NEW CHALLENGES FOR CENTRAL BANKS

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Abstract
New trends and challenges at the global level have forced central banks to address issues such as climate change, digitalization, and analysis of real estate market developments. Thus, central banks are no longer just institutions whose goal is to achieve and maintain price and financial stability. Bearing in mind that the costs of repairing the consequences of climate change can significantly affect monetary and fiscal policy, the issue of climate change is of great importance today. The emergence of crypto currencies (such as bitcoin) and the advancement of other forms of payment all point to the importance of digitization. The movement of prices on the real estate market affects price and financial stability, and inadequately secured mortgage loans were one of the causes of the financial crisis of 2007/2008. This paper will analyze new challenges for central banks, such as climate change, digitalization, and analysis of real estate market developments.

Key word: central bank, climate changes, digitalization, real estate market, price stability, financial stability.

NOVI IZAZOVI ZA CENTRALNE BANKE

Apstrakt
Nove tendencije i izazovi na globalnom nivou nametnuli su da se centralne banke bave pitanjima kao što su klimatske promene, digitalizacija i analiza kretanja na tržištu nekretnina. Time centralne banke više nisu samo institucije kojima je cilj postizanje i održavanje cenovne i finansijske stabilnosti. Imajući u vidu da troškovi saniranja posledica klimatskih promena mogu u značajnoj meri da utiču na monetarnu i fiskalnu politiku pitanje klimatskih promena danas je od velike važnosti. Razvoj kripto valuta (poput bitkoina), kao i razvoj drugih formi plaćanja govori o tome koliki je značaj digitalizacije. Kretanje cena na tržištu nekretnina utiče na cenovnu i finansijsku stabilnost, a upravo su neadekvatno obezbeđeni hipotekarni krediti bili jedan od uzroka finansijske krize 2007/2008. Ovaj rad analiziraće nove izazove za centralne banke, kao što su klimatske promene, digitalizacija i analiza kretanja na tržištu nekretnina.

Ključne riječi: centralna banka, klimatske promene, digitalizacija, tržište nekretnina, cenovna stabilitet, finansijska stabilitet.

JEL codes: E58, Q54, L85
INTRODUCTION

Changes at the global level have posed new challenges to central banks, which today are concerned about climate change, digitalization and the state of the real estate market. These challenges affect the fulfillment of the main goals of most central banks, which are defined as achieving and maintaining price and financial stability. The negative effects of climate change are increasingly materializing from year to year. Rising temperatures globally increase the likelihood of continued devastating events, such as fires, floods, droughts, hurricanes, extremely high temperatures and extreme cold. Thus, climate change has a direct impact on the implementation of fiscal and monetary policy, achieving and maintaining price and financial stability, but also climate change is an important issue for regulators and supervisors.

Fiscal authorities have been crucial in reducing the effects of the coronavirus epidemic since the start of 2020, while central banks have used a variety of monetary policy tools. It is the digitalization of payments that enables the smooth execution of payments of obligations of the corporates and the household during the pandemic and thus the avoidance of the liquidity crisis, which was especially important during the period of lockdown. At the same time, central banks have embarked on a project to develop their digital currencies to create an alternative means of payment that has good performance in a contactless payment environment [25, p.110].

The third important challenge for central banks is rising real estate prices. Rising housing prices can spill over into inflation over housing costs, directly affecting the goal of price stability. This paper investigates three issues that central banks must address: climate change, business digitization, and a sharp rise in real estate prices.

Six sections comprise the paper. The first section is devoted to a literature review, which is followed by three sections of the paper in which we analyze each individual challenge for central banks. The fifth section of the paper investigates the effects of these difficulties on central bank functioning, and the key findings are presented in the conclusion.

