

Transformation of Central Banking. Annual Research Conference of the NBU. Key Issues

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ABSTRACT

In May 2016, the National Bank of Ukraine (NBU) held its Annual Research Conference on Transformation of Central Banking for the first time. Over 300 participants shared in the work of the representative international forum, including experts from central banks and international financial organizations, as well as representatives of the Ukrainian and international academic community. Issues discussed during the conference included the recent trends in central banking, ranging from the monetary policy at low interest rates and under the threat of deflation, financial stability and management of capital flows, and the effect of new financial technologies and cultural features on the transition process in central banks.

The global financial system has changed rapidly and constantly during recent decades. Therefore, central banks must also transform quickly and efficiently to be in line with economic processes and financial markets, which likewise develop rapidly and become more complex.

The great recession made it clear that the traditional set of central banks' instruments proved insufficient to restore sustainable economic growth and financial stability. Accordingly, central banks began actively implementing new approaches and regulatory measures over the past 10 years.

In particular, central banks in developed countries tend to use innovative instruments to counter deflationary pressure. Meanwhile, those central banks considered as models for implementing monetary policy in the context of inflation targeting (IT) returned to the practice of using special techniques for exchange rate management, which in the past were considered incompatible with this monetary regime. For example, the Czech National Bank is actively implementing the practice of maintaining the upper level of the exchange rate, while the central bank of Sweden (Sveriges Riksbank) considers the possibility of conducting FX interventions in addition to monetary instruments to meet the target inflation level.

All these instruments help central banks achieve their goals, yet they also create the conditions for emergence of other problems. As a result of the activity of central banks, the global economy has become more dependent on the stimuli they provide.

Quantitative easing, introduced as a measure for crisis management, has become an instrument utilized on a regular basis. Today, modern central banks act as not only lenders of last resort, but also as active participants in sovereign and corporate bond markets. In this regard, they face the question of whether transforming quantitative easing into a standard instrument of macroeconomic management is expedient.

The global crisis of 2008-2009 and the debt crisis in the EU changed the understanding of the basic tasks of central banks. Before the crisis, experts believed that a central bank should focus on price stability and sustainable economic growth. This approach urged regulators to ignore the accumulation of systemic imbalances in the financial sector and their related risks. After the crises, authorities achieved a consensus regarding the need to pay more attention to macroprudential supervision based on the analysis of systemic risks and aimed to prevent financial crises. Financial stability has become the second priority objective of a modern central bank. And some central banks even equalized it with price stability goal.

Modern information and other technologies also significantly affect the banking activities, thus changing the nature of the banking system. High capital requirements and strict regulations increasingly push traditional banking business toward so-called "shadow banking". Accordingly, such activities as virtual currency, blockchain applications, crowd funding, and P2P-lending do not only reflect the tendency towards increasing efficiency and creating innovative business models, but also raise the issue of supervision on the part of regulators.

Hence, the NBU organized the first Annual Research Conference of the NBU (in collaboration with Narodowy Bank Polski and with the support of the Government of Canada and the Kyiv School of Economics) to consider these issues. Or, in other words, to provide an answer to the question, “what is a central bank of the future?” as NBU Governor **Valeria Gontareva** noted. Particularly, in her opening address, the NBU Governor described the transformation processes taking place in the Ukrainian financial system and within the NBU. Ms Gontareva also emphasized that, given the rapid pace of change in its transformation, the NBU should focus not only on the current state of the world’s leading central banks, but also on the vision of their role in 5-10 years.

The conference included five research sessions and three policy panels, as well as the key speaker’s Keynote lecture and separate Opening remarks of the second day.

RESEARCH SESSION 1. PRICE SETTING

Oleksiy Kryvtsov (Bank of Canada) opened the first research section with the presentation of the paper *Price Selection, Inflation Dynamics, and Sticky-Price Models*, written in collaboration with **Carlos Carvalho** (Pontifical Catholic University of Rio de Janeiro). In this paper, the authors analyzed the applicability of two canonical models price setting (Calvo and Golosov-Lucas) to explain the fluctuations of inflation in the UK using a large array of micro price data.

Expanding the classical view of inflation, as a result of price selection, which depends on the margin of prices that vary during the period, and on the average amount of price changes, the speaker suggested extend the usual decomposition by breaking the intensive margin into additional components, namely the average level of newly set prices (reset component) and their average level prior to adjustment (preset component).

According to the research, inflation in the UK weakly correlates with the preset price level, which accounts only for about 16% of inflation variance. Accordingly, inflation is mostly driven the adjustment of prices from below-average levels.

Asked about the impact of competition level on price setting, Kryvtsov noted that the extension of the model to account for the impact of market concentration is possible, for example, in the analysis of various product groups in various sectors. The result may be the discovering the existence of differences in price setting for different groups of goods and/or in sectors, depending on the level of market concentration.

Oleksandr Talavera (University of Sheffield) presented the *Price Setting in Online Markets: Does IT Click?* research work carried out with co-authors **Yuriy Gorodnichenko** (University of California, Berkeley & NBER) and **Vyacheslav Sheremirov** (Federal Reserve Bank of Boston). In the presented paper, the authors experimentally investigated the features of price setting in online markets, which theoretically should be more flexible than in standard markets. According to the authors, this is attributable to such factors as the relative ease of tracking nominal prices, the effectiveness of online services for goods searches and price comparison consumers utilize to independently monitor goods and analyze the existing prices.

The results of modeling presented in the report showed that pricing behavior in online markets had the same drawbacks as standard markets – rigidity of prices and significant variance. However, the features of price setting in online markets may explain the reaction of sellers to external shocks, e.g., sellers tending to change prices in periods of high demand that coincide with US holidays such as Christmas, Thanksgiving, etc. The authors also confirmed their assumption about the short-term nature of seasonal price surges.

During the discussion, participants agreed that the role of the online market’s importance continued to grow, and the use of special tools for collecting and processing online data had the potential to become an effective instrument for central banks to monitor and control inflation.

Anton Nakov (European Central Bank) presented a paper co-written with **Luca Dedola** (CEPR) entitled *State-Dependent Pricing and the Paradox of Flexibility*. The key question posed in the paper tested whether an increase in price flexibility is a factor of macroeconomic stabilization. The speaker presented the results of modeling the influence of state-dependent price setting on the effectiveness of macroeconomic stabilization, and analyzed the characteristics of the Calvo model and the fixed menu cost model.

