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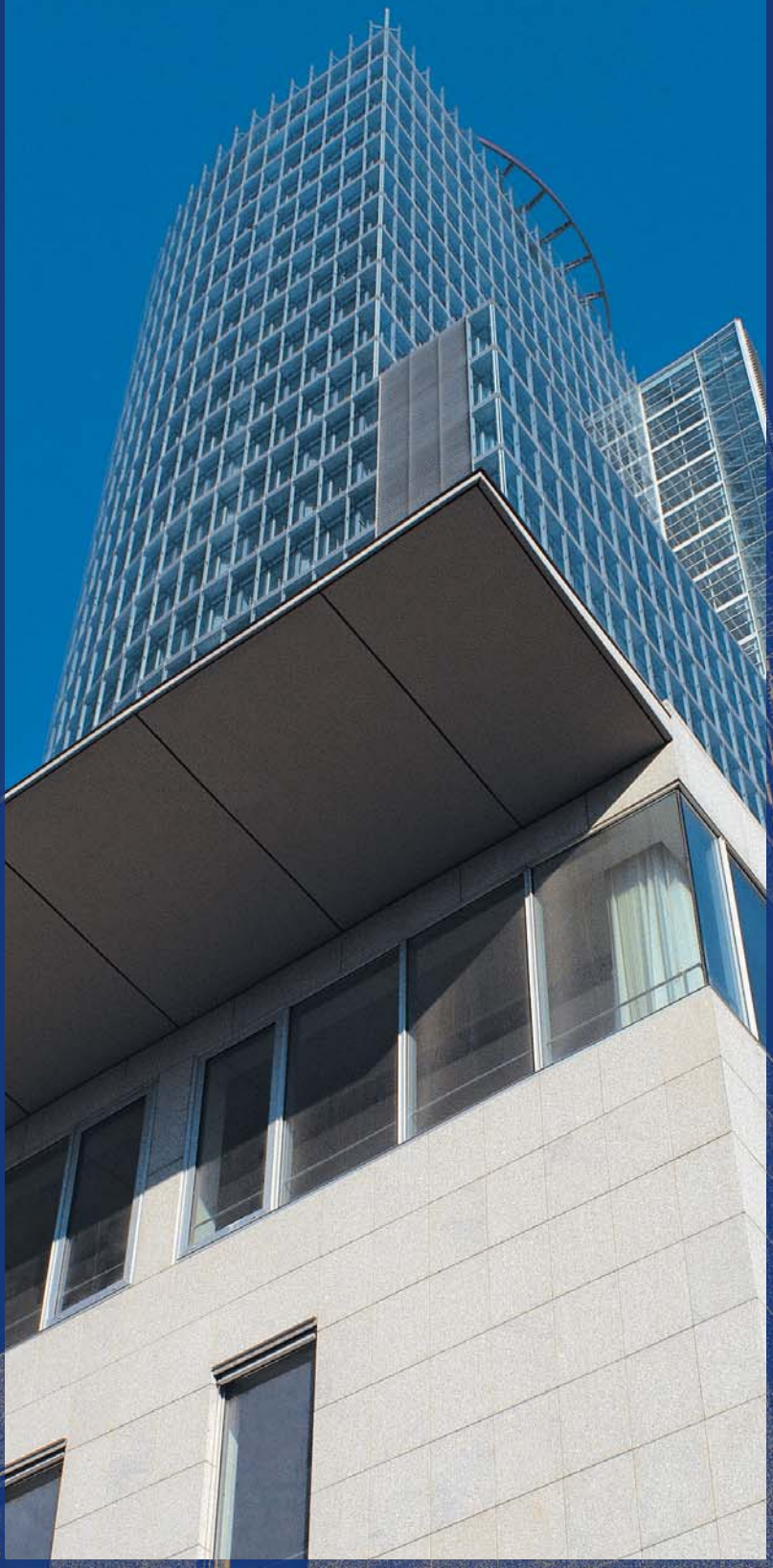

BIATEC

NÁRODNÁ BANKA SLOVENSKA

New challenges

By introducing the common currency, Národná banka Slovenska completed one of its evolutionary stages. Paradoxically, the full membership in the Eurosystem did not entail a decline in the bank's activities, but, on the contrary, many activities were extended or added.

