підприємства, що також включена у модель, стимулювати збут продукції та ефективно управляти дебіторською заборгованістю, що існує у компанії у той чи інших момент часу.

Ефективність роботи персоналу також безпосередньо впливає на підприємство. З організаційної підсистеми можна визначити чи є склад персоналу оптимальним, визначити ефективність заробітних плат, поліпшити системи підготовки персоналу і загалом удосконалити усю підсистему.

Отже, застосування системної динаміки є поширеним та актуальним у сучасних дослідженнях та допомагає відобразити причинно-наслідкові зв'язки об'єктів будь-якого з бізнес-процесів підприємства, при цьому визначивши вплив управлінських рішень на них. Моделювання демонструє роботу підприємства в цілому, допомагає з'ясувати як воно взаємодіє із зовнішніми підприємствами, замовниками і постачальниками та як організована діяльність на кожному робочому місці.

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MONETARY POLICY RULE AND MACROPRUDENTIAL TOOLS: INTERACTION VS. CONTRADICTION

For a long period of time monetary policy was only one major apparatus related to the financial markets regulation. It can be responsible for the economic growth and unemployment in some cases, but first of all it is empowered with core interest rate instrument to control inflation. Meanwhile, the financial system has been treated as a part of the transmission mechanism that has to ensure efficiency of the Central banks' instruments. But after the last global financial crises, new goal arises in front of regulators – financial stability, with its respective policy approach – macroprudential. And the question is whether there should be an efficient interaction between these two policies: macroprudential and monetary, if some obvious tradeoffs are in place.

Both monetary and macroprudential policies work through the financial market. Despite they have different goals there is an interaction between effects they make. For instance, such macroprudential tools as capital buffers are intended to increase the banking system resilience, on the other hand their implementation lead to the lending decrease, which further can provoke both output growth slowdown and inflation downturn. On the contrary, during crises the Central banks are advised to decrease capital requirements, which can lead to faster price growth, whereas inflation rate has to be restrained by monetary instruments. Not only in this case but in many others there can be an explicit tradeoff between monetary and macroprudential policy goals. Emergence of this new contradiction between macroeconomic policies rises both policy and research questions.

In this regard, one of the main policy questions that were in focus of economists is the architecture of the macroprudential regulatory bodies. Precisely, it is not obvious who should be in charge of the macroprudential policy to ensure its efficiency. There is no unique answer to this question. As it was shown in literature, in over 60 percent of countries with established macroprudential policy mandate it belongs to the Central bank. Moreover, among countries with emerging markets, even in case the mandate is given to the interagency financial stability body, the Central bank chairs the board in 58 percent of cases. Hence, the question of possible contradiction between policies becomes crucial for the Central bank's efficiency.

Possible negative effects that implementation of macroprudential policy may have of monetary goals and vice versa have been studied in several papers so far. The major instrument for this is dynamic stochastic general equilibrium models (DSGE). For instance it was shown that depending on

the shock, which hit the economy, the consequences of macroprudential regulatory actions for monetary policy can vary. In some cases, these policies can resemble each other, whereas sometimes even the agreed actions do not allow for muting the vulnerability of main economic variables in response to shocks. In general, there is an agreement between authors that macroprudential instruments suit to address financial stability disturbances, while monetary policy showed itself as efficient in terms of its main goals.

From the technical point of view, mentioned research used primarily DSGE with inbuilt monetary policy rules. At the same time there is a variety of ways to present macroprudential policy. It was done either with discretionary changes in instruments or with some macroprudential policy rules. But what seems to be interesting and promising regarding further steps in analysis is to implement the macroprudential goals the same as output and inflation expectations into the monetary policy rule. In this case, the possible contradiction between macroprudential and monetary instruments would be muted within the system by adjustment of core interest rate in order to react to both macroeconomic parameters and financial stability indicators.

Hence, monetary and macroprudential policy interaction is a complicated issue that needs practical investigations which can be performed with dynamics modeling. At the same time, it can be proven with modeling that both policy instruments can be efficient if applied to right tasks. Moreover, it is possible to achieve even better results if take into account both policies goals while setting the rules.

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MODELING EXCHANGE RATE IN UKRAINE USING SYSTEM DYNAMICS METHOD

In late 2014 Ukraine faced the change of exchange rate regime and after continuous existence under the terms of fixed exchange rate regime it established floating exchange rate regime. Since 2015 exchange rate has been experiencing instability as it is determined by free trade powers and isn't set by national bank regulator any more. Exchange rate has a significant impact on the goods' prices for export, so on the amount of export and revenues of export oriented producers, the level of competitiveness of Ukrainian goods abroad, the level of inflation and the burden of foreign debt to be repaid in foreign currency; it influences import just the opposite compared to export. Therefore, modeling exchange rate in Ukraine due to the methods of system dynamics can help to analyze the problem of volatility of the exchange rate (graph 1) [1, 4].

Considering the main hypothesis in the submodel, it may be emphasized that: when RW imports in $ rise more than Ukrainian imports in $, the value of the exchange rate falls; when Ukrainian imports in UAH rises faster that exchange rate, Ukrainian imports in $ rises; increasing in exchange rate adj time causes the delay in delta exchange rate, therefore, the exchange rate should change more slowly; decreasing in UKR imports percentage cause Ukrainian imports in UAH to decrease.

Comparing the model structure with real knowledge about the real system it may be achieved an adequacy of the model, because each relationship described the problem in real Ukrainian situation. Importantly, all variables and calculations follow real-world data which are taken from official sites.

Following the trend of historical data of the exchange rate, one can see that the exchange rate is truly volatile, but simulating the model shows that the model data and historical coincide (graph 2). With regard to the exchange rate model, the mean square error is 0,0834 stats^2 (so UAH/Dollar^2). In terms of error sources, there is an appropriate division of the total error of 0,0834 into bias that makes