Among the main results of the modeling, Nakov pointed out the following: 1) in the absence of IT, the state-dependent price setting model causes more destabilization than the Calvo model; 2) a higher level of price flexibility determines a higher destabilizing impact; and 3) the paradox of flexibility is not just an artifact of Calvo pricing model. The main conclusion of the research is that the main factor for ensuring macroeconomic stability is monetary policy that controls inflation processes in the economy.

RESEARCH SESSION 2. MONETARY POLICY RULES

Roc Armenter (Federal Reserve Bank of Philadelphia) stated that nominal targets have taken center stage in the design of monetary policy during his presentation of the research work titled *The Perils of Nominal Targets*. Inflation, price level, or nominal GDP may be such nominal targets. Inflation targeting has proven successful at curbing high inflation in both developed and developing economies. Armenter named Israel and Poland as examples of success. However, now these countries have a problem of inflation being less than the target in long-run.

In his research, Armenter raises the issue of capability of IT to overcome very low inflation. He considers a Neo-Keynesian model in conditions of the interest rate approaching the zero lower bound.

The main conclusion of the research is that central bank's commitments to nominal targets are a necessity, but not a sufficient condition to achieve the targets. Despite interest rates being at the zero level bound, inflation expectations have remained mostly anchored.

However, once economic agents' trust that the central bank can bring inflation growth to the target level disappears, the central bank would find itself unable to implement the target and restore confidence. Contrary to previous developments in this area, Armenter believes that the use of nominal targets such as level prices does not solve the problem of bringing expectations to the target level.

Armenter sees a possible solution to the problem of anchoring expectations in setting targets for long-term nominal interest rates. The consequences of such a change in the operational toolkit of central banks, in particular, for financial stability, fiscal stability, and the pension and insurance systems, were the subject of discussion during a series of questions and answers on the results of the report.

Further, **Carlos Viana de Carvalho** presented the research study titled *Anchoring Inflation Expectations* conducted in collaboration with **Stefano Eusepi** (Federal Bank of New York), **Emanuel Moench** (Deutsche Bundesbank), and **Bruce Preston** (University of Melbourne). The authors analyzed the issue based on a model of long-term inflation expectations, which are key to the success of monetary policy under IT.

In his presentation, the speaker demonstrated examples where expectations were anchored and when they were unmoored as a result of shocks. In equilibrium, actual inflation is a result of consolidated expectations of economic agents and households. If they believe that the long-term component affects the current inflation directly, expectations about the future are projected onto the current state. So, expectations are partially self-fulfilling, producing an endogenous inflation trend. An important feature of the model is the sensitivity of inflation to forecast errors. If economic agents conclude that actual inflation significantly differs from the expected level, in other words, the forecast errors are obvious, they will not take into account the previously forecast targets but will be guided by new inflation data.

The model also describes the evolution of long-term expectations, and its practical application demonstrates that forecasts proved true for most countries where tested. Using examples from many countries, the authors confirmed the effectiveness of the model for forecasting, especially considering the data about times when economic agents changed their expectations and what kind of short-termed data they used in the regime of changing expectations.

Key findings of the research: to successfully implement an IT regime, the central bank should utilize the most recent actual data and update the forecast in case new shocks occur. Some deviations from the forecast are exogenous in character, and they partially depend on macroeconomic policy. Under the influence of misconceptions about the inflation level and the impact of shocks, economic agents change their behavior and expectations. Under these circumstances, monetary policy must take into account changes in expectations and influence the formation of long-term inflation expectations based on new data.

Maurice Obstfeld's Keynote Lecture

On the first day of the conference, the Chief Economist at the International Monetary Fund, **Dr Maurice Obstfeld**, presented the *Keynote Lecture: Trilemmas and Tradeoffs: Living with Financial Globalization*. He considered two views on monetary policy in small open economies. According to the first view, a small open economy policy under conditions of a flexible exchange rate is not qualitatively different from a closed economy. Despite external economic shocks, the central bank, using the exchange rate as a buffer, enjoys monetary autonomy and can ensure the performance of internal objectives, inflation in particular. According to the second diametrically opposed view, countries with a small open economy in the globalized world enjoy no monetary autonomy, regardless of their exchange rate regime due to the impact of financial cross-border flows. These financial flows are determined by economic cycles and the policy of central banks from influential countries, primarily the United States.

The speaker emphasizes that each approach has its own rationale. However, as the results of empirical studies on panel data of a large sample of countries demonstrate, changes in short-term interest rates in small open economies hardly depend on changes in interest rates in major countries. Internal factors often determined interest rates. This means that countries with flexible exchange rates can afford a certain level of monetary autonomy. At the same time, for various reasons, these countries are also concerned about the issues of exchange rate management. This again puts countries into the classical trilemma of choosing between the free movement of capital, exchange rate stability, and monetary autonomy to achieve internal goals. In fact, countries with small open economies have to make a tradeoff in finding the optimal choice between these objectives.

A similar trilemma exists inherently in the financial system: countries cannot simultaneously afford financial stability, free cross-border financial flows, and national control over supervision and regulation of the financial system. The development of the banking crisis in the euro area proved this.

Finally, Obstfeld emphasized the importance of international cooperation and coordination through the interconnectedness of financial markets and the complexity of the international financial system. Thus, despite all uncertainties associated with flexible exchange rates, Obstfeld holds a deep conviction that it should be a choice by central banks that have internal targets. Moreover, to ensure financial stability in addition to the adequate monetary policy, countries should apply macroprudential regulation with particular efficiency. In this way, the efforts of national regulators only may be insufficient to achieve results, so international coordination and collaboration in this area should deepen. This will be facilitated by the Financial Stability Board and the Basel Committee, which allow for improving the quality of macroprudential supervision at the international level.

Answering questions during the follow-up of the report, Obstfeld pointed out the important role of structural reforms, without which monetary policy or macroprudential regulation are only the “second best” instruments. Additionally, while outlining the role of the IMF and other international financial institutions, Obstfeld emphasized the importance of countries creating their own protective buffers, including international reserves.

RESEARCH SESSION 3. MACROPRUDENTIAL POLICY AND FINANCIAL FRICTIONS

Marcin Kolasa (Narodowy Bank Polski) presented the research study *Could the Boom-Bust in Eurozone’s Periphery Have Been Prevented?* carried out with co-authors from Narodowy Bank Polski **Marcin Bielecki**, **Michal Brzoza Brzezina**, and **Krzysztof Makarski**. The authors examined the problem of cyclical dynamics of demand in eurozone countries in recent years, and the optimal macro-prudential policies governing these fluctuations.