LITERATURE REVIEW

The consideration of new difficulties for monetary authorities is an important topic because economic and development, living standards and economic prospects depend on achieving price and financial stability, as the main goals of most central banks. Due to their role for surveillance in the financial system, certain central banks have begun to examine the financial sector's implications of climate change and the transition to a decarbonised economy, according to Campiglio et al. [3, p. 463]. Green financial instruments need to be actively pushed and released in order to raise money for the reduction of climate change's effects. The analysis of Diluiso et al. [7, p. 4] shows that the application of green quantitative easing, according to which the central bank would buy low-carbon energy assets, would help stabilize financial markets, then contribute to the relaxation of lending conditions and increase the level of private investment.
The next important challenge for central banks is digital innovation. Today, given the need to strike a balance between innovation and ensuring the safety of all financial service users, this is a difficult task [11, p. 100]. Central bank toolkit today includes big data and machine learning tools [8, p. 3]. The role of central banks in digital innovation is very important taking into consideration that it is the interest of central banks to ensure safer and more efficient exchange of funds [29, p. 5]. One of the most recent advancements in digital innovation is the creation of cryptocurrency as a type of virtual property [5, p. 8]. The increased use of other payment methods (such as mobile phones payments and internet payments) has had a significant impact on the growth in electronic service users, particularly mobile banking. This created new solutions in the field of financial services, which are mostly covered on the mobile access channel [10, p. 51].

The third significant challenge for central banks is rising real estate prices. Any excessive rise in prices, which is above its fundamental values, can lead to asset price bubbles, which consequently affects almost all economic decisions. The increase in prices makes it easier for investors to finance new projects, which means that investments first increase, and then significantly decrease. Collateral, which banks use as means of security, is becoming overvalued and real estate prices are collapsing, which significantly disrupts the balance sheets of financial institutions that are lenders [4, p. 3]. Namely, if mortgage holders are not able to repay their credit obligations, it will trigger large-scale risk contagion within the real estate industry and between related banks [23, p. 480]. In the continuation of paper, we will analyze every new challenge that central banks face.

**CLIMATE CHANGES**

In order to reduce the level of global warming in 2016, the Paris Agreement was signed, with the goal of strengthening the global response to climate change as well as countries’ ability to cope with the consequences of climate change [13]. The Network of Central Banks and Supervisors for Greening the Financial System (NGFS) was founded during the One Planet Summit in Paris in December 2017 by monetary authorities and supervisory with the goal of jointly combating the consequences of climate change. The purpose of this network is to help meet the objectives of the Paris Agreement, as well as to strengthen the role of the financial system in risk management and capital mobilization for green investments, in order to achieve an environmentally sustainable development [21]. NGFS has published recommendations on: (1) monitoring climate risks; (2) developing taxonomy; (3) promoting transparency and (4) integrating climate risks into prudential policies. Table 1 provides an overview of these recommendations and links them to ongoing policy and regulatory initiatives at the European level by the European Commission and the European Systemic Risk Board (ESRB) [18].
Table 1. Recommendations by the NGFS and European initiatives with a focus on financial stability

<table>
<thead>
<tr>
<th>Monitoring climate-related risks</th>
<th>2019 NGFS Recommendations</th>
<th>2018 EU Action Plan and regulatory proposals &amp; ESRB proposals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central banks and supervisors are encouraged to develop methodologies for measuring climate-related risks, including forward-looking scenario analysis and stress tests.</td>
<td>The ESRB has proposed that the European Supervisory Authorities include climate risk scenarios in stress-test exercises, and is conducting analytical work on data and methodologies.</td>
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</table>

| Developing taxonomies | Regulators should develop taxonomies that aim to facilitate (1) financial institutions’ climate risk management, (2) assessment of the potential risk differentials between green and brown assets, and (3) mobilisation of capital for green investments. | The Commission has proposed a regulation for an EU classification system of sustainable economic activity (taxonomy), which aims to help investors redirect capital towards green activities. |

| Promoting disclosures | Non-financial and financial institutions should adopt the Financial Stability Board’s Task Force on Climate-related Financial Disclosures (FSB TCFD) disclosure recommendations. | The Commission has proposed a disclosure regulation and a regulation for a low-carbon benchmark and a positive carbon impact benchmark. |

| Incorporating climate-related risks into prudential frameworks | Central banks and supervisors are encouraged to integrate climate-related risks into supervision, among other things by (1) raising awareness and promoting climate risk assessment among institutions, (2) setting supervisory expectations regarding governance and risk management, and (3) potentially considering integrating climate risk into the prudential framework. | In its Action Plan, the Commission states that it will explore the feasibility of the inclusion of climate risks in institutions’ risk management policies and the potential calibration of capital requirements for banks as part of the CRR/CRD. |


