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CHALLENGES FOR CENTRAL BANKS IN A CHANGING PAYMENTS LANDSCAPE

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Abstract

The aim of the paper is to discuss key challenges facing central banks due to evolution of payment systems. The author distinguishes two aspects of the problem. The first one considers the implications of changes in payments for the roles of central banks in national payment systems, namely their role as operators, oversight authorities and catalysts. The second question is how evolution of payment systems influences the nature of central banking. The study is based on the literature review and the analysis and assessment of the information coming from the reports of international institutions. It also uses the results of the author's survey, which was conducted among central banks of eleven countries.

The research leads to the conclusion that the challenges for central banks concern among others: monitoring and assessing innovations and new mechanisms of payments, information policy in the area of payments, promotion of standardization and interoperability of systems, effective oversight and operational activities of central banks. The changing payments landscape also requires consideration of long-term implications for monetary policy and central banks' revenues.

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Introduction

Certain challenges which central banks are facing today have been the subject of debate for decades. Some of them arose in the wake of the financial crisis of the last decade. Nowadays central banks are increasingly expected to fulfil a number of varied functions, including maintaining price stability and stimulating economic growth, while guarding against financial system instability and crises at the same time. The financial services environment has been subject to many changes over the past years. Central banks have to adapt their strategies, structures, policies, and operations to these changes, including those concerning evolution of the payments landscape.

The aim of the paper is to discuss key challenges facing central banks due to the evolution of payment systems. The author distinguishes two aspects of the problem. The first one considers the implications of changes in payments for the roles of central banks in national payment systems, namely their role as operators, oversight authorities and catalysts. The second question is how evolution of payment systems influences the nature of central banking. The study is based on a literature review and the analysis and assessment of the information coming from the reports of international institutions. It also uses the results of the author's survey which was conducted among central banks of eleven countries.

The role of contemporary central banks in the context of payment system operation

Central banks operating in market economy conditions perform three basic functions. First, they issue cash money as a legal tender, having the exclusive right in this regard. This is connected with their responsibility for the real value (purchasing power) of the national currency and is the basic premise of their activities aimed at maintaining price stability. Secondly, central banks are defined as banks of the states, since they service the treasury and manage the state reserves. Thirdly, central banks act as banks' banks, servicing their settlement accounts, gathering their deposits and granting loans. In their activities related to this function they create a proper basis for the development of the financial market and the functioning of its participants. In the case of financial problems of commercial banks, they assist them as lenders of last resort. In addition, central banks supervise the banking sector or are involved in the supervision ensuring the stability of the banking system as a whole (macro-prudential supervision). The policy of modern central banks is characterized by several features: independence, credibility, transparency and democratic accountability.

Traditional functions of central banks are commonly known and described in the literature. The entire role of central banks has varied over time. In the last decades a number of common features and principal tendencies has emerged. Central banks have taken on new responsibilities after the last financial crisis leading to enhanced emphasis on their role in maintaining financial stability (Crockett, 2011, p. 19).

Central banks play an important role in organizing the transfer of funds between bank and non-bank entities. In all countries the central bank is the main institution responsible for the stability of the national payment system. The role of central banks in this area is changing due to market transformations and political decisions in the field of financial systems. It is also influenced by new technologies and payment innovations.

Pauli (2000, p. 25) indicates three basic functions of the central bank, which are related to its role in the payment system: control of the money supply, facilitating interbank settlements and payment system oversight carried out within the framework of macro-prudential supervision. They form an integral whole; the lack of any of them would cause serious difficulties in the implementation of the other two. For this reason, the activities carried out by modern central banks include both operations and oversight in the payment system.

Currently, central banks around the world seek to achieve two basic objectives: price stability and financial stability . While they are the only entities responsible for a low level of inflation and at the same time equipped with the necessary instruments in this field, they share the responsibility for the financial system with other institutions, forming a financial safety net. This safety net includes, in a broad sense, the group of institutions and regulations which protect stakeholders and the public against losses arising from the insolvency of banks and other financial intermediaries. In other words, a financial safety net consists of the institutional and legal regulations designed to protect the financial system

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against destabilization.

