REPUBLIC OF BELARUS

TECHNICAL ASSISTANCE REPORT—MONETARY POLICY MODELING

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REPUBLIC OF BELARUS

MONETARY POLICY MODELING

Karel Musil (Expert, Czech National Bank)

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GLOSSARY

FPAS	Forecasting and policy analysis system
FT	Forecasting team
IC	Initial Conditions
IMF	International Monetary Fund
IT	Inflation targeting
MCM	Monetary and Capital Markets
MPEAD	Monetary Policy and Economic Analysis Directorate
NBRB	National Bank of the Republic of Belarus
NTF	Near term forecasting
QPM	Quarterly projection model
TA	Technical assistance

PREFACE

At the request of the National Bank of the Republic of Belarus (NBRB), a MCM project mission comprising Karel Musil (external expert, Czech National Bank) visited Minsk during February 28–March 7, 2018 as the fifth of the IMF short-term technical assistance (TA) missions to help the NBRB enhancing its modeling, forecasting and policy analysis capacity, and the forecasting and policy analysis system, sponsored by the Swedish International Development Agency.

The mission followed up on the November-December 2016 MCM project initiation mission "Building Capacity in Monetary Policy Modeling and Analysis", led by Nils Maehle, four MCM TA follow-up missions and two in-country customized trainings.[1] The initiation mission reviewed the NBRB's modeling, forecasting and policy analysis capacity, and the forecasting and policy analysis system (FPAS). It agreed with the authorities on a medium-term program of IMF TA and training to revise the projection model and better tailor it to the evolving policy framework, strengthening NBRB's modeling capacity, and assist further developing and improving the FPAS and policy decision making and analyses process. The follow-up TA missions in 2017 reviewed and extended the core projection model (QPM) structure and covered several areas related to the FPAS at the NBRB. The last TA mission in 2017 reviewed the QPM calibration and compiled a mock-up QPM-based forecast scenario, which was presented to the management and the Board of the NBRB.

The mission met with Dmitry Kalechits, Deputy Chairman of the Board; Dmitry Murin, Head of the Monetary Policy and Economic Analysis Directorate; Zhanna Snopkova, Deputy Head of the Monetary Policy and Economic Analysis Directorate and Head of Forecasting Department; and other senior officials and staff of the NBRB.

The mission would like to express its deepest appreciation to the management and staff of the NBRB, for their hospitality and the excellent arrangements made to facilitate the mission's work, and to Julia Lyskova at the IMF Office in Belarus for her assistance during the mission.

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[1] The first four from series of quarterly MCM TA missions "Monetary Policy Modeling", all of them led by Karel Musil, took place during February 27–March 10, May 22–June 2, September 4–15, and November 8–15, 2017. The modeling team was also supported by two customized training courses delivered by the staff from the IMF Institute for Capacity Development and the Joint Vienna Institute in October 2017 and February 2018.

EXECUTIVE SUMMARY

The National Bank of the Republic of Belarus (NBRB) is reforming its monetary policy framework in line with recommendations of past IMF TA missions and its Road Map for Transitioning to Inflation Targeting with the aim of eventually adopting inflation targeting (IT). Transitioning to IT would require, among other measures and reforms, strengthening the monetary policy forecasting and analysis system (FPAS) and better integrating the core quarterly projection model (QPM) into the decision-making process. This TA mission was the fifth from series of quarterly IMF TA missions focused on the FPAS capacity building. It was mainly aimed to simulate initial conditions and compile a QPM-based forecast scenario as a part of a practical forecasting round at the NBRB in March. Moreover, the mission worked with the modeling team to deepen its understanding of the QPM's role in policy decision making and in internal communication.

The planned two-year IMF TA and training project aims at helping the NBRB implementing its reform strategy by assisting in strengthening the analytical tool kit and better integrating it into the decision-making process. As the NBRB is moving forward along its reform strategy towards a framework more in line with IT, policy formulations would have to become more forward looking and based on a better understanding of the current conditions and the underlying forces driving the economy that monetary policy may react to. To fulfill these requirements a semi-structural forward-looking core prediction model, like the QPM, is needed and should serve as the central tool for policy analysis and projections.