It is necessary for monetary and fiscal authorities to have a coordinated action in order to achieve and maintain financial stability, as one of the important preconditions for a healthy and sustainable economic development. Without it, the costs of resolving the crisis may be higher than the costs of avoiding or minimizing the impacts of climate change. Central banks can respond by enacting macroprudential policy measures aimed at identifying and mitigating systemic risks in the financial system with the aim of keeping the economy stable. Climate change may lead to new types of risks to the financial system, of which, from the perspective of central banks, two types of risks have stood out. The first are physical risks (natural disasters caused by weather, which can negatively affect the property of the population and the economy), and the second are transition risks (tightening regulatory requirements for certain technological processes, for example the introduction of taxes to reduce carbon emissions could lead to the lower appraised value of the property). Implementing climate-related risks in regulatory frameworks brings with it new and significant challenges, such as the development of new methodological approaches [12, p. 28].

The banking sector is exposed to physical and transitional climate-related risks indirectly, via corporate and household loans. There are two impacts of climate-related concerns on the financial sector. Risks related to climate change may affect both the quality of the client’s credit and the worth of the property used to secure it. Among the most prominent channels central banks can use when combating climate change is raising awareness about this issue and by promoting sustainable financing in the financial sector. This can be achieved by issuing green instruments (such as green bond, green loans) and invest those funds in project that can create economic
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growth and development on a long-term sustainable basis. In the fight against climate change, central banks have several policy options such as forcing commercial banks to introduce climate change capital, then for commercial banks to reduce lending to environmentally adverse industries, establishing climate banks and reallocating active in areas less prone to climate change events [27, p. 5-9]. Climate stress tests were initiated by central banks to assess the impact of climate change risk on bank capital. The Dutch Central Bank (De Nederlandsche Bank, DNB) was the first to deliver a climate stress test in 2018 [28, p. 58], with the Banque de France following suit in 2020 [2]. The Federal Reserve System in September 2021 published a stress testing procedure in order to examine the resilience of financial institutions to climate-related risks [22, p. 22]. In January 2022 the Banking Supervision of the European Central Bank launches climate risk stress test [14].

DIGITALIZATION

The development of innovative solutions in the digitalization of payments is the basic infrastructure of every modern society. In aspects of European digitalization, it is necessary to examine instant payments, the second Payment Services Directive (PSD2), and, finally, the Eurosystem's decision to consider the introduction of a central bank's digital currency, the digital euro [1, p. 2]. In addition to the above, we can add that the fourth challenge, in the field of digitalization, is the development and use of cryptocurrencies.

In November 2018 Target Instant Payment Settlement (TIPS), a brand-new market infrastructure technology, was launched by the Eurosystem. (Picture 1). TIPS enables real-time, round-the-clock, 365-day transfers of money to customers. Therefore, by implementing TIPS, it is enabled to individuals and companies to transfer funds to each other within a few seconds, regardless of the working hours of bank branches. TIPS has two features that can help make this technology accessible throughout Europe. To begin, TIPS is based on SCT Inst, an immediate payment mechanism that is likely to be used by a significant proportion of payment enterprises throughout Europe. Second, TIPS evolved from TARGET2, which already has a sizable user base in Europe [17].


The upgraded Payment Services Directive (PSD2) took effect in January 2016 and was required to be incorporated into national legislation by the EU’s member states by January 2018. PSD2’s main goals are: (1) to make a contribution to a higher degree of collaboration and effectiveness inside the European payment market; (2) to level the playing field for payment services by enabling young members to participate; (3) to provide greater security in the execution of payment services and (4) to provide protection for the household and corporates of Europe [16].