We may wonder why central banks are designated to act as guardians of financial stability. The answer to this question is given inter alia by Millard and Saporta (2005, p. 7), who argue that this is due to the key role of central banks in the payment system. They also suggest that the function of the central bank as a lender of last resort has its source in the conduct of settlement accounts of banks and providing the ultimate means of settlement . Moreover, they claim that the first forms of banking supervision were born in connection with the need to monitor the financial situation of the institutions for which the bank as a settlement agent maintained accounts and executed settlements.

The majority of authors do not associate the involvement of central banks in activities for financial stability directly with the payment system, but with the function of central banks in the economy as issuers of currency, and the relationship between price stability and financial stability (Szczepańska, 2008, p. 72). However, it is clear that the basic roles assigned to central banks require an efficient and safe payment system.

Buiter (2009, p. 495) distinguishes three groups of tasks faced by modern central banks:

1) maintaining financial stability,
2) activities for macroeconomic stability,
3) ensuring proper functioning of payment, clearing and settlement schemes.

In such an approach it is required to indicate the relationship between the execution of these tasks. The proper functioning of payment schemes is dependent on financial stability. This is highlighted, among others, by Ingves (2011, p. 23). On the other hand, the requirements of financial stability include efficient and secure payment mechanisms.

The responsibility of the central bank for functioning of the national payment system is the basis of its three fundamental roles in this area: an oversight authority, a catalyst, and an operator. The level and form of involvement in these three roles vary widely across central banks, reflecting different histories and institutional frameworks.

Payment system oversight has traditionally been assigned to central banks – either explicitly through legislation or implicitly as a result of accepted practice (Papademos, 2011, p. 26). The central bank monitors and assesses existing and planned schemes and other elements of the payment infrastructure in the light of the national and international standards. Oversight of the national payment system is aimed principally at ensuring that payment and securities settlement mechanisms are safe, effective and efficient and that access to such solutions is not restricted. This is a core requirement for maintaining financial stability and for meeting business needs of the economy. Oversight responsibility means that the central bank has access to direct market information and can give considerable help to the supervisors to encourage them to focus on the right questions in the accomplishment of their supervisory duties (Lamfalussy, 2011, p. 8).

In its catalyst role, the central bank plays an important role as a partner or coordinator of the private sector initiatives undertaken both for the development of payment, clearing and settlement schemes and for the establishment of market standards and practices that facilitate the overall efficiency of arrangements. It can especially assist by offering its expertise (Tumpel-Gugerell, 2006, p. 129).

In its operational role, the central bank owns and operates facilities providing payment, clearing and/ or settlement services for banks and other financial intermediaries. This typically involves the provision of account and settlement-related services for commercial banks through the RTGS payment mechanism (Kokkola, 2010, p.156-157). The degree of the central banks' operational involvement varies across countries. Some central banks also offer processing facilities by participating in private retail payment systems and/or operating their own retail payment system.

Implications of changes in payments for the roles of central banks in national payment systems

Payment systems are constantly evolving. Some of the last changes in payments had a revolutionary character. They included an especially common shift to electronic payment processes resulting from the introduction of payment innovations. Nowadays payment schemes and services are becoming independent from thus far dominant, banking institutions. Some payment and settlement mechanisms have started using different concepts of electronic or virtual money. Due to economic integration and globalization, payment schemes are gaining global dimension. With regard to organization

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of payment processes, contemporary observed global trends concern in particular:

1) dissemination of real-time processing of payment orders,
2) increasing complexity of the technologies used,
3) marginalization of the role of banks in retail payments,
4) growing significance of payment mechanisms with an international (European) or global reach.