The researchers found a significant concentration of internal imbalances in real estate markets in most Eurozone countries, which, in turn, had a significant impact on other sectors of the European economy. As a result, the risks and pressure on the euro exchange rate grew. Analyzing the residential mortgage sector, as a part of the European economy with significant asymmetry, the authors determined that problems in this sector were the catalyst at the onset of the financial crisis in European periphery countries in 2008. Under such conditions, a common monetary policy and a single ECB key interest rate for countries with different economic structures and development of their financial markets led to significant macroeconomic imbalances. Authors modeled the optimal monetary and macroprudential policy for the eurozone countries while considering their participation in monetary union and structural differences.

According to the researchers’ conclusions, the effective implementation of monetary policy requires flexible management of the key interest rate. At the same time, exclusively utilizing monetary policy instruments of at the level of the eurozone cannot ensure domestic macroeconomic balance of the peripheral European countries. Optimal macroprudential policy foresees the required potential to relax the credit cycle in the periphery countries, thus reducing the impact of imbalances. Effective implementation of these policies provides a solution to the problem of imbalances in the periphery countries of the eurozone. New rules for monetary and macroprudential policy should be optimized in order to avoid imbalances and to create additional buffers to prevent the impact of shocks.

Igor Livshits (University of Western Ontario) presented results from the research paper *Sovereign Defaults and Banking*, prepared in collaboration with **Koen Schoors** (University of Ghent). In this research, the scholars presented a model with the assumption about sovereign default using the examples of Russia and Argentina.

The main objective of the research is to develop approaches to prudential regulation to prevent the occurrence and realization of banking risks. The authors examined this question in the context of determining the exposure of assets, particularly for government securities. This is especially important because of the increase in the number of countries where government bonds cannot be classified as low-risk and profitable. Examples include the sovereign defaults of Russia in 1998 and of Argentina in 2001. The speaker emphasized that one of the key causes of the default in Argentina was a change by the government, at the legislative level on the conditions for purchasing government bonds leading to risky speculative activities by banks.

The main conclusions based on the results of the research lie in the necessity of providing high-quality prudential regulation. If high-risk government bonds in the market are considered to be safe, it leads to increased risks in the banking system and becomes the cause of the banking crisis. Under the condition of proper prudential regulation and the absence of excessive debt, the risks of sovereign default are minimal.

Concerning the prudential supervision under different conditions and patterns of central banks, the researchers found that important factors of quality and efficiency of macro-prudential regulation are imbalances (risky governmental policies, banks, etc.) that provoke a crisis. In their research, the authors point out different approaches to prudential regulation that will enable advance detection of high-risk speculative activities in the banking sector. Summarizing the results, Livshits said that prudential regulation must be realistic, establish the dependence of the capital adequacy coefficient on the volume of investment in government bonds, and consider all potential risks.

POLICY PANEL 1. CAPITAL FLOWS MANAGEMENT

NBU Deputy Governor **Oleg Churiy** opened the first Policy Panel with a presentation entitled *Ukrainian Experience With Capital Account Liberalization*. He pointed out that 20 years ago, control of capital movement was considered an anachronism and the free movement of capital was seen as the best solution for countries that had limited capital. The financial crisis clearly demonstrated that complete rejection of control over capital flows was premature. Managing capital flows currently is an instrument to ensure financial stability. Therefore, it is no substitute for conducting macroeconomic reforms, but strict measures allow short-term stabilization of the situation and the ability to buy time.

The speaker outlined three main priorities according to which liberalization of capital movements will be implemented in Ukraine. The first is to promote economic growth and production, particularly through liberalization of foreign direct investment and the current account. The second is the development of the financial market and increasing its liquidity. The central bank has gradually shed its function as a principal market participant and became the market controller. The third is to attract long-term equity and debt capital, and to increase Ukrainian investment abroad in the long-term perspective.

Regarding the strict administrative measures on the foreign exchange market introduced in recent years, Ukraine's experience of capital flows regulation can be used only in extraordinary situations. All measures taken by the central bank were appropriate to the situation in the country's economy. The central bank can apply some restrictive measures on capital movements even after the transition to a more liberal model, but already as macroprudential policy instruments. However, in the case of Ukraine, any restrictive measures are always negatively perceived by the market, despite the fact that they are aimed to limit devastating capital outflows or inflows.

Andrew T. Levin (Dartmouth College), in his presentation on *Capital Mobility and the Design of Monetary Policy Frameworks*, stressed that central banks should be protected from fiscal dominance or political influence, and they should have operational independence rather than be subordinate to the executive government. A central bank needs to have a legal mandate and clear objectives for policy implementation since it should be accountable to the government and the public. The public should be confident in the actions of its central bank to successfully implement policy, particularly in key strategic decisions.

The speaker pointed out three basic principles that are of importance for the implementation of monetary policy for a very wide range of countries from low-income countries, to developing, and the most developed countries.

The first fundamental objective of a central bank of a country with its own currency is to maintain the stability of its currency and high public confidence therein. This means price stability, and, consequently, anchoring of inflation expectations, which is expressed in the presence of medium and long-term goals. The population must understand that goal and see that the actual inflation rate is gradually approaching the target rate. The experience of many central banks, including New Zealand's central bank, showed that the concentration of efforts just on an inflation target in the short-term is a mistake because central banks have to achieve multiple objectives simultaneously, including to support economic growth and improve living standards.

The second principle is that a central bank should conduct interventions on the foreign exchange market only in case of an emergency. Its intervention should be transparent and systematic, and can only be justified in exceptional cases where it is necessary to smooth out a high amplitude of exchange rate fluctuations.

The third principle states that the use of macroprudential instruments is critical, no matter who applies them: the central bank, the government, or other public institutions. This principle is crucial to financial stability and ensures that monetary policy does not contradict the fundamental objectives of financial system stability.

Thus, an important part of the implementation of a central bank's policy is effective communication with the public and raising public awareness in implementing monetary policy, exchange rates, and operational independence, as well as justification and explanation of its decisions. The speaker stressed that a central bank should have at its disposal a variety of plans to minimize risks in different circumstances.

Marek Dabrowski (Bruegel), in the presentation on *Managing Capital Flows in a Globalized Economy*, stressed that the barriers to capital flow slow down economic development in a global context. In his view, constraints on capital flows cause damage to small and medium enterprises, and affect large companies to a much lesser degree.

The speaker considered the two most important implications of actually fully-open capital markets for balance of payments and monetary policy.