The third challenge in Europe, when it comes to digitalization, is the digital euro, which will be a secure, fast, and easy instrument for everyday payments. Thus, the introduction of the digital euro will support the digitalization of the European economy. The digital euro will be in the form of euro banknotes, but in digital form. The Eurosystem will be in charge of issuing it, and both individuals and businesses will have access to it. The European Central Bank conducted public consultations between October 2020 and January 2021 and led focus groups in all eurozone countries between October and December 2021. The results of this research will be included in the current phase of examination on the introduction of the digital euro. The European Central Bank’s research phase will take roughly two years and is scheduled to end in October 2023. The Bank will decide whether to start generating the digital euro after the researching is complete [15].

The fourth digital challenge for central banks is cryptocurrencies, which are a form of digital currency that can be used as a medium of exchange using cryptography. Massive increase in cryptocurrencies began in 2008, when Satoshi Nakamoto’s work was published and the design of a blockchain-based electronic payment method was clarified [26, p. 4]. Various and diverse communities so far had shown interest in the use of distributed technology [6, p. 1]. Since of their impact on the overall financial sector, cryptocurrencies have emerged as one of the most serious matters for the financial industry over the years [24, p. 188]. Bitcoin, the first cryptocurrency based on decentralized technology, was created in 2009. Ever since, a significant number of cryptocurrencies have indeed been developed that make use of a decentralized network distributed as one of a large number of computers. This decentralized structure allows cryptocurrencies to function outside the control of governments and central banks.

**REAL ESTATE MARKET**

Inadequate security of housing loans is one of the causes of the global financial crisis 2007/2008 and thus developments in the real estate market can have a significant impact on the real and financial sector. For financial stability, the importance of residential real estate (RRE) stems from the fact that the household sector invests a large part of its assets in real estate, then the financial sector has a primary role in financing real estate investments (construction, purchase, adaptation) and real estate is important as collateral. As a consequence, macroprudential authorities, including the European Central Bank, take priority the identifier and tracking of risks that may arise from the residential real estate market, but also the effective application of macroprudential policy (Table 2) [19].
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Table 2. Macroprudential policy measures, by the type of RRE risks that they could directly address

<table>
<thead>
<tr>
<th>Identified RRE stretch</th>
<th>Household stretch</th>
<th>Collateral stretch</th>
<th>Banking stretch</th>
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</thead>
<tbody>
<tr>
<td><strong>Flow tools:</strong></td>
<td><strong>Flow tools:</strong></td>
<td><strong>Flow and stock tools:</strong></td>
<td></td>
</tr>
<tr>
<td>LTI cap, DTI cap, DSTI cap, affordability requirements, amortisation rules</td>
<td>LTV cap, amortisation rules, term limit</td>
<td>Sectoral capital requirements/increased risk weights on RRE lending, stress testing, capital buffer (including countercyclical)</td>
<td></td>
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<tr>
<td><strong>Stock tools:</strong></td>
<td><strong>Stock tools:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
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</tbody>
</table>

*Note*: LTI-loan to income; DTI-debt to income; DSTI- debt service to income; LTV-loan to value


The European Central Bank unveiled a revised monetary policy in July 2021 that took into account housing costs in the harmonised consumer price index and looked at how climate change would affect price stability. The European Systemic Risk Board (ESRB) established in 2010 to oversee the European Union's financial system, publishing recommendations and warnings to prevent and mitigate systemic risks that could jeopardize stability of the entire economy. In early February 2022, the ESRB issued five cautions and two suggestions on medium-term dangers in the real estate market, as well as an evaluating the level of execution of the recommendations issued by the ESRB in 2019 for the same purpose. The warnings, which also include newly identified risks that have not been appropriately removed, were sent to five countries: Bulgaria, Croatia, Hungary, Liechtenstein, and Slovakia. The ESRB also deliver suggestions to Austria and Germany, which received ESRB warnings in 2016 and 2019, due to risks that were not appropriately excluded. The key risks highlighted by the ESRB are medium-term and, depending on the country, relate to the accelerated growth of real estate prices and possible overestimation of RRE prices, the level and dynamics of household indebtedness, housing loan growth and signs of weakening lending standards [20].
CONSEQUENCES FOR CENTRAL BANKS

