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## **The Role of the Quarterly Projection Model in Monetary Policy of the Republic of Belarus**

In recent years the National Bank of the Republic of Belarus (the National Bank) is actively involved in examining the issue of the monetary policy regime improvement, including evaluation of the expediency of the gradual transition to the inflation targeting (Lobanov and Kalechits, 2004), National Bank of the Republic of Belarus, 2007). This regime gave a rather good account of itself during the recent years in a number of countries in view of inflationary expectations stabilization and enhancing monetary policy transparency and accuracy. Moreover, the successful functioning of the regime was registered not only in the countries with the developed market economy, but also in the countries whose market is under development (Batini, et al., 2005). But, with a view to transitioning to the inflation targeting regime a number of practical issues should be tackled, including, significant lowering of administrative intervention in price-setting; assuring availability of the stable foreign economic sector and developed financial market; elimination of fiscal domination over monetary policy; and establishing reliable analytical instruments for the comprehensive reflection of the monetary policy transmission mechanism. All these issues are critical for achieving successful results on practice. The article dwells on the individually taken aspect of the implementation of the developed program of transition to the inflation targeting, namely, creation of the corresponding system of analysis and projection of monetary policy of the Republic of Belarus.

### **I. Main Characteristics of the Monetary Policy Analysis and Projection “Benchmark” System**

During the last 50 years monetary economists developed a number of scientific principles on the basis of the accumulated theoretical and practical experience which are at present the basis for the activities of the majority of central banks. The key principles are: (1) inflation, with regard to the sustainable growth of prices, is always and everywhere a monetary phenomenon; (2) price stability has important advantages: a low and stable inflation level contributes to the more efficient use of the production resources in the economy; (3) there is no a compromise choice between the level of unemployment and inflation in the long-run: in the long-run the Phillips Curve is vertical, i.e., a definite natural level of unemployment is inherent in the economy which does not depend on the level of inflation and all the attempts of the monetary authorities to keep the unemployment at the level which is lower than the natural one cause an even higher inflation rather than the increase in employment; (4) expectations are one of the main factors of inflation and play an important role in the monetary policy transmission mechanism; (5) when the level of inflation is growing it is necessary to increase the real interest rates, i.e., to comply the Taylor Principle; (6) the time-inconsistency problem (problem with economic agents confidence in the central bank, namely, with a central bank’s ability to follow the announced policy) is peculiar to discretionary monetary policy; (7) the central bank’s independence, mainly, in the choice of monetary policy instruments contributes to the increase in its efficiency; (8) the adherence to the stability of a nominal anchor (inflation, money supply, or exchange rate) plays an important role in the attainment of good monetary policy outcomes by the central bank; (9) the stability of the financial system is important for the maintenance of stable economic growth rates (Mishkin, 2007).

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In order that above-mentioned scientific principles have applied character central banks, with the active use of econometric models, develop and apply specific algorithms, methods, analysis, projection and implementation systems of monetary policy. A certain progress in this field was achieved during the last ten years. The central banks that switched to the inflation targeting and popularized development of the forecasting and policy analysis system (FPAS) based on the neo-Keynesian paradigm (Blach, Laxton, et al., 1994), Black, Cassino, et al., 1997), and CNB (2003) contributed to this progress. Laxton and Scott (2006) distinguish the following main features of the FPAS “benchmark” for inflation targeting:

1. The reporting, database and near-term forecasting system is based on the use of the limited in number but major in nature macroeconomic variables that enables each new person involved in the forecasting and developing monetary policy process to use the same data.
2. Database updating, monitoring and preparation of reports should be performed on the timely (weekly) basis. That is why all the persons that are involved in monetary policy forecasting and developing must be informed on the permanent basis about the manner in which the new high frequency data influence the near-term inflation forecast (and how they may influence the long-term inflation outlook).
3. The availability of the simple quarterly projection model (QPM) which reflects the Monetary Policy Committee’s (MPC) point of view with respect to the monetary policy transmission mechanism and the standard set of shocks that affect the economy. At the beginning, the model may be rather simple. The main thing is to start formalizing the mechanism in which, from the MPC’s point of view, the key macroeconomic variables respond to monetary policy instruments. The model must be extended as may be necessary based on the practical needs. At that, it should not be too complicated and turned into the “black box”.
4. The quarterly development of the consistent medium-term forecast using QPM. This work presumes the assessment of risks to the baseline forecast and making, on this basis, proposals on amending the official baseline forecast.
5. Development measures of uncertainty in the forecast, for example, confidence intervals that may be useful to characterize the forecast accuracy.
6. Examination of specific risks related to the fulfillment of the baseline forecast and development of the contingency policy alternatives. It is necessary to examine the scenarios of the central bank’s reaction on new information that may appear during the period between official forecasts.