The mission worked daily with the NBRB's staff to simulate initial conditions reflecting the current situation in the economy and to compile a QPM-based forecast scenario as a part of a practical forecasting round at the NBRB in March 2018. This main goal of the mission was accompanied by discussing and interpreting not only the baseline forecast scenario, but also alternative scenarios. The mission also worked with the QPM team on other elements of the FPAS, in particular the role of the QPM in the system, structure of meetings during the forecasting rounds, and the adoption of an interest rate-based operating framework at the beginning of this year.

Given the approved calendar of the monetary policy meeting for this year, the authorities started to use model-based results to support policy decisions from March, which is another important milestone of the TA project. The set of regular meetings with the Board presenting and discussing initial conditions and macroeconomic forecasts as a part of the FPAS for each forecast round was approved at the monetary policy meeting in December 2017. The first of the regular forecasting rounds took place in March 2018 and it established and gradually developed a set of internal processes, communication channels, deadlines and responsibilities, constituting a model-based FPAS, which is necessary to further evolve and institutionalize the FPAS within the NBRB.

The summary of the key recommendation and future steps recommended by the TA mission is presented in the table below. Besides the recommendations, the table also provides an implementation timeline and emphasizes that some of them should be addressed prior to the next mission.

Table 1. Key Recommendations

Action	Timing	Comments
Establishing a formal forecasting team (FT) with its head and ensuring its effective operating.	Short Term	Preferably before the next forecasting round.
Expanding the modeling team by at least 2 experts (and providing the team with regular and constructive feedback on their forecasting work).	Medium Term	New members of the team can participate in follow-up TA missions.
Considering a schedule for the next forecasting round (based on Table 2) compiled by the staff considering: • The length of the forecasting round, • Regular data update during the forecasting round.	Short Term	Prior to the next TA mission.
Improving the NTF techniques, especially fiscal analyses and forecasting.	Medium Term	
Remote work of the team with TA experts focusing on any new issues and the update of: • data and NTF nowcast, • IC and forecast scenario, • forecast scenario presentation.	Short Term	Do the updating not only by management request but regularly.
Boosting forecasting and policy analyzing capacity by: • reviewing the QPM and its presentation to NBRB's experts and management, • extending the portfolio of available models for NTF and sectoral projections.	Medium Term	

I. INTRODUCTION AND BACKGROUND

1.   **The NBRB is strengthening its monetary policy following the three-stage strategy recommended by the past IMF TA missions**.[2] The first stage, comprising of a conventional money targeting framework, has been already implemented. During the second stage the NBRB has shifted its operational target to the overnight interbank rate while an intermediate target for broad money in combination with enhanced economic analysis would guide the setting of the interest rate target. The interest-rate-based monetary framework was launched in January 2018. The third and final stage envisaged a gradual shift to fully-fledged IT once the analytical tool kits is sufficiently developed, policy transmission is strengthened and the legal and governance framework is reformed.

2.   **Adopting Inflation Targeting (IT) and increasing monetary policy effectiveness would require broad-based reforms as compressively outlined in the developed Road Map for Transitioning to Inflation Targeting**. The Road Map operationalizes the stages of the reform. The last stage would require in particular *(i)* actions to strengthen monetary policy transmission channels; *(ii)* changes to the legal and governance framework for monetary policy of the NBRB to ensure its institutional and operational independence, responsibility for price stability, and public announcement of medium-term inflation targets; *(iii)* development of a robust methodology for forecasting inflation, including reforms to the internal monetary policy communication and decision making process and its better integration into the decision making and policy analysis processes; *(iv)* development of financial institutions and markets; and *(v)* enhancement of the information policy.