One of them is the preparation of medium term macroeconomic predictions. It has been necessary to adapt the internal prediction making process to the common Eurosystem forecasting process and to start using a new model. At the same time, contacts with the ECB have intensified in the form of bilateral exchange of views as well as by increasing the number of official joint meetings.

Apart from the necessity to adapt to this new system, it has been and it still is necessary to face the challenges brought by the development of the real economy. After many years of GDP growth, during which we had recorded increasingly high growth rates, it was not easy to put up with the possibility of a recession. Expectations of a negative "growth" of Slovakia's economy were almost unthinkable until the end of 2008. A negative growth came true though. However, it remains to be answered, whether the economy reached its bottom in the first quarter of 2009.

Signals from both Slovakia and from abroad are heterogeneous. First signs of a possible recovery have occurred, but mostly rather in the form of stabilised or slightly more positive expectations of economic agents. For the time being, the so-called "hard" data do not correspond to the improved expectations unambiguously. For all that we have endorsed the gold mean with a slight bias towards the more optimistic side in our prediction of the economic contraction in the current year in the NBS when we weighted the individual risks. In an environment of mutual outstripping in publishing more negative data, we consider such an approach appropriate and correct in order to signalize a possible light at the end of the tunnel (resulting from some indicators).

Obviously, we know that there are still some downward risks, especially in the GDP development. In an environment of so considerable uncertainties and unknown reactions of the individual agents within the Slovak economy, which has not been experienced directly until now, all predictions are likely to be equally good or equally wrong. Perhaps the GDP results for the second quarter will bring a clearer signal about the heading of our economy in the current year. However, the problem is that the crisis is global and the lost confidence is hard to restore. Also, the crisis has not originated in Slovakia, therefore there is no domestic cure, whether in the form of monetary or exchange rate policy, to eliminate it. Our fiscal measures can have a social or relieving rather than correcting effect. In spite of the permanently postponed expectations of a recovery in the euro area, it is currently real to expect the year 2010 to be the year of change, the year of global growth recovery. However, in that year, it will be necessary to start dealing with the opposite risk – mainly the risk of the impact of loosened fiscal policies. But that is a topic for one of the next volumes of this journal.

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The process of creating a medium-term prediction at the NBS and basic features of the current prediction MTF-2009Q2

The aim of this article is to shed some light on the basic characteristics of the prediction process at the NBS, which had to be harmonized with the prediction process used at the Eurosystem level at the European Central Bank, both to the professional and to the general public. The second part provides a short presentation of the recent NBS medium-term forecast (MTF-2009Q2).

The forecasting process within the Eurosystem

By Slovakia's accession to the euro area, the NBS has become a member of the Eurosystem and, as its full member; it participates in all activities and processes within the ECB. That includes the participation of the NBS in the forecasting process. The forecasting process within the ECB is represented by four predictions, which are drawn up on a quarterly basis. Twice a year (in June and December) all central banks of the Eurosystem take part in the preparation of a common prediction of the macroeconomic development within a process called "Eurosystem staff macroeconomic projections for the euro area". The other two predictions (March and September) are the result of the prediction process of ECB employees, the so-called "ECB staff macroeconomic projections for the euro area". Predictions of the macroeconomic development include a prediction of the HICP, of the real GDP growth and its components in the medium run (a two year period). The predictions are also an appropriate analytical tool, which offers a complex view on the current and future economic development. The creation of a forecast is a combination of the use of a model-based approach and the judgment of economic experts. The results of predictions are presented to the Governing Council and serve as one of the source materials in the decision-making on monetary policy settings of the ECB.

The forecasting process[1] includes narrow cooperation between the employees of the ECB and individual national central banks (NCB), which is supposed to guarantee that the resulting forecast for the euro area will be based upon all available expert analyses and will be a consensus within the whole Eurosystem. The entire process is under the charges of the Monetary Policy Committee (MPC), whose members are also responsible for the final draft report on the prediction. The Working Group on Forecasting (WGF), which is one of three working groups (in addition to the WGF, it is the working group for econometric modeling and the working group for public finance) submitting their materials to the MPC, is responsible for the creation of particular figures of macroeconomic forecasts, as well as for the creation of the first version of the report.