Traditionally, prior to liberalization of capital movements, experts focused their attention on the current account, issues of competitiveness, trade policy, and the exchange rate. Only at the next stage the problem of financing the current account deficit was raised. Once the time for the free movement of capital came, causality relationships reversed. Now, the movement of capital is exogenous in nature, while the current account is adjusting to changes in the financial account through the exchange rate. Thus, recent currency crises in CIS countries are attributable to the outflows in the financial account. Therefore, the question arises: if there are no instruments to control capital flows in countries, how can the capital account be affected otherwise? According to Dabrowski, such leverage exists, but their influence is very limited and unpredictable. These instruments include macroprudential regulation and monetary and fiscal policy.

As for monetary policy, issues related to free movement of capital lie in the fact that the monetary supply in a country is becoming a largely dependent variable. Moreover, significant exchange rate fluctuations provoke unintended and unwanted adverse effects on financial stability, competitiveness, and the real economy, and in cases of significant depreciation reduce confidence in the domestic currency. In addition, the majority of the world's economies are influenced by monetary decisions of the Federal Reserve System and the European Central Bank, which lead to increased volatility of capital flows and imported inflation.

Linda L. Tesar (University of Michigan), in her presentation entitled *Weighing the Costs and Benefits of Capital Market Integration*, tried to answer the question of how the financial crisis forced us to rethink the capital market integration.

She identified three main factors among the potential benefits for capital market integration. The first is a gain in efficiency, which is to stimulate the outflow of capital from economies with a capital surplus to economies that need it the most, thus reducing capital costs. Moreover, the efficiency in the financial sector increases as a result of higher competition. The second factor is increased stability thanks to smoothing fluctuations in the national income (consumption), a higher level of diversification and risk management, better "market discipline," and facilitating better information exchange. The last positive factor is higher economic growth through savings mobilization, increasing profit rates, aligning revenues with relatively more developed countries in the short-term, and the exchange of technology through an investment in the long-term.

However, contrary to the theory, capital redistribution between developed countries and developing countries did not occur after the liberalization of capital movements. The majority of capital flows continue to pass through developed countries. Moreover, easing of consumption fluctuations in developing countries was very limited; capital flows in these countries are generally pro-cyclical, so they even increased volatility.

The latest global crisis has confirmed the relationship between the degree of openness of financial markets and vulnerability to external factors such as sudden stops, currency crises, the effects of contagion, and a lack of lenders of last resort. Thus, the role of the financial sector needs to be rethinking, as it was the main source of instability in developing countries, but developed countries still did not consider such risks. Also, taking into account all the potential benefits, the role of capital controls must be revised. Governments should give more attention to financial regulation and global cooperation, the role of public debt, and the efficiency of the financial sector, but prudent public policy should be paramount.

Philipp Hildebrand's opening remarks

Vice Chairman of BlackRock investment company, **Philipp Hildebrand**, opened the second day of the conference with his presentation *Are Central Banks Out of Ammunition?* Its main point is to evaluate how effective the actions of the central banks in developed countries are in conditions of low inflation and weak economic growth.

A special feature of the current economic situation in developed countries is extremely low inflation, which did not exceed 2% per year starting from 2013. Recognizing that maintaining the inflation rate at the desired level is necessary for economic growth, central banks combined keeping *key interest rates* at zero, in some cases even at a negative level within their assets redemption programs. This policy was effective since almost all developed countries showed signs of recovery in economic activity, which was a result of financial conditions easing. In addition, these central banks' actions prevented a turn in price and wage deflation in these countries, which combined with high levels of public and private debt would have had really disastrous consequences for their economies.

Nevertheless, inflation in developed countries has remained at an extremely low level for very long periods of time. Even more important is the fact that market interest rates also continue to decline, which significantly increases the amount of the

sovereign debt market with a negative yield. This situation is largely due not only to low interest rates set by central banks, but also both insufficient private and public investments, the volume of which is substantially lower than the current savings. Uncertainty is caused by investors' negative assessments of the level of future income that can be derived from investments.

What are the scenarios for ending low interest rates and the deflationary period?

The first scenario involves actual continuation of the current situation, the main feature of which is the surplus of savings over investment for a long period of time. Such an economic state is characterized by low economic growth, inflation, and interest rates, which may cause a new price "bubble" on certain assets. However, gradual recovery of the US and German labor markets, the countries most affected by the crisis, indicates the probability to exit the recession through acceleration of investment activity.

The second scenario assumes a recession exit with the aid of prudent fiscal incentives and, more importantly, structural reforms that stimulate investment growth.

Summing up the speech, Hildebrand noted that the result of central banks' activities is the development of prerequisites for economic growth in the country. However, these efforts must be supported by appropriate government policies. Otherwise, central banks' actions to overcome the crisis independently may involve significantly more time and effort.

POLICY PANEL 2.

INSTITUTIONAL BUILDING OF THE MODERN CENTRAL BANK

Opening the second Policy Panel, its moderator, **Marco Škreb**, pointed out that the specificity of the central bank's operations changed very rapidly due to the dynamic changes of external environment and associated challenges. Speakers of Policy Panel 2 provided their answers to the questions of what changes should be made and in what manner in order to ensure effective functioning of the central bank, bearing in mind that the central bank in each country is a legitimate monopoly.

The transformation features of the central bank in order to increase efficiency in its activities were outlined in the presentation titled *Transformation of the NBU: The Big Bang Practice* by NBU Deputy Governor **Vladyslav Rashkovan**. The NBU was urged to fully reform its activities in the context of deep financial crisis, a sharp drop in GDP, exchange rate depreciation, and the institutional weakness of the banking system. Amid the most important steps the speaker defined were elimination of non-core functions, organizational structure reform, redesign of decision-making processes, and implementation of new approaches, including focusing on the core functions, centralizing many functions, and intensifying the analytical component of decision-making.

The ultimate transformation goal is that the NBU shall become an effective modern regulator and a member of the family of European central banks. A lot has been done to this end, and the NBU is gradually becoming a legitimate professional, transparent organization that enjoys growing public trust, more open to the country and the world.

Rashkovan also stressed that the NBU's mission is to ensure price and financial stability that will promote economic growth in Ukraine. The goals are ambitious, and they are gradually being implemented. The NBU continues working on capital accounts liberalization, implementation of IT, research function development, a clear vision of what the central bank should be like, and changing corporate culture, particularly in defining the mission, vision, and values of the organization. As a result of the transformation, the NBU will become a powerful institution that will have a significant impact on the formation of favorable government economic policy.

