts, and FinTech companies are intermediaries and showcases in terms of marketing). The development of fintech companies in the field of mobile payments has great prospects in Eastern Europe but only based on bank accounts and bank payment systems.

#### 5.4.3. Cryptocurrencies, Blockchain and CBDC

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The dynamism of FinTech technologies development in the financial sector has not bypassed the payment systems. Blockchain technologies have great prospects, using the open code of cryptocurrencies, properties of decentralisation, the absence of intermediaries, the low cost of transactions and the convenience of transferring payment for goods and services (Javaid et al., 2022). However, to implement these ideas at the national level of Eastern European countries, it is necessary to grant legal status to cryptocurrencies and blockchain settlement technologies, as well as to form clear rules for mining, trading on the exchange and cryptocurrency settlements.

The lack of legal status of cryptocurrencies causes the understanding of cryptocurrency as a money surrogate in the form of an investment instrument, and not a full-fledged financial asset. In this regard, about 80-90% of the use of cryptocurrencies accounts for speculative transactions as an exchange asset, and the rest on payment transactions (Ahsan et al., 2024).

It would be a mistake to argue that cryptocurrencies and blockchain technologies in countries with a high level of the shadow economy are used solely to hide real income from entrepreneurial activity. In fact, non-cash payments using blockchain technologies and using cryptocurrencies should be considered as an opportunity to effectively overcome the shadow economy and corruption.

The introduction of blockchain technologies in the traditional monetary system (which will make transparent all transactions of the central bank and commercial banks, commercial banks among themselves and commercial banks and customers) can be an effective measure in terms of the development of payment systems. The system of decentralised data storage will increase the security of financial transactions (Aquilina et al., 2024). In addition, the introduction of blockchain into the banking operations system will allow banks to save on transactions and costs for keeping cashiers, whole branches because all cash transactions will be carried out automatically (Turksen et al., 2024).

The growing popularity of cryptocurrencies and blockchain technology has prompted central banks in many countries to explore the possibilities of using new technologies not only privately, but also at national level. More than 100 central banks of different countries are actively researching the possibility of introducing the digital currency of the central bank (CBDC) into monetary circulation. The concepts of CBDC are becoming relevant in addition to private FinTech companies in the field of payment systems, cryptocurrencies and blockchain technologies (Claessens et al., 2024).

Quite promising, in the authors' opinion, is the idea of creating a national cryptocurrency, where the central bank will be the main developer of software and cryptographic code. In this context, two concepts prevail in the scientific literature: 1) the central bank is the main developer and the main miner; 2) the central bank is the main developer, provided that financial institutions (both banks and non-banks) carry out mining.

In the first case, the central bank may act as a major miner in the implementation of the idea of creating a national cryptocurrency. At the same time, the central bank provides a nominal value to the national cryptocurrency, reducing the volatility of exchange rate and allowing it to become a full-fledged currency by digitisation of fiat money. However, in this case, the idea of decentralisation of cryptocurrencies, laid down by Satoshi Nakamoto, is violated. A positive aspect is that an opportunity is created to regulate the circulation of cryptocurrencies, since counterparts will be known as a result of fulfilling the conditions for identifying persons. The idea of the absence of intermediaries in the purchase and sale of goods and services will also remain because each counterparty will have its own wallet and will be able to directly carry out transactions (Benson et al., 2024). As a result, the system of decentralised control of operations using blockchain technology will increase the transparency of money circulation in general.

In considering the existing trends in the development of payment systems and card payments in Eastern Europe, it can be noted that the creation of cryptocurrencies of central banks is a promising direction for increasing the volume of non-cash payments. Given the lower level of economic development of countries such as Ukraine, Romania, and Belarus, which affects the dynamics of the introduction of POS-terminals in the cashless payment system, the introduction of blockchain technologies and national cryptocurrencies is a much cheaper way to develop payment infrastructure. Moreover, given the high level of the shadow economy, the use of cryptocurrencies of central banks in Eastern Europe will significantly increase the transparency of non-cash payments, and due to the attractiveness of cryptocurrencies for the population, it will increase the volume of non-cash payments and the refusal of cash transactions.

## 5.5. Conclusions

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The study of the development of payment systems in Eastern Europe allowed to identify the main drivers for the further development of payment systems. A significant influence on the development of non-cash card payments has emerged from the development of payment infrastructure, the development of e-commerce, distribution and access to the Internet, and payment innovations.

The analysis of trends in the development of non-cash payments in countries with weak political institutions (Ukraine, Belarus, Russia), which leads to permanent political and economic crises, indicates that there is little connection between economic trends and trends in the growth of non-cash payments.

Examining the drivers of the development of non-cash payments, the study's analytical findings confirm the important role of increasing the share of Internet users by increasing the volume of non-cash payments and the number of non-cash transactions.

This study also confirmed the important role of innovations in stimulating the development of non-cash payments, but unlike Bounie and Camara (2020), who investigated the impact of mobile payments and contactless technologies on the development of non-cash payments, the authors concluded that in Eastern Europe the main driver of the development of non-cash payments is the payment infrastructure. This refers to an increase in the absolute number of POS terminals and the number of POS terminals per million people. The presence of these terminals at retail enterprises enables all payment cardholders and smartphone users with NFC technology to make payments.

The conducted research on the tendencies in the development of payment systems and cashless payments in Eastern Europe made it possible to emphasise the importance of forming and expanding the payment infrastructure by installing more POS-terminals. At the same time, the authors are aware of the fact that in countries such as Ukraine, Belarus, Bulgaria, and Romania, which belong to the countries with low non-cash payments, most of the payments are concentrated in the shadow sector, and the level of economic development does not allow to save the necessary resources to increase the volume of non-cash payments.

Therefore, given this situation, less developed countries should actively involve the latest blockchain technologies in the development of payment systems. It is necessary to give cryptocurrencies legal status and develop common and understandable rules for non-cash payments through blockchain systems for this. Such measures do not require large-scale financial resources, which, in the authors' opinion, can be part of an effective strategy for the development of payment systems, an increase in the volume of non-cash payments, minimisation of the shadow economy and stimulation of economic growth.

Examining the drivers of the development of non-cash payments of countries with a medium and high levels of development of the payment sphere, it was noted that the higher level of economic development expands the opportunities for increasing the number of POS-terminals, as well as the purchasing power of households. However, there are countries with a higher level of economic development, in which the habits of their citizens hinder the processes of introducing non-cash payments even in the presence of developed payment infrastructure (for example, Germany, where more than 1,800 euros of cash per person are in circulation). FinTech startups are a good opportunity to solve these problems and encourage cashless payments.

The cryptocurrencies of central banks (CBDC) in Eastern Europe, as a digital form of money denominated in the currency of the country to which the central bank belongs, can be promising financial technologies nowadays. The research suggests that digital cryptocurrencies of central banks in Eastern Europe will increase the level of transparency of settlements, reduce the cost of settlements and the cost of servicing the payment system, and reduce the volume of the shadow economy. However, according to the authors, the main role of cryptocurrencies of central banks will be the institutionalisation of blockchain technologies and granting legal status to private cryptocurrencies.

To sum up, the study identified the development of payment infrastructure, e-commerce, Internet access, and payment innovations as key drivers for the growth of non-cash payments in Eastern Europe. It also highlighted the potential of blockchain technologies and CBDCs in promoting transparency, reducing shadow economies, and fostering economic growth, particularly in less developed countries.

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