The above-mentioned changes in the payments landscape have many implications for central banks in their oversight, catalyst and operational roles in national payment systems.

The framework of the oversight role requires periodic verification to adapt it to the changes in various elements of the payment system. It includes among others the identification of new potential oversight objects, extending the scope of oversight policy to non-bank payment mechanisms and the introduction of new oversight tools to cover innovations (Berndsen & Buitenkamp, 2010, p. 242).

Considering new potential oversight objects central banks as overseers have to follow the processes of consolidation in the banking sector since they lead to concentration of payment flows at a small group of banks. Financial consolidation heightens the importance of tiering in large-value payments. Therefore, central banks have to take seriously the phenomenon of migrating these payments from central bank's RTGS systems to privately operated mechanisms (quasi-systems) (Giannini, 2011, pp. 245-247).

Monitoring and assessment of new payment solutions requires access to statistical information that will help to avoid overestimating or underestimating their consequences. In order to evaluate payment innovations, central banks need to be knowledgeable about their technological and organizational aspects. The key challenges in this area cover:

1) updating statistical data collection systems to include emerging new initiatives and solutions (also those in a pilot phase),
2) gaining access to public and private information sources based on existing legal regulations,
3) ensuring the influence on the market participants' reporting obligations to the central bank in the area of payment system operation,
4) adjusting information capacity of the data to the methods of identification of vulnerabilities in the area of safety and fraud prevention,
5) standardization of key terms to ensure international comparability of the data,
6) increase in the experience in technological components of innovative products or cooperation with other specialized authorities or external experts in this field,
7) organization and funding of analytical research related to the functioning of the payment system.

The above actions aim at elimination of information gaps identified by the central banks in the survey conducted among central banks of eleven countries (Iwańczuk-Kaliska, 2014). The results of the survey indicate the insufficient information held by some central banks on the issue and use of electronic money (Australia, Brazil, Mexico, Turkey) and the activities of payment service providers (Poland, Sweden, Australia and Brazil).

Increasing complexity of payment processes creates the need to limit information asymmetry in this area. This poses challenges in terms of the information policy of central banks. They communicate with the market in the area of the payment system by their official websites and by publishing reports. The information policy is also realized by international institutions. The lack of compatibility between some terms used by individual central banks limits the possibility of comparative analysis of the data.

The emergence of international and global payment mechanisms and cross-border services poses challenges for central banks to cooperate internationally. In the context of internationalization of cash flows as well as trends in consolidation of payment infrastructure, national oversight is insufficient. Consideration should therefore be given to the transnational transfer of some oversight and decision-making powers. Oversight standards should certainly include the links between national payment systems since they may potentially imply a spillover of risks from one system to another (Noyer, 2006, p. 159). Due to the fact that the oversight of the payment system in each country is carried out by the same entity - the central bank - the organization of international cooperation in this area is easier than in the case of banking supervision. The other issue related to internationalization of payments is the harmonization of safety requirements in order to avoid regulatory arbitrage.

Central banks are usually the operators of interbank

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settlement systems. Thus, in this area the changes are introduced under their control. Due to the emergence of technological innovations, central banks face a problem in choosing the moment of their implementation. They have to take into account the costs and benefits for all participants of the financial system. Their direct or indirect involvement in pro-innovation initiatives contributes to interoperability and interconnection between different payment schemes, improving the functioning of the payment system. Due to how non-banking entities have been taking over the role of banks in payments, central banks face the problem of extending access to settlement accounts. It raises the issue of supervision of their liquidity.

In some countries, for example in the USA, the central bank is a primary service provider as well as a regulator. The rapid evolution of the U.S. payment system consisting of the transition from checks to electronic payments has presented challenges for the Federal Reserve as a provider of financial services (Santomero, 2006, p. 174). This example proves that central banks acting in similar global trends may be affected in different ways due to their different roles in national payment systems.