Emma Murphy (Bank of England), in her presentation *The Role of Culture, Engagement, and Communication Challenges in Transforming Modern Central Banks*, considered the development of corporate and organizational culture as a necessary component of the successful operation of a central bank. The Bank of England has a very distinct and strong corporate culture, and all employees are proud to be part of the institution. An integral part of the transformation of a central bank is creating an organizational culture that should be part of the central bank's policy. Employees should have a clear common goal, the achievement of which should unite them. Unfortunately, changing corporate culture is a long-term and painstaking process.

The Bank of England recently developed a mission that unites all goals in one - improve the welfare of British citizens through financial and monetary stability. The mission establishes a single command and determines the central bank's accountability to the public. Shared values motivate people and determine what is most important in their work; they encourage employees to act towards a certain direction. Values also help change the system of quality management. They should be fundamental components ensuring the achievement of the desired result.

The Bank of England has implemented internal communications to support and implement solutions, such as video broadcasts. Effective internal and external communications is a key component for the successful transformation of the structure and implementation of innovation. The program of implementing changes also requires effective external communications provided by an informational group since the central bank has qualified professional economists who are largely introverts and not effective communicators. Given the fact that some employees may internally oppose changes, they should be involved in the process so that they not only experience these changes by themselves, but also play a role in providing changes.

The specific use and control of central banks' financial resources was examined in *The Finances of Central Banks* presentation by **David Archer** (Bank for International Settlements). New challenges facing central banks are prerequisites for changing their structure. First of all, independent funding is necessary to ensure successful reforms as it enables the pursuit of independent policies.

Independent funding secures functional independence. Central banks have to distance themselves from politicians and establish independent sources of financing and funds, as well as pay attention to the impact of weak budget constraints to reduce financial risks. The strong financial position of a central bank is important in terms of ensuring its independence. Each central bank's policy should be analyzed in terms of benefits and its total cost, because the activity of a central bank directly affects the state of public finances. Public financial resources deposited at the central bank are part of the so-called "deal with the public," so the money should not be jeopardized in any case.

As known from practice, under certain circumstances central banks may be insolvent. To prevent this, capital should be accumulated, properly classified, and distributed while the format and mechanism of the recapitalization of the central bank and transfer of financial risks from the central bank to the treasury shall be legislatively regulated (application of non-standard policies involves high risks). In order to establish the political legitimacy for the actions of central banks, there is a need to conduct direct negotiations with the government. When making decisions on capital and liabilities of a central bank, it is necessary to exclude dividend distribution issues (the problem of asymmetric distribution). Archer provided the example of the Swiss National Bank, which took all of these steps, i.e., its case is the best example of the use of a complex system approach to manage their own finances.

At the end of the presentation, Archer said that budget constraints for the central bank were inevitable, but useful as they promote efforts to achieve priority objectives, including ensuring price and financial stability.

Andrei Kirilenko, lecturer of the Imperial College of London Business School, suggested to view his presentation *New Technologies, that Central Bankers Need to be Aware of* in the prism of a generation of innovation and money circulation in various forms.

Recently, the Bank of England and the People's Bank of China have presented their own development – cryptocurrencies, which gave grounds for global media to state that central banks seized the bitcoin championship. Some central banks provide an opportunity for customers to hold cryptocurrency accounts, which is a leverage distribution technology. As far as a central bank is an institution trusted by market participants, its involvement in cryptocurrency production allows working in a niche, which is now independent of the central market. The regulator can quickly analyze the situation to get information on where cryptocurrency is placed and in what amount. This also allows for quick and efficient distribution of money, conducting unconventional monetary policy, and directing cash flows accurately to where they are most needed.

Kirilenko thoroughly analyzed the functioning of blockchain technology, which provides central banks opportunities employed by other market participants. These technologies are implemented in corporate decisions regarding property rights, and they are increasing in the segment of implementation of verified financial transactions and secure payments. While most central banks ignore the technology, it develops independently of the regulators' influence. Currently, there is no regulatory framework for such technologies, and the attitude towards them differs ranging from neutrality, to interest, to concern, and rejection. The UK and US regulators demonstrate the most practical interest for innovation. For example, the issuance of special bit licenses was announced in New York state.

The speaker drew conclusions as for the availability of objective prerequisites to apply technological innovations in central banks. Building an infrastructure based on blockchain technology payments can reduce expenses, increase the level of trust, and create real competitive advantages for Ukraine. The central bank, if necessary, can be at the head of innovation that provides a tremendous opportunity for the implementation of monetary policy and financial stability on a new basis using new instruments.

When asked about the prospects for the development of an open-source platform and launch of cryptocurrencies and their exchange by different countries, the speaker underlined that blockchain technology and the corresponding Internet protocol that ensures its operation is a revolutionary way to store and transmit value rather than to store and transmit information about a certain value. These technologies are changing lives as they have great potential. Therefore, the natural solution is not prohibition, but joining this process and using its potential, particularly open-source technology, which provides all participants with an opportunity for consensus on the system architecture. Participation in such a consensus is not a matter of the distant future and can be a starting point to ensure financial stability on a brand new platform.

The speaker also referred to a quote voiced by Larry Summers during a conference at the US Department of Treasury that central banks could soon be comparable with the private sector in terms of currency issuance. This can lead to negative or zero interest rates for a long time since competition evolves between the public and private sectors in the issuance various forms of currencies that are demanded and trusted in a modern world, i.e. are capable of operating autonomously on certain platforms in certain communities, such as the Internet environment. In this context, central banks have faced the real challenge of monopoly on the issuance of various forms of money in circulation. Central bank has a choice to respond to the challenge with a ban or to act proactively by mastering new technologies.

RESEARCH SESSION 4. ISSUES IN MONETARY TRANSMISSION MECHANISM

The fourth research session was opened by **Oleksandr Faryna** of the NBU, who presented the research work titled *Exchange Rate Pass-Through and Cross-Country Spillovers: Some Evidence from Ukraine and Russia*. The issue of the impact of the exchange rate pass through is of particular importance for countries with small open economies, including Ukraine, characterized by high sensitivity to external disturbances.

The issues of direct and indirect effects of exchange rate pass through in theoretical and empirical studies are considered as “isolated islands” where the impact of external shocks on domestic prices is one-sided, and the probability of transmission of the shocks between countries is not taken into account. Meanwhile, the financial and economic relations between countries are characterized by close trading, financial, and other relationships that have an impact on the extent and value of the effect of the exchange rate pass through. In particular, strengthening of the exchange rate in accordance with theoretical assumptions helps to reduce the price level in one country, and the depreciation processes that evolve at the same time in another country aggravate inflation. At the same time, the growth of domestic prices in one country entails the growth of prices for imported goods to another and thus compensates for the effect as a result of appreciation.