Laxton and Scott (2006) point out the benefits that are ensured by such structured forecasting and policy analysis system. First, it facilitates communication between the people that are involved in the forecast and the policy debate and leads to the important mutual activities and steady improvement of quality of mutual analytical work. Second, it assures more structured debates about the risks in the forecast facilitating the identification and discussion of problems related to the key policy issues. Third, it assures the database development that makes it possible to assess the previous forecasts informing staff about the required new investigations. Forth, it contributes to the development of the highly-specialized human capital. Fifth, it facilitates the development of institutional knowledge on the monetary transmission mechanism and the effects of different shocks on the economy. Sixth, is ensures a higher degree of transparency of the monetary policy systemic component and forecasts development process because the managers’ statements and official reports on central banks’ monetary policy not only incorporate the forecast of interest rates, but also provide a comprehensive and convincing for the public reasoning of the forecast. It is grounded by the need to increase and maintain confidence in monetary policy. In this

case, the models make it possible to form the well-grounded and coordinated history of the economy development and progress.

As a rule, two problems are defined among the main factors that hinder or impede the FPAS development. First, the desire to obtain the perfect FPAS in the shortest possible time without ensuring of the minimal acceptable quality of the near-term analysis and forecasting and, secondly, the effective FPAS requires significant integration of all its constituent elements: the reporting system, human capital, information technologies, databases, etc. For example, until the creation of the efficient database and availability of the corresponding intellectual and reporting system required to support monitoring and near-term forecasting it will be untimely to spend significant resources for developing a perfect model of the economy. Besides, the practice proved that the peculiarities and development of the FPAS depend, to a great extent, on the monetary policy regime and the degree of the central bank's independence (Laxton and Scott, 2006).

## **II. Development of the Forecasting and Monetary Policy Analysis System in the Republic of Belarus**

The development of the forecasting and policy analysis system at the National Bank is inseparably linked to the evolution of the monetary sphere of our country and development of such fields of economic science as "Monetary economics" and "Econometrics". It is considered that the carrying out of independent monetary policy commenced in 1994 when the Belarusian ruble was approved as a single legal tender in the Republic of Belarus. The period 1994 – 1999 was difficult for the monetary system of the Republic of Belarus because the country overcame the crisis which was caused by the general economic recession after the collapse of the Soviet Union. Significant volumes of credit emission were transferred to the economy to keep state enterprises "afloat" and cover budget deficit. In the conditions of limited general economic and structural reforms as well as the low level of gold and foreign exchange reserves the high rates of money supply growth resulted in the multiple exchange rates in the foreign exchange market, significant devaluation of the Belarusian ruble versus foreign currencies, and drastic inflation growth, whose rates in 1999 amounted to 251.2%.

Several years earlier, in 1991, "Money circulation and credit" and "Econometrics" were professed in the Republic of Belarus for the first time. During the first years the introductory courses to certain branches of "Econometrics" and "Money circulation and credit" that were traditional in 1970 – 1980 were taught. Correspondingly, the indicated period was characterized by application, mainly, of the simplest approaches, monetary policy analysis and projection methods, based on the well-known equation of exchange, money multiplier formula, and basic macroeconomic identities (Komkov, 1996). As statistical data were accumulated, modeling skills were developed, and scientific staffing was formed the first investigations of the Belarusian economists were carried out that involved the analysis and modeling of processes in the monetary sphere, including, with application of econometric models. Rusakevich (1998) developed the generalized econometric model of the monetary system of the Republic of Belarus that combined the blocks of the basic macroeconomic identities and monetary identities, as well as the regression models of the money supply and money demand. The author used logarithmical-linear regression equations to describe the behavioral dependencies. During 1997 – 2000, the use of regression analysis was fully justified and adequate due to the high elasticity of consumer prices with respect to the money aggregate M1 (1.0) and exchange rate BYR/USD (0.7).