Central banks may contribute to the safety and efficiency of retail payments by creating legal and regulatory constraints for innovation initiatives, providing competitive market conditions, and promoting cooperation on standards and payment infrastructure. The differences in the institutional and regulatory environment and the legitimacy of the activities, objectives, strategies and instruments of central banks are the source of the varied impact of payment innovations on the activities of individual central banks. Nevertheless, some generalizations can be made in this respect (BIS, 2012, p. 52):

1) central banks generally attach great importance to innovations in retail payments due to their impact on safety and efficiency of the national payment system,
2) central banks promote the use of efficient and secure payment methods, in particular they encourage the use of non-cash electronic payment instruments,
3) in many countries, the emergence of innovative retail payment solutions has become a key premise for the change in their oversight policy,
4) central banks pay increasing attention to non-bank institutions involved in payments,
5) in many countries, central banks have contributed to the introduction of new regulations with regard to innovations in the area of payments,
6) central banks, which operate retail payment systems, have upgraded them in response to the emerging opportunities and requirements of payment service market participants.

Central banks performing the above mentioned important functions in the payment system can both influence the payments market and be influenced by innovations and market developments. Not with standing, almost all central banks consider it important to monitor and assess significant changes in retail payments, as well as to ensure an effective oversight, including cooperation with other authorities (BIS, 2012, p. 52).

Effective introduction of payment innovations cannot take place without coordination. Therefore, most central banks take the role of coordinator. They promote standardization and interoperability, for example by fostering dialogue among various stakeholders or actively contributing to the development of national or global standards.

Innovations in retail payments enable central banks to achieve the objective of counteracting financial exclusion. As a form of widening access to modern payment services, the central bank's persuasion is required. It should lead to:

1) dissemination of basic payment services to the public,
2) growing interoperability between different payment mechanisms,
3) strengthening cooperation between financial institutions and operators of national postal services to which access is more common than to banking services,
4) using new technology to initiate non-cash payments by the public.

Innovations such as digital money, virtual currency schemes or crypto-currencies could have a range of impacts on central banks. They are not full forms of money from a legal perspective, but they may substitute banknotes and coins and e-money in certain payments. The problem arises from the fact that they are not connected to a sovereign currency, are not a liability of any entity and are not backed by any authority. Furthermore, they have zero intrinsic value and they derive value only from the belief that they might be exchanged for other goods or services, or a certain amount of sovereign currency, at a later point in time (BIS, 2015, p. 4).

The development of digital currencies based on the use of distributed ledgers raises a number of potential

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policy issues for central banks with reference to their roles in national payment systems. Digital currency schemes are not widely used or accepted, and they face challenges that could limit their future growth (BIS, 2015, p. 3).Thus currently, central banks do not interfere directly with the development of digital currencies but some of them use moral suasion towards users and investors in order to highlight the relevant risks and to influence the market (usually by public warnings). They do that to protect customers and limit the conditions for money laundering and other criminal activities arising from the relative anonymity of digital currencies. Some central banks take the next step - they work on the idea of retail central bank crypto-currencies. It is the way to strengthen their role in payment systems. On the other hand, in the future, authorities could ban the use of private digital currencies in their respective jurisdictions through special regulatory arrangements.

The impact of changes in the payments landscape for the nature of central banks

Changes in payment systems affect not only the functions of central banks in the area of payments but also the functioning of the central banks themselves. There are some aspects of central banks' operation which may be considered in this regard.

The transformation of payment systems concerning the use of forms of money and payment instruments affects the economics of central banks. All modern central banks have a monopoly on the issue of cash and conducting monetary policy. This unique privilege is the basis for central banks' income in the form of seigniorage (Neumann, 1996, p. 105).