3.   **This medium-term TA project aims to primarily help the NBRB with medium-term inflation forecasting and policy analysis and related tools to effectively support policy making.** The project composed of series of TA and training missions particularly focused on the preparation of forecasts and policy analyses, the medium-term forecasting and policy analysis model, and presentations of the forecasts and policy analysis. It covers in particular *(i)* an updated and enhanced QPM that better reflects the stylized facts of Belarusian economy and the evolving monetary policy framework; *(ii)* an enhanced capacity to maintain, re-calibrate, amend, and operate the QPM; *(iii)* an enhanced capacity for using the QPM in understanding the current conditions of the economy and deciding on the policy adjustments needed to bring inflation in line with the NBRB's target over the medium term; *(iv)* a strengthened role of the QPM within the FPAS to become efficiently and regularly utilized in policy decision making; and *(v)* improved communication, interaction and information sharing among monetary policy decision makers, macroeconomic analysts and sectoral experts. The already provided TA missions have partially covered all the areas; nevertheless, they have been aimed mainly at the work with the QPM.

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[2] The referred past TA missions are Monetary Policy Strategy and Implementation (May 22-June 3, 2013) and Strengthening Monetary Policy Implementation (April 13-April 23, 2015).

II. ENHANCING THE MODELING CAPACITIES: CURRENT SITUATION, MAIN CHALLENGES AND RECOMMENDATIONS

4. **The NBRB gradually improves its monetary policy framework and policy actions in-line with the three-stage strategy.** The NBRB has shifted its operational target to the overnight interbank rate since January 2018. Furthermore, the internal inflation goal for this year is set to 5.5 percent for the overall year-on-year inflation for December 2018, consistent with the official target in the 2018 in the Monetary Policy Guidelines of year-end inflation at "no more than 6 percent."

5. **Since the last TA mission in November 2017 there have been several improvements to the FPAS.** The Board of the NBRB approved a calendar of regular policy meetings for this year constituting a framework for the regular forecasting rounds. This establishment is another significant milestone for processes of the FPAS. Within each of the forecast rounds, which are planned four times for this year, there are three meetings with the Board about initial conditions, first and final versions of the forecast scenarios. The first official QPM-based forecast round started in February and the management presented and discussed the initial conditions with the Board. The second meeting about the first version of the forecast scenario and possible alternatives to the baseline scenario took place at the beginning of the TA mission. Another aspect of the improving FPAS and strengthening the role of the QPM is that estimations of some key variables (output gap, real interest rate gap, etc.) for the current situation in the Belarusian economy have been newly included in a historical development report, Key trends in Monetary Policy, which is publicly available.

6. **The QPM team has recently boosted its capacity to operate the QPM and run policy relevant model-based analyses and forecast simulations.** Between this and the previous TA missions, the QPM team worked regularly and frequently with the model, codes and results that is approved by the progress received from discussions and work during this TA mission. The team worked also remotely with the TA experts, very intensively in particular before the December 2017 monetary policy meeting and simulations of the initial conditions prepared for the March forecasting round (which were presented to the Board in February before this TA mission). Additionally, two members of the team took part in a modeling workshop at the Czech National Bank. There were also the second one-week customized training in February 2018 focusing on forecasting processes, generating and interpreting alternative scenarios and internal communication with the Board.

III. THE PROVIDED TECHNICAL ASSISTANCE

7. **The mission focused mainly on two streams during the TA mission.** The main task of this mission was to work with the core modeling team to re-simulate initial conditions for a forecast and to compile a QPM-based forecast scenario as a part of a practical forecasting round at the NBRB in March 2018. The second stream was focused on the FPAS and its processes, including internal communication, presentations and their structure and a schedule of regular meetings during forecasting rounds.

8. **The mission worked daily with the QPM team and the work was organized as a learning-by-doing process with extensive hands-on sessions provided by the mission expert.** Such a work strategy helps the team to get confidence and familiarity in operation of the model. Moreover, the daily work was designed in the way assisting the NBRB's experts to understand all required steps in model-based forecasting and the motivation behind to allow them repeating the procedures.

9. **The cooperative work between the QPM team and the mission expert, related to the generating a QPM-based forecast scenario, covered several areas.** It mainly included re-simulating initial conditions, generating forecast and alternative scenarios,[3] imposing expert judgments, results interpretation, elaborating risk and uncertainties around the scenarios, discussing related issues and possible problems, and TA mission expert's guidance on compiling a model macroeconomic story and presenting model-based outcomes. Moreover, there were debriefings from the Board monetary policy meeting in December 2017 and presentations of the initial conditions delivered to the Board in February 2018, discussions about presentations of the first and final version of the forecast scenarios. On top of that, a fruitful discussion about the near-term inflation nowcasting and forecasting took place. It revealed an obvious progress in this particular field. On the other hand, based on the discussions, the area of fiscal policy analyses is still not satisfactorily covered although it plays an important element of the Belarusian macroeconomic situation (for more details about this topic see section C Recommendations and Future Steps towards Further Enhancement of the FPAS).