In 2000, significant positive changes in the monetary sphere got under way, namely, the system of multiple exchange rates was liquidated, a single exchange rate was introduced, the rates of the credit emission were reduced, and interest rates were maintained on the positive, in real terms, level. With a view to attaining the key monetary policy target the National Bank started to use the ex-

change rate as an intermediate target, attempting to assure predictable dynamics of the Belarusian ruble exchange rate versus the US dollar and prevent significant appreciation of the real effective exchange rate of the Belarusian ruble in the conditions of the foreign trade deficit. As a result, in 2001-2006, the rates of the devaluation of the official exchange rate of the Belarusian ruble versus the US dollar dropped from 33.9% in 2001 to 0.5% in 2007. At that, in 2005 and 2006, the nominal exchange rate appreciated by 0.8 and 0.5%, respectively. The decrease in the rates of devaluation of the Belarusian ruble along with the other economic and monetary measures contributed to the gradual disinflation and business activization in the country. Inflation which was measured by the CPI growth decreased from 46.1% in 2001 to 6.6% in 2006; the average rate of the real GDP growth amounted to 8% during 2001 – 2007.

The achieved relative macroeconomic stabilization in the country on the background of foreign and national scientific investigations development in the field of economic and mathematical modeling and the international experience of the practical use of econometric models with a view to tackling monetary policy tasks contributed to the successful development of the VAR-models and ECM-models by the National Bank's specialists (Kallaur, Komkov and Chernookiy, 2005). Thus, Chernookiy (2004) in his paper considered modeling different inflation indicators involving the ECM-models. Based on monthly data Malugin, Pranovich et al. (2005) developed the system of error correction models for monetary policy targets (First Econometric Models System for Monetary Policy (EMS MP-1) designed to analyze, forecast and evaluate monetary policy options in the Republic of Belarus. In the modified version of this system (Second Econometric Models System for Monetary Policy (EMS MP-2) econometric models are integrated and interrelated by the guided exogenous variables (monetary policy instruments: refinance rate and reserve money) and general exogenous variables (output, inflation target and external factors) as well as endogenous variables (intermediate monetary policy targets: exchange rate, money supply, and long-term interest rates). The EMS MP-2 serves as one of the basic instruments of forecasting monetary proportions and a core model of the forecasting and policy analysis system of the Republic of Belarus (Belarusian State University, 2007). For the time being, the EMS MP-2 complies, to the greatest degree, with the legally prescribed procedures of monetary policy development and implementation in the country. First, it takes into account the practice of the coordinated development of the general economic and monetary forecasts and measures for the next year: the parameters of the annual forecast of the social and economic development are the starting basis for drafting the Monetary Policy Guidelines of the Republic of Belarus. Second, it covers the entire system of intermediate monetary policy targets, including the exchange rate target and indicative parameters of term deposit rates, credits to the real sector and ruble money supply.

Notwithstanding a certain progress in the econometric modeling and examination of the monetary policy transmission mechanism the analytical instruments used in 2004-2005 remained limited. The models were developed, mainly, on the basis of monthly data, evaluated separately and presented, mostly, for the purpose of the short-term forecasting. Besides, the extension of the lag of the monetary policy impact on prices, increased importance of the non-monetary factors of inflation and considerable changes of the foreign economic environment started to hinder, to an increasing extent, forecasting and meeting the exchange rate target. The uncertainty of quantitative assessments of money velocity and the instability of the money demand function did not allow to rely completely on the growth rates of the monetary aggregates only. All these facts stimulated debates on the expediency of changing the system of intermediate monetary policy targets and switching to the inflation targeting regime. Therefore, in 2005, the National Bank of the Republic of Belarus in order to improve methodological conditions of monetary policy and with the technical assistance of the IMF and the National Bank of the Czech Republic started to study the neo-Keynesian approach

to the analysis and projection of monetary policy (Clarida, Gali and Gertler, 1999), (Walsh, 2003), (Woodford, 2003), which is mainly used in conditions of the inflation targeting. This project contributed, to a great extent, to the understanding of the monetary policy transmission mechanism functioning, development of the approaches to monetary policy of the Republic of Belarus analysis and projection with account of the world experience, and comprehensive use of the system of models and expert judgements of the National Bank's staff.