The central bank's issue function is reflected in its balance sheet. The central bank's obligations, called central bank money, are the basis of modern monetary systems. These obligations include banknotes and coins in circulation and deposits of commercial banks with the central bank, i.e., payment means held in central bank accounts. The value of central bank money in the economy depends on the following factors (BIS, 2009, p. 104):

1) the demand for banknotes and coins - it varies greatly from country to country, depending on preferences and habits on how payments are made and values are stored, as well as on the level of payment infrastructure development,

2) banks' demand for balances with central bank accounts - it is conditioned by the architecture of the interbank settlement system and the central bank's policy on intraday credit available to its participants.

Over the last few decades there has been a significant increase in the number and value of non-cash payments at the expense of reducing the use of cash. The emerging innovations in retail payments intensify this trend, and thus affect the role of central banks as cash money issuers. Banknotes in circulation are non-interest-bearing liabilities of central banks, hence the substitution of cash by non-cash money may lead to a decline in the central bank's cash income. Loss of part of the seigniorage may become a problem for central banks, which will consequently become dependent on other revenue sources. In addition, even a moderate reduction in seigniorage may cause concern for some governments, especially in countries with high budget deficits. However, the reduction of cash usage in payment transactions, due to dissemination of deposit or electronic money doesn't have to mean that cash will disappear. Money, apart from the function of a means of payment, performs value storage function. Cash, and especially high-value bank notes are used not only for hoarding but also for criminal-type of transfers. This puts central banks in some kind of dilemma (Leinonen, 2010, p. 30).

Changes in payment systems may have an impact on the implementation of monetary policy. In this context the key issue is the role of the central bank as a central settlement agent, arising from its monopoly in running RTGS interbank settlement systems. It is related to the issuance of reserve money as a means of settlement between banks. Acting as a settlement agent, the central bank also establishes the conditions for completing deficits on the settlement account and for the management of surpluses (Freedman, 2000, p. 229).

Arnone and Bandiera (2004, p. 13) claim that as long as the settlement takes place in the books of the central bank, the demand for central bank money will not disappear, so central banks will maintain control over the short-term interest rates. Goodhart (2000, p. 205) states that the ability of the central bank to control interest rates is a matter of political economy. He argues that technological innovations will not exacerbate the role of central banks, but they can significantly reduce their

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income and even lead to a situation that will require the state treasury to cover the cost of interest rate control. This raises the question about the state benefits of the existence of a central bank and the ability to pursue monetary policy. This revives the debate on free banking (Marszałek, 2014).

In conclusion, it is important to note that the opinions on the impact of changes in the methods of making payments on the implementation of monetary policy are very different. Some of them are focused on the public demand for cash in the context of changes in the use of payment instruments, while others emphasize banks' demand for reserves in the central bank (Schmitz, 2006, p. 113). Some assure that the implications of changes in payments for monetary policy are insignificant; other say that development of new payment mechanisms may, in conditions of no particular regulation, prevent monetary policy and threaten the existence of central banks. The fact is that monetary policy is based on the control of the monetary base, i.e. the value of the central bank's obligations to the banking sector, although it most often refers to the impact on interest rates. As emphasized by White (2005, p. 23) the balance sheet of central bank is the key to understanding the central bank's ability to influence interest rates.

Using real-time gross settlement mechanisms in interbank payments and the involvement of central banks in operational aspects of the operation of RTGS systems results in a change in the role of reserves held by commercial banks at the central bank. Nowadays the reserve requirement has a very limited application as a monetary policy instrument; it is rather a liquidity management tool in the high-volume payment mechanism operated by the central bank. The challenge for modern central banks as operators of RTGS systems, and at the same time as entities responsible for financial stability, is thus to adjust the reserve requirement system to the reduction of the time horizon of interbank payments.

The impact of digital currencies in these areas would have many similarities with the potential impact of e-money. A widespread substitution of banknotes with digital currencies could lead to a decline in central bank noninterest paying liabilities leading to reduction of their balance sheets and seigniorage revenue. So far, the increasing use of distributed ledger technology to settle transactions has provoked central banks to consider using this technology. The consequences of this for central banks hasn't been entirely examined yet.