10. **The mission also reviewed the amended and latest structure and calibration of the QPM with respect to the issued identified based on using the model for practical forecasting.** These activities included an amendment of money block (an impact of forex depreciation on money supply), core inflation (very limited direct effect of changes in oil prices to core inflation), dollarization of the economy (an influence of forex depreciation on dollarization), and wage block (re-specification of real wage equilibrium). Although all blocks of the QPM have been discussed and revised several times, they might need to be adjusted again in the future given new information or due to a practical operating the model by the QPM team during upcoming forecasting rounds.

11. **Among other topics covered by the TA mission, there were discussions about a structure of meetings during forecasting rounds and the switch to the interest rate instrument realized at the beginning of this year.** Discussion and setting up a structure of meetings about model-based initial conditions and forecasts, including their content and focus, attendances, structure of presentations, and outcomes of the meetings should help to further improve this important element of the FPAS. The mission also assessed the potential training demands of the staff and agreed on follow-up activities to be undertaken by the modeling team before the follow-up TA mission in the second quarter this year (see section C Recommendations and Future Steps towards Further Enhancement of the FPAS). Moreover, the

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[3] An updated possible forecast scenario, as an example of a model-based simulation, is presented in Appendix.

review of the transition and using the new policy instrument was done mainly from the point of the model framework.[4]

12.   **Given the progress of the project and the outcomes of the TA mission, the authorities will support the continuation of the work and continue in using the QPM-based FPAS to support policy decision making.** The Deputy Chairman of the Board appreciated the work done during the TA missions and stated his continuing support to this project. He also advocated for further improvement in communication of the NBRB—first to build up an efficient internal communication within the FPAS and then use the internal communication for establishing an external communication.

A.   Recommendations and Future Steps towards Further Enhancement of the FPAS

13.   **Because the model-based FPAS started to be in use, it is necessary to further develop it so that the staff of the NBRB will benefit from discussing model-based projections and analyses within the Forecasting Department and with management and the Board in particular**. The central bank should continue in institutionalizing and formalizing forecasting processes. This in particular means to (i) develop a detailed schedule of meetings within forecasting rounds taking into account internal deadlines, constraints and data releases; (ii) follow a set of regular meetings during forecast rounds to discuss and present forecasts developed with the help of the model; (iii) establish a formal forecasting team as a forum for sharing expert views within the Monetary Policy & Economic Analysis Directorate; (iv) formally set up information channels, rights and responsibilities. These will help spreading the knowledge of model-based simulations and results and establishing a common language within institution. At the same time the Board and the management are aware that further TA missions' help and training are needed to further develop forecast procedures and help the staff of the NBRB in forecast rounds. The Board is ready to accept that there is a learning curve.

14.   **As already recommended by the previous TA mission, a formal forecasting team within the Monetary Policy and Economic Analysis Directorate (MPEAD) should be established.** The forecasting team should encompass not only the current modeling team and sectoral experts from the Forecasting Department but also representatives from other departments of the MPEAD. The forecasting team will meet on regular basis during forecast rounds according to a schedule. In the meantime, between the forecast rounds, each team member works on its own agenda. The forecasting team is recommended to consist of the current QPM team, sectoral experts, experts on external development, experts on communication and a head of the FT. Whereas the experts with their responsibilities have started to form the FT, the head of the FT (responsible for managing team activities and bearing responsibility for timely delivery of team work outcomes) is still missing.

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[4] Although the interbank market operations are out of the scope of this TA mission, the mission expert advises to improve the current NBRB's operations in order to effectively manage and control the interbank rate in line with monetary policy decisions. The systematical biasness of the interbank rate compared to the NBRB's refinancing rate since the introduction of the interest rate instrument in January this year calls for an improvement in the monetary policy implementation.