### **III. The Experience in the Field of Development and Use of the Small Semi-structural Quarterly Projection Model for Medium-term Forecasting and Monetary Policy Projecting at the National Bank**

The semi-structural QPM for analysis, medium-term forecasting and monetary policy projecting which was developed for the Republic of Belarus is a simple model of the first generation in which the indicators of deviation of the real economic variables from their equilibrium trends are used. The model was developed on the basis of quarterly data obtained since the beginning of 2002, i.e., from the moment when the level of inflation amounted to less than 35% per annum, and includes a standard set of the aggregated behavior equations: *the inflation equation*, which represents a dynamic equation of the aggregate supply, is based on the modified Phillips Curve (Gali and Gertler, 1999) and describes interrelations between inflation, persistence in inflation (autoregressive inflation variable), inflation expectations, imported inflation (including changes of prices for power supplies), and marginal production costs that are approximated by the output gap indicator; *the total demand equation* according to which the output gap is determined by the persistence typical to the output gaps, real monetary conditions (deviation of the real interest rate and real exchange rates from their equilibrium levels) and external demand (the output gap in Russia); *the interest rate equation* which is represented in the form of the modified version of the Taylor rule (Rudebusch, 2001); *the exchange rate equation* according to which the exchange rate dynamics is determined by the Purchasing Power Parity (PPP) in the long-run, the Uncovered Interest Rates Parity (UIP) in the medium- and short-run, and National Bank's interventions in the foreign exchange market. Taking into account nuances of the transition period of the Belarusian economy development this model was adapted to the state pricing policy peculiarities and National Bank's monetary policy. This was reflected in the specifics of modeling inflation, exchange rate, interest rate and other variables. Let's take a detailed look at this aspects.

*Inflation.* The Phillips Curve equation was developed not for core inflation that complies with the standard practice of its modeling, but for overall CPI inflation. It is explained by the fact that despite the officially declared 30% share of the administrative regulated prices in the consumer basket a more wide control over the price changes is used in the Republic of Belarus. It is exercised through the direct price- and tariff-setting for certain types of goods (some baked goods, certain meat and milk products, tobacco goods, vodka, and certain medicines) and services (housing and communal services, transport, infant school services, etc.) by the corresponding bodies of state administration; prescribing the maximum level of prices (tariffs), the maximum trade markup (discount) to the prices, and the maximum profitability rate for enterprises and organizations; as well as through setting the maximum growth rate of sale prices (tariffs), practically, for all the economic entities. At the same time, as it follows from the experience, the administrative regulation is characterized by the non-strict control of the fulfillment of the prescribed restrictions by the regulatory bodies. Such situation is imposed by the objective circumstances and conclusions made on the basis of the price regulation practice in the previous years, namely, the inefficiency of maintenance of the significant deviation of prices from the "natural" for the economy level (State Scientific Institution "Institute of Economy of the National Academy of Sciences of the Republic of Belarus", 2003). It was also con-

firmed in the year 2007, when imported gas prices increased by more than 2.1 times, that resulted in the deterioration of the financial position of a great number of enterprises and organizations, and forced to raise prices for households for the electricity and gas by 20% and heating by 12%, prices for firms for gas by 88.9%, for electricity by 21.2%, and for heating by 40%, that, naturally, caused the growth in the CPI. Besides, the intensive growth of prices for foodstuffs in the world market, including Russia, resulted in 2007 in the disparity of prices for the individual foodstuffs in the Russian and Belarusian markets and, as a result, in the quick re-orientation of the national producers towards the foreign markets. In such a situation the increase in domestic prices was unavoidable for the purpose of stimulating the delivery of goods to the domestic market by the producers, that also made an impact on the dynamics of the CPI. As a result, in 2007 the growth of the CPI amounted to 12.1% and exceeded the upper border of the inflation target by 1.5 times.