The challenges for central banks identified in a survey

Identifying the challenges facing central banks may be complemented by selected results of the survey conducted by the author in 2013. The study covered 11 central banks operating in the European Union and outside the EU. The questionnaire was addressed to the heads or senior officials of appropriate departments of central banks responsible for national payment systems. The entire purpose of the survey was to recognize the central banks' perception of the issue of payment systems evolution both nationally and globally and their policies in this regard. A part of the results of the survey are presented in Tables 1-4.

Almost all respondents pointed to several symptoms of changes in the functioning of payment systems, which are a challenge for the central bank (Table 1). The most popular answers included:

1) innovations in payment instruments,
2) growing significance of non-banks as payment intermediaries,
3) growing use of complicated technology in payments.

Less than half recognized development of nonbank payment mechanisms and e-money as a challenge for the central bank. Under the heading "other", there were comments concerning new international standards and regulations, as well as the development of digital money such as Bitcoin. In the opinion of a representative of Riksbank (Sweden) none of the indicated phenomena would make the central bank take an active action in order to affect the market. However, he admitted that there is a need to change the way they gather information.

All respondents claimed that the transformation of the national payment system influences the scope of payment system oversight (Table 2). The vast majority of respondents among the central bank's functional areas affected by changes in the payment system indicated:

1) achieving the objective of financial stability,
2) implementation of monetary policy,
3) central bank operating functions,
4) cooperation with the financial supervisory authority.

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Table 1: Changes in payment systems posing challenges for central banks

Country	Growing significance of non-banks as payment intermediaries	Development of nonbank payment mechanisms	Growing use of complicated technology in payments	Development of e-money	Innovations in payment instruments	Other
European Union countries						
France		X	X			X
Italy	X	X	X	X	X	X
Netherlands	X	X			X	X
Poland	X		X		X	X
Sweden						
Other countries						
Australia			X		X	
Brazil	X	X		X	X	
Canada	X	X	X	X	X	X
Mexico	X			X	X	
Switzerland			X			X
Turkey					X	X

Source: Author's survey

Table 2: Areas of operation of the central bank affected by transformation of the national payment system

Country	Achieving the objective of financial stability	Implementation of monetary policy	Volume of cash issued and seigniorage	Central bank operating functions	Scope of payment system oversight	Cooperation with the financial supervisory authority
European Union countries						
France	X	X		X	X	X
Italy	X	X	X	X	X	X
Netherlands	X	X	X	X	X	X
Poland	X	X	X	X	X	X
Sweden			X		X	
Other countries						
Australia	X	X		X	X	X
Brazil	X	X		X	X	
Canada	X	X	X	X	X	X
Mexico	X			X	X	X
Switzerland	X	X			X	
Turkey	X	X		X	X	X

Source: Author's survey

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Less than half confirmed the impact on the volume of cash issued and seigniorage. According to all respondents, changes in payment processes complicate the performance of tasks arising from responsibility for the stability of the payment system or require additional work to accomplish these tasks.

The respondents claimed that the transformation of the payment system might be in the next few years the basis for organizational changes in the central bank (7 central banks), verification of the rules of cooperation with the financial supervisor (6 central banks) and the need to take into account the reduction of the importance of banks in the payment system (2 central banks). This is presented in Table 3. The representative of the

Table 3: Influence of changes in the payment system on central bank organization

Country	Organizational changes in the central bank	Verification of the rules of cooperation with the financial supervisor	The need to take into account the decline in the significance of banks in the payment system	Other
European Union countries				
France	X	X		
Italy				
Netherlands	X			
Poland		X		
Sweden				X
Other countries				
Australia		X		
Brazil	X		X	
Canada	X		X	
Mexico	X	X		
Switzerland	X	X		
Turkey	X	X		

Source: Author's survey

Table 4: Elements of the national payment system requiring more attention of the central bank in the next few years