Faryna proposed a bilateral vector autoregressive model that allows for considering the effect of transferring the exchange rate based on market and foreign trade relationships between countries using the example of Ukraine and Russian Federation. According to the research results, cross-country spillovers should be considered where the effect of transfer of the exchange rate for Ukraine is evaluated. In particular, the result of the Russian ruble depreciation against the hryvnia is an increase in domestic prices in Ukraine, indicating the presence of additional trade spillover channels. In addition, according to the alternative model, which includes the ruble and US dollar exchange rates, it was found that the ruble depreciation is a source of weakening of the hryvnia, including through joint competition on foreign markets. Considering the results, the NBU should also take into account the influence factor of the Russian economy on Ukrainian consumer prices when making decisions to achieve inflation targets.

Bartosz Maćkowiak of the European Central Bank presented the research work *Monetary-Fiscal Interactions and the Euro Area's Malaise* in collaboration with **Marek Jarocinski** (ECB). The most important issue raised in the research is the relationship between monetary and fiscal policies and their impact on macroeconomic results in the eurozone during the “great recession”.

In their research, the authors apply a simple general equilibrium model with rigid prices and a single monetary regulator that aims to achieve inflation targets and acts in accordance with the Taylor Rule subject to the lower border of the interest rate. However, the model takes into account two fiscal authorities which refer to the countries of the “North” (Germany, France, the Netherlands) and “South” (Italy and Spain) for simplification and assume the default probability of their debt securities. Fiscal authorities are seeking to stabilize the debt level by means of correcting the primary budgetary balance and experience default in cases of excess in the level of debt on a certain upper limit. According to the authors, this simple model specification allows for displaying the basic features of implementation and coordination of monetary and fiscal policy in the eurozone, as evidenced by the results of the simulation of the model and their similarity with historical data.

Proceeding from the basic model, the authors conducted an experiment that provides for an alternative method of coordination of monetary and fiscal policy. The main feature of the alternative model specification takes into account the involvement of a new centralized pan-European institution that has the authority to buy debt securities of certain financial institutions and also issues its own debt securities (payments on which are ensured by the monetary regulator, so there is no risk of default on such securities). Thus, in the case of achieving the lower border of the key interest rate, monetary policy becomes passive and fiscal institutions act in accordance with established functions of fiscal policy reactions and increase the primary budget surplus in accordance with the general debt level in the eurozone. The experimental model's results showed that the use of the suggested approach to the coordination of monetary and fiscal policy would considerably improve macroeconomic results and avoid a long period of recession in the eurozone.

In his report entitled *Rules Versus Discretion in Monetary Policy Conduct. Lessons for Ukraine*, **Alex Nikolsko-Rzhevskyy** (Lehigh University) considered separate approaches to monetary policy and outlined the main advantages and disadvantages

of their adoption in Ukrainian realities. In particular, the author compares monetary policy based on the established rules and discretionary policy where the monetary regulator is more focused on current economic conditions than on predetermined rules.

As the speaker noted, the system of rules applied allowed for increasing the transparency of the monetary regulator and secure long-term inflation expectations on one hand. In this context, the Taylor Rule, which implies a change in the interest rate in response to deviations of inflation from target level and the actual level of output from its potential, is classical. Discretionary policy, on the other hand, is more flexible, can include a much greater spectrum of information, and is independent to structural changes in the economy. A comparison of these approaches occupied a central place in macroeconomic studies that were intended to answer questions about the effectiveness of rules and discretion in certain historical periods. However, existing studies determine such periods mostly in an exogenous and subjective manner, and that is why evaluations of the effectiveness of certain approaches are contradictory.

Using the US Federal Reserve policy as an example, the author endogenously separates the periods of minor deviations of the US Federal Reserve rate from the calculated value of the interest rate in line with the classic Taylor Rule, which correspond to “*rules periods*”, as well as the periods of significant deviations being considered as “*discretionary periods*”. The researcher assessed the effectiveness of monetary policy in these periods based the loss function, and the results obtained were better in periods when monetary rules were used rather than in periods of discretionary policy.

In his opinion, the findings can be used to form an effective monetary policy in Ukraine. Despite the reform and purification of the banking sector, IT implementation, updating and simplifying the instruments of monetary policy, the main challenges for the NBU remain relatively high inflation expectations, significant differences in regional development, lack of trust in the monetary regulator and a false understanding of the goals of monetary policy by investors and the public. The establishment of a monetary rule will help improve confidence in the regulator and the transparency of monetary policy, reduce political pressure on the NBU and fix inflation expectations.

Following the report during a question and answer session, the participants discussed to what extent a central bank’s policy, based on IT regime (including the NBU), can be considered discretionary. According to the speaker, for a central bank to be classified as one that applies strict rules, public awareness and approval of such rules is necessary. However, according to representatives of central banks using IT, raising public awareness of the goals and explaining changes in their operational instruments already implies following monetary policy rules.

POLICY PANEL 3. CHALLENGES FOR INFLATION TARGETING

Opening the third Policy Panel, its moderator, **David Vavra** of OGREsearch, noted that IT regimes proved successful not only in developed countries, but also in emerging market countries. In his opinion, Ukraine’s accession to the club of countries with an IT regime is the right step.

For almost 30 years of IT regimes, its basic characteristics remained unchanged: quantitative inflation target, institutional independence and transparency of the regulator, and a flexible exchange rate of the national currency. However, the macroeconomic environment changes with time, so IT implementation is country-specific.

NBU Deputy Governor **Dmytro Sologub**, in a report titled *NBU in the Transition to Inflation Targeting*, outlined how the central bank should implement the new monetary regime.

In his view, the transition to IT was the only way out of the crisis, which was the result of almost twenty years of fiscal dominance and fixed exchange rate of hryvnia. However, the introduction of IT did not start from scratch. Some developments took place, but there was lack of political will to implement IT. Sologub thanked colleagues from Canada, New Zealand, Poland, the Czech Republic, and Sweden for sharing their experiences in decision-making at the central bank and the assistance in implementing the necessary changes.

One of the main results of the NBU’s work in the past 12 months is development of a strategy for implementing the IT regime and publishing the objectives of the NBU. The approved strategy is already bringing positive results: inflation is gradually decreasing and getting closer to target levels. By the end of 2016, consumer inflation in annual terms should be about 12%, and about 5% by the end of 2019. The system of decision-making has changed with the newly established Monetary Policy Committee operating effectively. The process of developing an effective monetary transmission mechanism is ongoing; operational design of the interest rate policy is qualitatively changing.