The administrative price regulation in the Republic of Belarus has one more distinctive feature: in the conditions of the limits prescribed by the state individual enterprises act like monopolists. They are not afraid of domestic competition and decrease of demand for their products in the conditions when all the producers increase the prices and very often increase their prices together with other enterprises (even if it is not necessary) and lobby the increase in prices in the government bodies grounding it by the increase in the costs of production and decrease in the profitability (State Scientific Institution "Institute of Economy of the National Academy of Sciences of the Republic of Belarus", 2003).

Thus, modeling the modified Phillips curve for overall CPI inflation is, and the research results confirm it, an approach quite adequate for the Republic of Belarus.

*Exchange rate.* Under the inflation targeting regime and floating exchange rate central banks of small and open economies generally describe the dynamics of the national currency exchange rate versus the currency of the country-the main trading partner relying on the PPP subject to the Balassa-Samuelson effect and UIP:

$$s_t = \chi_0 E_t[s_{t+1}] + (1 - \chi_0)(s_{t-1} + 2(\pi_t^* - \pi_t + \Delta z_t^{eq})/4 + (r_t - r_t^* - pr_t)/4 + \varepsilon_t^{ls}), \quad (1)$$

where

$\pi_t$  is domestic inflation;

$\pi_t^*$  is foreign inflation;

$s_t$  is the nominal exchange rate of the foreign currency versus the national currency;

$z_t^{eq}$  is the equilibrium real exchange rate of the national currency;

$r_t$  is the domestic nominal interest rate;

$r_t^*$  is the foreign nominal interest rate; and

$pr_t$  is the risk-premium of foreign investors.

So far the National Bank maintains the regime of soft pegging of the exchange rate of the Belarusian ruble to the US dollar, i.e. to the currency of the country that is not its main trading partner what is due to the considerable weight of the US dollar in the domestic foreign exchange market and in the structure of the households' foreign exchange savings, as well as its large share in the settlements of foreign trade operations. Therefore, the description in the model of the change in the BYR/USD exchange rate target is based on the condition of gradual adjustment of the nominal exchange rate to the level of its fundamental equilibrium which depends on the process of real convergence of the developing Belarusian economy with the level of developed countries, including the USA:

$$\Delta ls\_usd_t^{tar} = \theta_0 \Delta ls\_usd_{t-1}^{tar} + (1 - \theta_0)(us\_pie^{SS} - pie_t^{tar} + \Delta lz\_usd_t) + \varepsilon_t^{\Delta ls\_usd_t^{tar}}, \quad (2)$$

where

$ls\_usd_t^{tar}$  is the nominal USD/BYR exchange rate target;

$us\_pie^{SS}$  is inflation in the USA in the long-run in a steady state;

$pie_t^{tar}$  is the medium-run inflation target in the Republic of Belarus; and

$lz\_usd_t$  is the real BYR/USD exchange rate.

For example, if the long-run inflation target in the USA is 2% and in Belarus 5%, given the trend of the productivity growth of the Belarusian economy is 3 percentage points higher than the same indicator for the USA, there's no reason to expect a change in the nominal BYR/USD exchange rate in the long-run.

The nominal exchange rate may diverge, in the medium- and short-run, from its fundamental equilibrium level under the impact of the change in the difference between domestic and foreign interest rates in accordance with the UIP.

$$ls\_usd_t = \lambda_0 ls\_usd_t^{tar} + (1 - \lambda_0)[ls\_usd_{t+1} + (rn_t - us\_rn_t - us\_prem_t^{eq})/4] + \varepsilon_t^{ls\_usd_t}, \quad (3)$$

where

$rn_t$  is the nominal interest rate on new bank credits in the national currency to firms (excluding interbank credits and lax credits);

$us\_rn_t$  is the nominal interest rate on new credits in US dollars to firms; and

$us\_prem_t^{eq}$  is the equilibrium risk-premium of foreign investors on BYR/USD operations.