Research and modeling of climate change risks are important for achieving and maintaining the price and financial stability of central banks, bearing in mind that these risks have so far been insufficiently investigated. To accomplish this, a database for climate change analysis should be created, which should include data from financial sector, macroeconomics, and environmental parameters (such as the frequency of earthquakes, floods, and fires). Central banks should conduct a thorough evaluation of the impact of global warming risk on the whole financial sector while promoting public understanding of the detrimental effects of climate change on day-to-day life. We have previously stated that climate change manifests itself through two types of risk - physical and transitional risk. Realization of physical risks can worsen the ability of debtors to properly service their debts, which can lead to an increase in non-performing loans. In addition, climate risks can contribute to accelerating the amortization of collateral that serves as a means of securing a specific loan, thus increasing the loss given default. Due to regulatory changes, transition risks can contribute to investors changing their portfolio of investments because they believe that some type of asset has become less profitable and thus less attractive for investment. For example, the automotive industry has made a turnaround in business and has moved from the production of cars with fossil fuels for the production of electric cars. This may change the perception of the financial sector towards customers due to changes in their business model, which could potentially increase the cost of borrowing for these customers. Keeping all of this in mind, the requirement for central banks in the coming period in terms of climate change is to incorporate monetary and macroprudential policies alongside with fiscal policies, with the goal of mitigating the bad repercussions of future climate change risks.

When considering the impact of digitalization on central banks, it is important to consider which digitalization is in question. Digitization of payments has contributed to shortening the time required to make payments, which has led to an increase in business efficiency, while reducing the cost of executing the transaction. In addition, clients have gained access to places where they can make payments, because today it is not necessary to go to the bank, but it is possible to pay obligations online (via mobile phone or computer). The future of digitalization also lies in the development of digital currencies of central banks, which will represent the form of money in digital form, and behind which will stand the monetary authority. Cryptocurrencies, on the contrary, are a type of digital currency whose value is not issued nor secured by a monetary authority. Therefore, cryptocurrency owners are susceptible to the volatility of their currency's value because there is no mechanism for preserving the value, as there is with fiat currencies, creating a risk for owning these currencies that can lead to significant economic consequences.

For central banks, it is of great importance to closely monitor developments in the real estate market and respond in a timely manner with adequate monetary and macroprudential policy measures, with the aim of achieving and maintaining price and financial stability. The global financial crisis has pointed to the need to properly value collateral, which is the basis for securing real estate. If the collateral is not
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adequately assessed, it consequently leads to credit losses from the mortgage portfolio that occur due to unfavorable economic and financial trends, as well as due to negative trends in the real estate market. Finally, the inability to repay mortgage loans causes a build-up of non-performing loans, which tends to increase banking system's risk aversion, tightens credit standards (such as financial institutions' requirements for high collateral values, loan maturity periods are shortened, and interest margins are increased), decrease banks' income, and raises provisions for increased non-performing loan coverage, as well as increased employee engagement in non-performing loan departments.

CONCLUSION

Nowadays, central banks face numerous challenges, such as climate change, digitalization, and real estate market developments, in addition to the consequences of these developments for the central bank. To achieve and maintain price and financial stability, central banks must pursue responsible monetary and macroprudential policies while coordinating fiscal policy implementation. From the perspective of central banks, climate change may lead to the creation of new types of risks to the financial system. Physical risks are manifested through the occurrence of natural disasters, which has a negative impact on the property of the corporates and the households. The second type of risk relates to transition risks, which involve stricter regulatory requirements, which could potentially lead to a reduction in the assessment of the value of assets.

The next important challenge for central banks is digitization. Digitization of payments enabled fast settlement of transactions, which contributed to the improvement of business conditions and lower costs of transaction execution. Concerning digitalization, it is important to highlight the entrepreneurial spirit of a large number of central banks to start an analysis of the introduction of a central bank digital currency. This would enable the digital format to exist instead of paper and coins. The development of cryptocurrencies is a possible source of instability for central banks, as these currencies represent digital assets that central banks do not issue or guarantee their value. As a result, cryptocurrency holders are exposed to the risk of price changes, as well as possible risks of financial losses.