Country	Payment institutions	Payment instruments	Payment mechanisms and infrastructure	Other
European Union countries				
France	X	X	X	
Italy	X	X	X	
Netherlands		X	X	
Poland	X	X	X	X
Sweden	X	X		
Other countries				
Australia	X	X	X	
Brazil	X	X	X	
Canada		X	X	
Mexico		X	X	
Switzerland			X	
Turkey			X	

Source: Author's survey

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central bank of Sweden stated that "Riksbank has the organizational structure and cooperation framework with the supervisor that will work properly in the foreseeable future". He however also claimed that "there is a need to change some aspects of contacts with some other authorities, e.g. the competition authority".

All central bank representatives indicated that in the perspective of the next few years there will be a need for increased interest of central bank in the functioning of some elements of the national payment system, i.e. payment institutions, payment instruments or payment mechanisms (Table 4).

The results of the survey show that central banks are prepared for the evolution of the payments landscape to varying degrees. However, all central banks included in the survey analyze changes in payment systems on a national and global scale. This is also confirmed in the reports published on their websites as a part of their information policy.

The increasing challenge for central banks arises in these areas where the information and the data are insufficient. They include global payment mechanisms beyond the control of the national or international authorities, e.g. digital currencies. The reports prepared by international institutions such as Committee on Payments and Market Infrastructures or European Central Bank include the data on e-money as prepaid value stored electronically, which represents the liability of a bank, an e-money institution or any other entity authorised or allowed to issue e-money in the local jurisdiction and which is denominated in a currency backed by an authority (BIS, 2017). However, the reports do not provide data on digital currencies or virtual currency schemes. They concentrate on a range of possible impacts of decentralised payment mechanisms based on the use of a distributed ledger on various aspects of financial markets and the wider economy (BIS, 2015; ECB, 2015).

According to the survey, central banks in 2013 considered the possible implications arising from different payment innovations. Due to the increasing scale of the use of digital currencies and distributed ledger technology and identified threats to domestic and international financial markets it is recommended that central banks continue monitoring and analysing the implications of these developments.

Conclusions

Studies on the future of central banks focus mainly on the consequences of the recent crisis for their roles (Ernst&Young, 2012). However, there are more elements of the environment that impose new roles and responsibilities on central banks, among them: new technologies, new participants, new risk profiles, and new market structures (Oliver & Weiner, 2010, p. 199).

The functioning of central banks in the changing payments landscape poses a number of challenges for them. They deal with issues relating to the responsibility for the safety and efficiency of the national payment system, the issuance of cash money and the implementation of monetary policy.

The evolution of payment systems requires a revision of the scope of oversight at national level. Due to the emergence of global payment mechanisms and institutions it is worth considering international oversight. Nevertheless, it is important for central banks to create a systematic decision-making framework for policy changes on innovative payment mechanisms.

The involvement of central banks in payment mechanisms should be aimed at removing imperfections of the market. Criteria for making decisions in this area should be linked to the achievement of the following objectives: limiting systemic risk, protecting consumers, increasing efficiency, integrity, availability of instruments and payment mechanisms. It is also important to choose the way of engagement, taking into account the possible roles of the central bank, i.e. operator, catalyst, or oversight authority.

Changes in various aspects of the functioning of payment systems at the national and global level undoubtedly have an impact on central banks in the area of their functions. These functions are: payment system oversight, issue of currency and the implementation of monetary policy. The transformation of the payments landscape also affects the information policy of central banks.

Central banks cannot remain neutral to the diffusion of modern instruments and mechanisms used in payment processes. It is very important for them to identify the long-term implications of the innovations in payments for their policy and operations. In response, many central banks may re-evaluate their roles in retail payment systems.

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After the time of the survey several reports raising the subject of virtual currencies were published and discussed on the international level. The increasing use of distributed ledger technology to settle transactions provoked some central banks to consider using this technology. The consequences of this for central banks and the economy in the national and global perspective are worth further research studies.

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