Thus, if LIBOR in USD for one year is 3% and the market interest rate on new credits in Belarusian rubles is 13%, given the difference between the interest rate on credits in US dollars to firms and LIBOR (risk-premium) amounts to 8 percentage points on average, all other conditions being equal, it is reasonable to anticipate in the short-run (for example, in the nearest quarter) the appreciation pressure on the BYR/USD exchange rate corresponding to the appreciation of the nominal exchange rate by 0.5% per quarter.

At the same time, given the fact that Russia is the main trading partner of the Republic of Belarus and, accordingly, economic processes in Russia have the strongest effect on socioeconomic development in Belarus, the dynamics of the BYR/RUR exchange rate which is automatically defined on the basis of RUR to USD cross-rate is taken into consideration in inflation and output gap modeling.

*Interest Rate.* The third peculiar feature of the model is the absence of the yield curve equation which shows relationship between short-term and long-term interest rates in the market economy relying on the expectations hypothesis subject to the risk-premium factor. In the Republic of Belarus interest rates on ruble-denominated credits to firms whose share in the total volume of the banks' ruble-denominated claims on the economy accounts for more than 70% are susceptible to administrative control, i.e. interest rates on new credits must not exceed the refinance rate subject to 3% margin in order to make the banks' credit resources accessible to the enterprises. However, in case of exigency this limitation can be removed, as it happened, for example in the first quarter of 2007, for the purpose of promoting the stabilization of economic agents' devaluation expectations and reducing the demand for foreign exchange which sharply increased after a more than twofold increase in prices for natural gas imported from Russia to Belarus and substantial change in the terms of oil products supply. Nevertheless, at a time when an active control over the level of interest rates in the economy is retained there is no sense thus far in

modeling the relationship “the National Bank’ refinance rate → banks’ long-term interest rates on credits”. Therefore, the Taylor rule is represented in the model as an equation for the interest rate on new ruble-denominated credits to firms:

$$rn_t = \delta_0 rn_{t-1} + (1 - \delta_0)[(rr_t^{eq} + pie3_{t+2}) + \delta_1(pie3_{t+2} - pie3_{t+2}^{tar}) + \delta_2 l g d p_t^{gap}] + \varepsilon_t^{rn}, \quad (4)$$

where

$rr_t^{eq}$  is the equilibrium real interest rate in the Republic of Belarus;

$pie3_{t+2}$  is the predicted value of three-quarter CPI inflation (over the current and the next two quarters);

$pie3_{t+2}^{tar}$  is the target of three-quarter inflation (over the current and the next two quarters).

In the future, if the margin is cancelled or the share of credits with administratively controlled interest rate is substantially reduced the model will possibly be extended by the yield curve equation.

In 2008, we tried one more experiment setting the value of  $\delta_1$  coefficient in equation (4) equal to zero. As a result, the optimal level of the nominal interest rate on new ruble-denominated credits to firms in the model was brought in conformity with the neutral level of this rate (the equilibrium level of the real rate plus an anticipated inflation rate) adjusted for the reaction of the National Bank to the output deviation from its potential level. It is assumed that the excess demand in the economy necessitates interest rate policy tightening, and, conversely, the negative output gap requires that the interest rate be reduced, thereby facilitating, by means of monetary policy measures, the maintenance of sustainable growth rates of output in the economy. Such modification of the interest rate equation (the lack of the National Bank’s reaction to the divergence of inflation from the target) is due to the fact that the dynamics of inflation in the Republic of Belarus nowadays is defined, in many respects, by non-monetary factors, i.e. the administrative control of prices, the structure and level of costs in the real sector of the economy, the dynamics of foreign prices for intermediate and mainline imports, policy on household money income, and fiscal policy.