15.	**By establishing the model-based FPAS, risks and benefits of personal substitutability should be carefully considered from the managerial point of view.** The core QPM team currently consists of three experts which can be considered as the minimum number enabling to operate the model. Nevertheless, the model operating agenda will be growing and extending the team is highly desirable. The NBRB's management should expand the modeling team by at least two economists (model operators) to enable the team to cover all important aspects of the forecasting process with the desirable depths and scope.

16.	**The recommended structure and sequence of regular meetings within a forecast round is presented in Table 2.** It shows the meetings in the sequential order how they should follow each other. Meetings of the forecasting team (FT) with the management of departments and the MPEAD and the Board ensure a vertical flow of information from the FT up to the Board and provide crucial feedback from the Board. On top of these meetings, there are meetings of the FT organized at discretion, following needs and work flows during forecasting rounds.[5]

Table 2. Structure of Recommended Meetings during a Forecast Round

Meeting	Week	Purpose	Audience	Outcome
Forecasting techniques	1	Present changes in the QPM and other forecasting tools (technical meeting).	FT management	Approval of changes and amendments of the QPM and other forecasting tools.
Issue meeting	1	Discuss issues which might be important for the Board in the forecast round.	FT management	A list of issues to be analyzed in the forecast round.
Near-term forecast (NTF)	2	Discuss nowcast, NTF and views of sectoral experts.	FT management	Consensual views on current macroeconomic developments.
Initial conditions (IC)	2	Presents, discuss and get a feedback on the IC prepared for the meeting with the Board.	FT management	Management feedback on initial conditions.
Initial conditions meeting with the Board	3	Present and discuss the IC with the Board and get a Board's feedback.	FT management Board	The Board view and feedback on the initial conditions.
First version of the forecast	3	Present the first version of a forecast.	FT management	Consensual view on the forecast.
Meeting on the first version of the forecast with the Board	4	Present and discuss the first version of the forecast. Collect demand for alternative scenarios from the Board.	FT management Board	Board's view on the forecast and a list of alternative scenarios.
Final forecast	4	Present and discuss the final forecast.	FT management	Approval of the forecast by the management.
Meeting on the final forecast with the Board	5 or 6	Present the final version of the forecast.	management Board	Monetary policy decision.
Post mortem	5 or 6	Identify issues during the forecast round.	FT management	Improvements of forecasting processes for the next round.

Note: Meetings with the Board are highlighted in red.

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[5] To ensure a smooth continuation between forecasting rounds, the FT is recommended to take and save notes about main comments, issues and suggested solutions. They can be useful for meetings during follow-up forecasting rounds.

To keep a track of data updates, the schedule of meetings is useful to extend by data releases of main macroeconomic variables so that it is clear when new data is available and if the data is incorporated to the forecast.

17. **The forecasting round should be as short as possible, but not threating any delivery of high quality analyses and projections.** Based on Table 2, the forecasting round should not exceed six weeks to prevent continuous updates of projections by new information, but ensuring that all simulation results are up-to-date. Possible shortening of the forecast round can be achieved by providing the Board with materials for meetings only couple of days in advance, presenting the first version of the forecast to the Board without complete financial programming calculations, providing the QPM team with nowcasts and near-term forecasts simultaneously at one time, etc. At the same time, it is necessary to preserve sufficient conform for the Board during the forecasting rounds.

18. **Although the forecasting round is quite long, the final version of the forecast should be up-to-date.** The presented final version of the forecast should include all the relevant information and newly available data that emerge during the forecast round. This will require setting a cut-off date of data update for the projection reflecting other deadlines and data availability. The deadline should be as close to the Board meeting on the final version of the forecast as possible. Even if new pieces of information are not incorporated to the final version of the forecast, the Board should be briefed about them, including possible implications for the forecast. To avoid big changes of the final version of the projection to the Board compared to previous versions, it is desirable to do data updates gradually after every data release.