The practice of implementing an IT regime in Ukraine shows that its success is largely determined by the presence of political will for change. No countries had fulfilled all the prerequisites for transition to IT. These conditions are usually created during the implementation of the new regime.

The speaker noted that the impact of the central bank on the economy was not absolute, so structural changes are necessary for the successful implementation of IT. Only comprehensive measures by the government and the central bank will contribute to the achievement of price and financial stability.

The detailed report *Inflation Targeting in Emerging World: Lessons from Poland* was presented by member of the European Parliament **Dariusz Rosati**, who was directly involved in the establishment of this monetary regime by Narodowy Bank Polski.

The development of a plan for Direct Inflation Targeting implementation began in Poland in 1997, immediately after the adoption of the Law *On Narodowy Bank Polski*. This law granted full independence to the central bank and defined its main objective as ensuring price stability. In 1998, in order to achieve price stability Narodowy Bank Polski established a new body called the Monetary Policy Council. Despite the fact that direct IT was introduced in Poland in 1999, the country maintained a controlled exchange rate of the zloty until 2000.

The conditions for the transition to IT in Poland were not ideal. Years of hyperinflation had passed before IT was implemented. It was necessary to make considerable efforts for a long time to reduce inflationary expectations. The impact of non-monetary inflation was very significant. There was a significant excess of liquidity at the banking system, which hampered the work of the monetary policy transmission mechanism. At certain times, monetary instruments were supplemented by restrictive measures to reduce inflation.

After lowering inflation to a moderate level, an independence of regulator and forecasting were the basis for the further successful implementation of the strategy. To prevent accusations of manipulation, Narodowy Bank Polski published its forecasting methodology. However, since there is no model that would project with high probability all of the possible impacts on the economy, the Monetary Policy Council could always use a flexible approach in determining the level of the key rate. Thus, transparency has been and remains an important part of the success of IT.

According to Rosati, the lessons Ukraine can learn on the Polish experience in implementing IT are as follows: IT proved to be effective in emerging markets. During the early stages of transition economies, inflation is determined mainly by non-monetary factors that reduce the effectiveness of monetary policy. Their effectiveness also depends on the level of monetization and lending. IT is more efficient to maintain inflation in a certain range, not to reduce it from higher levels. The optimal range of inflation targets should not be too narrow to preserve the possibility to pursue a flexible monetary policy. Going beyond the target range negatively affects the central bank's credibility. An obligatory component of successful achievement of inflation targets is consistent adherence to the chosen communication strategy. The bank's policy must focus on the future. The mid-term objective is a key component of the strategy, while short-term objectives are complementary.

At the end of the report, Rosati noted that the development of the global financial crisis showed that IT is not a panacea. It is impossible to solve a number of problems in the economy exclusively by regulating the amount of money, in particular to prevent the emergence of "bubbles" in some markets. In his view, such an instrument is insufficient to ensure both price and financial stability. To attain and maintain financial stability, the central bank should probably have more instruments, and, perhaps, for this purpose another independent agency should be established.

Deputy Governor of Sveriges Riksbank **Per Jansson** presented a report themed *Contemporary Inflation Targeting: Time to Change?* In the 1990s, economic conditions for the implementation of the IT framework in Sweden were unfavorable. The economy was overheated, salaries and social benefits grew steadily, unemployment was declining, inflation was high enough, people were waiting for depreciation, and the country's debt grew. However, due to implementation of structural reforms, particularly in fiscal policy, the country's economy was balanced. The preconditions for implementation of IT were created. The preparatory period continued for 5 years.

It is also important that a central bank does not complicate the transition to IT. It is particularly undesirable to start public dialogue about a new monetary regime with the publication of inflation reports intended for analysts. Information should be clear and accessible for most people. The information strategy should be reasonable. It needs to be open, but the path to this target should be gradual. Additionally, it is important to skillfully use the trust of society.

Jansson also said, "Do not pretend that you can do more than you actually can". One should avoid generating expectations that are impossible to fulfill since failure will lead to frustration and loss of credibility. It is necessary to develop an action plan in case of deviations from the inflation target in advance. In the case of IT, it is more important to achieve the desired inflation trend than quantitative targets.

After reaching intermediate or ultimate targets, the central bank has to understand that it must constantly maintain the trust of the public and businesses. To this end, Sveriges Riksbank systematically publishes minutes of monetary policy meetings and reports on monetary policy that contain forecasts. Forecasts require particular attention. They should be treated with due care. "You are responsible for all the data you publish. The openness of the central bank and trust from the public ensured the success of IT in Sweden", Jansson said.

A Canadian Queen's University representative, **John Murray**, focused on the important aspects of practical implementation of IT in his research study entitled *25 Years of Inflation Targeting: View from Canada*. According to him, despite the differences between developed countries and countries with emerging markets, the differences in the implementation of IT by central banks of these countries are not fundamental in practical terms.

In addition, there is no need to overcomplicate the IT regime. "Inflation targeting is really very simple. It only involves being clear, being public, explicit. It is simple and yet very important, because it disciplines your own behavior as a central bank, ensures accountability, and helps to adjust the expectations of the public and businesses. Transparency is an important component of a successful policy," Murray said.

As time has shown, an IT regime proved to be the most effective for Canada (compared to the previous monetary regimes). Murray describes the features of the IT regime in Canada in different periods: before the global financial crisis, in its course, and in post-crisis times.

Canada is the second country in the world after New Zealand, which implemented IT on the advice of the government and one of the first since World War II, that established a flexible exchange rate of national currency. Initially, the process of implementation of IT was criticized and distrusted. Even the IMF believed that the implementation of IT was not a reasonable solution. Over time, the position of society and the IMF changed, but it happened only after the performance of IT exceeded expectations. Declines in production slowed down and interest rates stabilized. The speaker also stressed that one of the prerequisites of IT success in Canada were realistic targets and cooperation between the central bank, the government, and the public.

At the end of the report, Murray considered the feasibility of raising inflation targets. Currently, the prospect of targeting price level is widely discussed among experts. This area has great potential to enhance the effectiveness of monetary policy of the central bank. He also noted that there was evidence that unconventional monetary policy proved effective, and therefore new creative instruments at the disposal of central banks had great prospects.