An important challenge, both from the aspect of preserving price and financial stability, is the present growth of prices on the real estate market. Residential real estate represents the largest part of the household's assets, the financial sector has a primary role in financing real estate and these real estates are important from the aspect of use as collateral. In addition, significant growth in housing prices can largely spill over into inflation and thus jeopardize the achievement of price stability.

All the analyzed challenges indicate how important the role of central banks is today. The corona virus pandemic showed that the central banks, together with the representatives of the fiscal authorities, needed to react quickly and adequately in order to provide support in repairing the consequences of the pandemic for the corporates and the households. Currently, the operations of central banks are under the influence of great uncertainty resulting from disruptions in supply chains, higher
inflation rates compared to targets, as well as pressures caused by the geopolitical situation between Ukraine and Russia. All of the above represent new challenges for central banks that need to show their resilience and adaptability in these times of crisis.

LITERATURE

New challenges for central banks


REZIME

Danas se centralne banke suočavaju sa brojnim izazovima, kao što su klimatske promene, digitalizacija i razvoj tržišta nekretnina, pored sagledavanja tih uticaja na poslovanje centralnih banaka. Da bi postigle i održale cenovnu i finansijsku stabilnost, centralne banke moraju voditi odgovornu monetarnu i makroprudencijalnu politiku uz koordinaciju sa sprovođenjem fiskalne politike. Iz perspektive centralnih banaka klimatske promene mogu dovesti do stvaranja novih vrsta rizika po finansijski sistem. Fizički rizici se ispoljavaju kroz dešavanje prirodnih karastrofa, što ima negativan uticaj na imovinu privrede i stanovništva. Druga vrsta rizika se odnosi na tranzicione rizike, koji podrazumijevaju ponoštanje regulatornih zahteva, što potencijalno može da dovede do smanjenja procenjenje vrednosti imovine. 

Sledeći važan izazov za centralne banke jeste digitalizacija. Digitalizacija plaćanja omogućila je brže salidiranje transakcija, što je doprinelo poboljšanju uslova poslovanja i sniženju troškova izvršenja transakcija. U pogledu digitalizacije važno je istačiti inicijativu velikog broja centralnih banaka da započne analizu o uvođenju digitalne valute centralne banke. Time bi se omogućilo da umesto papirnog i kovanog novca postoji i digitalni format. Razvoj kriptovaluta predstavlja mogući izvor nestabilnosti za centralne banke, jer ove valute predstavljaju digitalnu imovinu koju centralne banke ne emituju niti garantuju njenu vrednost. Posledično imaoci kriptovaluta su izloženi riziku promene cena, kao i mogućim rizicima od finansijskih gubitaka. Važan izazov, podjednako sa aspekta očuvanja cenovne i finansijske stabilnosti, jeste prisutan rast cena na tržištu nekretnina. Stambene nekretnine predstavljaju najveći deo...
aktivne stanovništva, finansijski sektor ima primarnu ulogu u finansiranju nekretnina i te nekretnine su važne sa aspekta korišćenja kao kolateral. Pored toga, značajan rast cena stambenih nekretnina može u velikoj meri da se prelije na inflaciju i time ugrozi postizanje cenovne stabilnosti. Svi analizirani izazovi ukazuju koliko je danas važna uloga centralnih banaka. Pandemija virusa korona je pokazala da su centralne banke, zajedno sa predstavnicima fiskalnih vlasti, trebale brzo i adekvatno da reaguju kako bi pružile podršku u saniranju posledica pandemije za privredu i stanovništvo. Trenutno je poslovanje centralnih banaka pod uticajem velike neizvesnosti koja proističe iz poremećaja u lancima snadbevanja, višim stopama inflacije u odnosu na ciljane, kao i pritiscima koji su prouzrokovani geopolitičkom situacijom između Ukrajine i Rusije. Sve pobrojano predstavlja nove izazove za centralne banke koje u ovim kriznim vremenima treba da pokažu svoju otpornost i prilagodljivost u poslovanju.