19. **As the nowcast and the first quarter of a model-based projection should be re-taken from the NTF tools and sectoral experts, the sectoral experts should provide NTF covering all the required areas.** The areas have been highlighted in reports from previous missions. Although some progress was reached in the NTF techniques and analyses, the fiscal policy area offers a scope for an improvement in particular. To properly assess the fiscal stance on the current situation in the economy and over the forecast horizon, a deeper analysis of fiscal policy and the quantification of a fiscal impulse are required as exogenous factors entering the QPM-based projections. The fiscal impulse should include not only the overall volume of lending provided by the government (in line with the official government program including its various modalities), but also all credits under the subsidized interest rates provided indirectly through other financial institutions (for example through the Development Bank). Moreover, an analyses and outlooks for government sector wages might significantly improve the performance of the wage block of the QPM. A comprehensive analysis of these areas will enable to include the impact of the fiscal policy into the model framework in a more precise way in the future.

20. **Given the fact that the next forecasting round is planned to finish in mid-June, a follow-up TA mission have to take place in late-May to support the QPM team and to enhance communication.** Because the first meeting with the Board of the forecast round is scheduled on May 23, the follow-up mission would be planned for the second half of May ideally. The TA mission will focus on assisting the QPM team at the beginning of the forecasting round. It would mainly concentrate on a generating a fully-fledged forecast and

organization of the whole forecasting round. An important part of the mission will be the interpretation and presentation of the results to the management and the Board of the NBRB and the internal communication in general.

21. **To further support and increase the modeling capacity within the FPAS, the modeling team is advised to continue working with the TA experts remotely in the meantime; especially before the monetary policy meeting on March 14 and for the updating the forecast scenario.** The continuous improvement of modeling capacities and cementing the already gained knowledge is highly desirable for the modeling team and other involved experts participating in the forecast processes. The work after this TA mission and prior to the one scheduled for the second quarter 2018 should be aimed mainly at:

- *Update the current version of the forecast scenario for the monetary policy Board meeting.* This will ensure that the delivered forecast is up-to-date including all available information relevant for policy decision.

- *Keeping the forecast scenario updated before the follow-up mission in May*. The team is advised to re-run the model for the forecast scenarios, compare the outcomes, discuss possible differences and identify potential problems related to the new observations. The current version of the amended model is still work in progress and thus can be easily handled with any amendments and/or recalibration coming from its practical using.[6]

- *Reviewing the structure of the QPM and calibrated parameters.* The team is advised to recapitulate all the model adjustments, extensions and recalibration and discuss any unclearness within the team and with the external expert and/or the management.

- *Prepare a schedule of meetings during the next forecasting round.* The schedule should follow the structure of meetings outlined in Table 2, containing clear deadlines and responsibilities.

- *Updating the outlooks of all exogenous variables.* Prior generating a new forecast, the outlooks of the exogenous variables (including interpretation of their dynamics and assumptions used) are required to be prepared, even if they are based only on experts' views and opinions. During the follow-up mission there will be an official presentation provided by the experts. Additionally, the follow-up missions might review the process and tools used for these outlooks and advice about their adjustments and improvements.

- *Reviewing presentations used during the first forecasting round in 2018.* The modeling team and the management have introduced several presentations based on model simulations. The team is recommended to review find possible improvements and update the presentations.

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[6] Nevertheless the modeling team is not recommended to recalibrate the model independently, but rather to identify possible problems and prepare possible solutions. These will be discussed and implemeneted with the assistance of the TA experts either remotedly or during the follow-up mission. The reasoning behind this procedure is the fact that the recalibration requires some level of experience and to check all the consequencies for model specification and behavior. Sometimes the problems related to the initial conditions and forecasting can even be solved by expert judments implementations.

APPENDIX I. A MODEL-BASED FORECAST SCENARIO

The following simulation of a QPM-based forecast scenario is based on the NBRB's baseline forecast scenario and updated by a new available data as of March 7, 2018. This scenario was not presented to the Board of the NBRB and it is not an official forecast scenario of the NBRB, or the NBRB's Board or management, or the QPM team, or the TA mission expert. It only demonstrates a possible story telling capacity of the model-based scenario with respect to the current and potential future development of the Belarusian economy. It served as an exercise for the QPM team to handle potential issues, constraints and possibilities related to the process of running initial conditions and forecast scenarios.

Figure 1. A Possible Updated QPM-Based Forecast Scenario