Another distinctive feature of the National Bank’s new set of models which distinguishes it from similar models of other central banks is determining, with the help of the Kalman Filter, *the deviation of the indicator for real volumes of the banking sector’s lending to the economy from its equilibrium level*. There were several reasons behind it: *in the first place*, popular point of view that the credit channel is more effective than the interest rate channel and, accordingly, management’s wishes to allow for this fact, where possible, in the model; and *in the second place*, an additional opportunity to analyze the relationship between the output gap and the banking sector’s credits denominated not only in rubles but in foreign exchange whose role in maintaining high growth rates of the economy increased significantly beginning in 2007.

In 2007, the National Bank started the approbation and practical use of this model, as well as began to develop FPAS on its basis so that to bring the latter closer to the “benchmark”. New instrument showed immediately that it is in demand because after the hike in the prices for natural gas imported from Russia to Belarus and the change in the terms of crude oil supply authorities began to pay more attention on the risk assessment and effects of unfavourable external shocks on the economy of our country, as well as the analysis of the National Bank’s reaction to these effects. An ad hoc forecasting team (FT) consisting of the team manager, modeler and model operator, as well as experts in different sectors of the economy makes all model calculations and descriptions thereof.

Today, the timetable for calculations involving QPM model depends on the current practice of holding quarterly meetings of the Board of the National Bank and weekly meetings of the MPC. Preparing the first (preliminary) forecast starts approximately on the 10th day of the last month in the reporting quar-

ter and takes about 5-7 working days. An assessment of the economy's current state, major inflation risks, and real monetary conditions is the main task of the forecast, having regard to actual data for the past two months and near-term forecast for the last month in the reporting quarter. The description of the forecast results and presentation thereof are brought up for discussion at one of the last meetings of the Monetary Policy Committee preceding the meeting of the Board of the National Bank where the forecast of major monetary indicators for the next quarter is considered and approved.

Following the publication of actual data for the quarter, i.e. approximately on the 10th day of the first month in the quarter which follows the reporting quarter, the FT starts to develop the second (more accurate) forecast which is taken into consideration in analyzing monetary policy scenarios produced on the basis of alternative methods and models.

A fairly short experience of using this model by the National Bank showed that it is definitely useful for the purposes of monetary policy in an environment of the transition economy and the exchange rate targeting regime despite the problems basically confronting the development and application of any other model. *In the first place*, this is an additional instrument for studying the monetary policy transmission mechanism and identifying topical issues of the research as well as areas of improvements to statistics. For example, the shortcomings of the CPI calculation method which was in use in 2007 were revealed in the course of using the model, namely the calculation of the price for heating. The price for this service depends on the norm for thermal energy consumption which was generally revised two times a year: a sharp downward adjustment in May and upward adjustment at the end of the year. As a result of such corrections fluctuations of seasonally adjusted quarter inflation (in annual rates) amounted to  $\pm 2$  percentage points. New procedures for calculating this norm as well as the norm for the consumption of thermal energy to heat water were adopted in 2008 that assume their recalculation once a year, in May and September (respectively), what is still inconsistent with the international experience as the practice of multiple changing the structure of the consumer basket within a year is continued. Also, the need for further improvements in the approaches to the analysis and forecast of monetary and non-monetary inflation factors requires extracting energy goods items from consumer basket and creating a subgroup index within the CPI which would make it possible to analyze the dynamics of the aggregated index of energy prices (prices for oil products, natural gas, coal, and electric energy). *In the second place*, this is an efficient instrument for explaining, spreading, and popularizing new knowledge about the monetary economy among both experts of the National Bank and academic economists of the country because the QPM as a brief description of the transmission mechanism of Belarus's monetary policy and relationships between major macroeconomic variables gives not only quantitative assessments, but, at the same time, an explanation thereof. The model is simple to use and understand what is provided by a small number of equations developed on the aggregated level. *In the third place*, this is an additional alternative instrument for assessing current state of the economy and analyzing monetary policy. *In the fourth place*, this is a fairly powerful analytical system for medium-term forecasting of major macroeconomic indicators which combines historical data, the near-term forecast, and expert judgments and makes it possible to calculate alternative monetary policy scenarios subject to uncertainty. And *in the fifth place*, this is a good means of verifying the consistency between forecasting and analysis of economy, though the list of macroeconomic variables calculated by the model is limited.