RESEARCH SESSION 5. ISSUES IN LABOR MARKET AND BUSINESS CYCLES

Marianna Kudlyak (Federal Reserve Bank of San Francisco) presented the research work *Measuring Resource Utilization in the Labor Market* in collaboration with **Andreas Hornstein** (Federal Reserve Bank of Richmond) and **Fabian Lange** (McGill University, Canada).

The labor market situation is always an area of close attention for the US government both at the level of each state and at the federal level. In particular, the main goal of the US Federal Reserve System is to ensure a high employment rate combined with low inflation. Since 2007, there is a contradictory situation in the US: a decreasing unemployment rate combined with a reduction of participation of labor. Therefore, the question is whether there is underutilization of resources in the labor market in the US. In order to deepen the analysis of this question, the authors developed the Non-Employment Index of Hornstein-Kudlyak-Lange (NEI) based on the results of monthly surveys of 160,000 households conducted by the Bureau of Labor Statistics of the Department of Labor.

The main differences between the NEI and the standard unemployment rate are that the NEI takes into account not only the unemployed, but also persons out of the labor force (persons excluded from the labor force, including the unemployed who have stopped searching for work, pensioners, students, disabled persons, and the rest of the unemployed persons referred to as a separate group). Different groups of unemployed and persons out of the labor force are included in the calculation of NEI with regard to their weight, defined as the probability of the return of these population groups into labor market, including people who work part-time. Studying the probability for each group of unemployed to find a new job allows for the development of a strategy for their further employment.

A direct relationship exists between actual unemployment and NEI. In particular, before 2007 and after 2013, NEI and the actual unemployment rate provided for similar measurement of labor utilization. However, throughout 2007-2013, the actual unemployment rate index overstated the underutilization of labor.

Yuliya Demyanyk (Federal Reserve Bank of Cleveland) presented research in collaboration with **Elena Loutschina** and **Daniel Murphy** of the University of Virginia themed *Can You Cure Debt With More Debt?* High levels of consumer debt significantly contributed to the depth of the recession in 2008 and further held back economic recovery. The basic research questions include: Can the fiscal policy be effective when households are compelled to refuse loans? Is it possible to mitigate the adverse effects of consumers' debt burden?

As defense spending in the United States ranks third among government spending after the health and social insurance, the research proceeded from the analysis of data on US Department of Defense spending in 1966-2006 (at the level of individual contracts, which included the amount and term of contract, and also the state where the contract was implemented). Defense spending is entirely dependent on political will, so the peaks of such spending occur during periods of military campaigns and are independent of regional conditions. This allows for assessing the impact of fiscal policy on economic growth under conditions of different levels of household debts in each state.

According to model calculations, the fiscal multiplier is higher in the regions with higher levels of consumer debt. Thus, stimulating fiscal policy is effective even with a significant debt burden on households in recession. However, there is not enough evidence that the economy is stimulated through the mechanism of expanding consumption.

Ilkka Korhonen (Institute for Economies in Transition, the Bank of Finland) presented the research work themed *Analysis of Business Cycles of China and Its Impact on the Rest of the World*, which was done based on a meta-analysis of more than 70 studies by other authors. The main point of the research is to assess the impact of the deceleration in economic growth in China or the Chinese economy's rebalance on the development of other countries.

The research was conducted on two main scenarios: a "hard landing scenario," which involves growth of the share of consumption in GDP by 5 percentage points and a "rebalancing scenario" in which China's GDP growth will not exceed 5%, and the share of consumption in GDP will increase by 1 percentage point. The "hard landing" will have the greatest negative impact on the GDP of Asian countries and Australia, and a more moderate impact in the eurozone, Russia, and the US. Also among the economic sectors, the most affected are construction, mining, and processing industry, while growth in the service sector and agriculture will accelerate. Thus, China's business cycle closely correlates with the situation in other countries, especially Asian countries and the US. Changes in China will have different effects on the economies of different countries and different sectors, but, as long as China's economy grows, the impact will be positive.

An important channel of China's influence on other countries' economies is the financial channel. Possible liberalization of capital movements by China will have a significant impact on the financial markets of both developed and emerging economies, and for a long period of time. Although global financial liabilities will almost not change, the flow of capital from China to other countries and the inflow of speculative capital into China, as well as change to the size of international reserves can occur. The pure effect is currently difficult to assess, but the portfolios of assets and their relative prices will change. Thus, study of the influence only through the trade channel is insufficient. The spreading of financial vulnerability from China to other parts of the world now is quite likely given the development of financial ties.

Timofiy Mylovanov of KSE made closing remarks for participants. He noted that Ukraine is changing qualitatively and holding the first Annual Research Conference of the NBU evidences this. Ukraine needs high quality economic studies to make informed and balanced decisions. The NBU can be a driving force for their production.

References

- Armenter R. (2013). The Perils of Nominal Targets. Working Paper, No. 14-2, FRB of Philadelphia. <https://doi.org/10.2139/ssrn.2368471>
- Carvalho C., Eusepi S., Moench E., Preston B. (2015). In Search of a Nominal Anchor: What Drives Long-Term Inflation Expectations? University of Oregon. The Department of Economics. Available at: https://www.philadelphiafed.org/-/media/research-and-data/events/2015/dsge-models-workshop/papers/carvalho_eusepi_moench_preston.pdf?la=en
- Dedola L., Nakov A. (2014). State-Dependent Pricing and the Paradox of Flexibility. ESSIM.
- Fidrmuc J., Korhonen I. (2015). Meta-analysis of Chinese business cycle correlation. BOFIT Discussion Papers, No. 480, Bank of Finland, Institute for Economies in Transition.
- Gorodnichenko Y., Sheremirov V., Talavera O. (2014). Price Setting in Online Markets: Does IT Click? Working Papers, No. 20819, National Bureau of Economic Research, Inc.
- Hornstein A., Kudlyak M., Fabian L. (2014). Measuring Resource Utilization in the Labor Market. Economic Quarterly, Federal Reserve Bank of Richmond, Issue 1Q, pp. 1-21.
- Livshits I., Schoors K. (2009). Sovereign Defaults and Banking. University of Western Ontario. Working Paper.
- Nikolsko-Rzhevskyy A., Papell D., Prodan R. (2013). (Taylor) Rules versus Discretion in U.S. Monetary Policy. Working Papers, No. 2013-198-44, Department of Economics, University of Houston.
- Obstfeld M. (2015). Trilemmas and tradeoffs: living with financial globalization. Working Papers, No. 480, BIS. Available at: <https://www.bis.org/publ/work480.pdf>