The forecast creation itself usually takes two months and consists of three basic steps. The first step is the setting of assumptions serving as a source for the whole process. The second step is the actual creation and approval of the final figures of the forecast. At this stage, the prediction for the euro area is created as an aggregation of the individual national forecasts, the consistency of the overall prediction is checked and country forecasts on the part of the ECB and a selected national central bank are evaluated. The last step is the preparation of a report for the Governing Council and its publication.

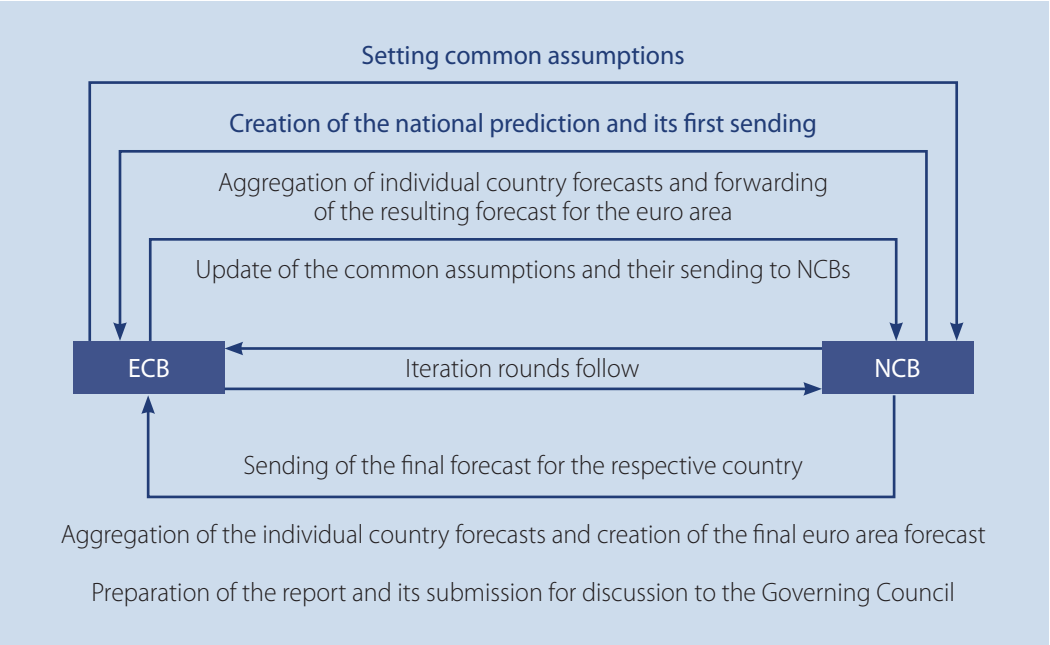
Setting the assumptions

Preliminary assumptions related to the interest rates, exchange rates, international environment and fiscal variables are agreed upon at the beginning of the process. These assumptions are revised and change anytime in the course of the process, if they become inconsistent with the actual economic development.

Creation of the prediction

Based on the agreed preliminary assumptions, which are binding for all national central banks, NCB employees and ECB employees separately create the first predictions. These are described in a standard format in reports, which focus mainly on the basic features of the forecasts of individual countries and describe basic economic principles and specific assumptions at the national level (e.g. the development of the labor market and the wage outlook). Each central bank prepares a forecast for its country and the ECB prepares a prediction both for the individual countries and for the euro area as a whole (the prediction is consistent

1 *ECB: A Guide To Eurosystem Staff Macroeconomic Projection Exercises, June 2001.*



with the aggregate forecast of the ECB for individual countries). The ECB subsequently aggregates also the forecasts of national banks. In connection with the preparation of the prediction, the ECB and the NCB jointly create many supplementary source analyses, dealing with specific technical or structural issues in detail. Forecasts created this way are discussed in detail within the WGF. The discussion and subsequent agreement on the forecast for the euro area are based on a comparison of figures at the euro area level (when the euro area forecast of the ECB is compared to the aggregate forecast of the individual countries, also with respect to supplementary analyses), on a check of the consistency of the forecasts and on an evaluation of the country forecasts on the part of the ECB and selected central bank. Based on the evaluation of the predictions, the results of the consistency checks, as well as possible consultations at the MPC, a list is set up, containing the agreed adjustments, which have to be performed to the country forecasts and subsequently also in the aggregate forecast for the euro area. Several iterations of this process are usually required to obtain final national forecasts and the final macroeconomic forecast of the euro area, which is the result of aggregation of approved revised forecasts of individual countries.