It is natural that the practice of the model use and FPAS operation in the National Bank thus far differs substantially from the "benchmark". Above all, this is due to the difficulties in adapting new methods for monetary policy analysis and projecting to the terms of the exchange rate targeting regime and the time required to cope with them and to raise confidence in the results of model calculations. Even if the analysis is based on the modern economic theory employing advanced ma-

thematical instruments, all the same, it is necessary to acknowledge that there is an uncertainty in the change of observed variables. Expert assumptions of the staff as well as forecasts about the dynamics of exogenous variables which are highly uncertain exert significant influence on the results of model calculations. This aspect of the problem is of top priority for the Belarusian economy which currently undergoes major structural changes defining, to a large extent, the future dynamics of equilibrium trends. Besides, difficulties for getting reliable results are determined by the use of relatively short time series built on quarterly data for 2002-2008 that is connected with greater instability of economic processes which took place in the development of the country in past years.

Currently, the use of the above-mentioned model in the process of monetary policy projecting in a small and open transition economy also becomes more complicated under the impact of external factors. One should take it into consideration that the trend towards significant acceleration of inflationary developments became visible lately in many countries around the globe resulting from sharp increase in the world demand at a time when raw materials and labor force are limited. Borio and Filardo (2007) believe that as the dynamics of domestic prices becomes increasingly dependent on global factors (what is peculiar to the Republic of Belarus), the efficiency of domestic monetary policy on control the excess demand and inflation in the short-run decreases and importance of taking global measures aimed at limiting the excess demand in the world as a whole increases.

#### **IV. Areas of Further Development of FPAS in the National Bank**

High quality FPAS is very helpful in making informed decisions in the monetary policy sphere, in an environment of the transition economy in particular, which is characterized by frequent and substantial structural changes. Therefore, the National Bank attaches special importance to the task of continuous and all-round development of its analytical and forecasting instruments. In connection with this, we would like to place emphasis on a number of areas of further development of FPAS which are of high priority to us.

Currently, the Concept of the Financial Market Development is implemented in the Republic of Belarus and a number of regulatory acts stimulating the development of business environment as well as the inflow of foreign investments have been adopted. Accordingly, conditions for pursuing more flexible exchange rate policy and increasing the role of interest rate in regulating economic processes are outlined. Therefore, in cases where significant changes in the conditions for the implementation of monetary policy pursued by the National Bank occur high emphasis should be placed on the timely adjustments of the QPM specification. Continuous and sustainable development of all other elements of FPAS with a view to gradual bringing the latter closer to the “benchmark” is also important.

We think it is expedient to start to develop the dynamic general equilibrium model (DGEM). In contrast with the QPM, this model offers significant advantage, i.e. the coverage of all sectors of the economy and the description of relationships between indicators of flows and stocks. Building such kind of the model would make it possible to substantially improve, at this stage, staff's knowledge of economic processes and of how these processes affect the choice of monetary policy measures in the transmission mechanism, would help to find out what is the subject to further research, and would facilitate the development of more consistent macroeconomic forecasts.

Assessing and forecasting equilibrium trends in the dynamics of real economic variables, application of the business cycles theory for the purposes of macroeconomic analysis and projection, price and wage rigidity, assessment of inflation expectations and their impact on the price level, as well as aggregation of individual behavior and use of the representative agent model – all these issues are quite new for the Republic of Belarus and are poorly covered in the domestic academic and eco-

conomic literature. This makes practical use of the new kind of model rather complicated and requires further deep theoretical and applied research, including with the help of alternative approaches and by involving all scientific institutions of the country which specialize in monetary economics. This would make it possible not only stimulate new scientific debates on topical aspects of monetary regulation, but would be conducive to further improvement in the principles of Belarus's monetary policy development and implementation.

In consideration of the foregoing, as well as in view of growing instability in international financial markets, the task of incorporating the imperfections of the banking system and financial market of the Republic of Belarus into structural model of the economy and business cycles development model is the priority for the National Bank. Ensuring stability of the financial and banking system is one of the main tasks of the National Bank today.

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