Preparation of the report

At the end of the process, the MPC in cooperation with the WGF prepares a report on the prediction, which is then submitted to the Governing Council for discussion – usually at the first meeting in June or December – and subsequently published at the ECB web site. Only after the publication of the resulting euro area prediction, the national central banks can publish predictions for their countries, which have been prepared within the given prediction process.

It depends on the decision of the national central banks, how many predictions they publish in the course of a year. Some national central banks publish only two a year, as a result of the forecasting process of the Eurosystem, other central banks publish two own predictions with a time lag. The NBS publishes its medium-term predictions four times a year in order to maintain continuity with the period before the accession to the euro area and to achieve quarterly updates of predictions just like in the ECB. Two of the four NBS predictions (the spring and autumn prediction) are the result of the above mentioned forecasting process of the Eurosystem and the remaining two predictions, published in the interim periods, are the result of NBS's own prediction process.

Basic features of the current medium-term prediction of the NBS (MTF-2009Q2)

Since the NBS participates in the prediction process of the Eurosystem, it has been also necessary to harmonize the prediction approach of the NBS. Because predictions are made at quarterly changes of seasonally adjusted economic indicators, the NBS, too, started to monitor and analyze the GDP development that way. That has been a fundamental change against the hitherto drawn up medium-term predictions, which, however, has not influenced the presentation of the prediction in a widely used way in the form of year-on-year dynamics. The NBS has also replaced the original "gap" model by a new macroeconomic model.

The final prediction should contain the "story" behind the economic development and prediction and what has changed compared to the previous prediction (which factors have influenced the economy, and which factors will influence it in the future). To be able to interpret the prediction and make it consistent, it is necessary to

evaluate the current and expected development and compare it to the previous prediction[2].

COMMON TECHNICAL ASSUMPTIONS OF THE PREDICTION AND THE EXTERNAL ECONOMIC ENVIRONMENT

The common technical assumptions of the prediction and the external economic environment will be prepared by the ECB as of determined cut-off date. The date is fixed and changes only in the case of large fluctuations in fundamental indicators (e.g. the oil price). However, the resulting prediction works with data that do not have to correspond to the current situation on the day of publication or of the deliberation at the meeting, respectively. The recent prediction of the ECB is based on assumption from 13 May 2009 and the Governing Council discussed the prediction on 4 June 2009. The medium-term prediction MTF-2009Q2 has been debated by the NBS Bank Board on 16 June 2009.

WHAT DO RECENT DATA TELL US?

The development of the economy in the first quarter was not favorable, because the seasonally adjusted gross domestic product decreased by 11.2% quarter-on-quarter, which represented a more considerable contraction than expected by the NBS. This was due to a reduction in domestic and foreign demand. Investment and final consumption have been the parameters to decrease most within the GDP structure. Because foreign demand for our products plummeted, the net exports also contributed to a negative GDP growth in the first quarter. Only government consumption had a stimulating effect in the first quarter. During the crisis, when production records a decline as a result of low foreign demand and access to funding is more complicated, firms decrease investments in construction and machines. Such a development predominated during the first quarter of 2009. The negative development of the economy in the first quarter was also reflected in the development of the labor market, which can be observed from the number of unemployed (46.6 ths. as compared to the previous quarter) or from a decrease in the number of hours worked (5.6% quarter-on-quarter). Monthly statistics have also indicated a substantial decline in the number of employed persons, but quarterly data have not shown a significant reduction in the number of employed persons so far (reduction by 2.3% against the 4th quarter of 2008). Due to the current economic crisis, the employers probably dismissed contractual employees first and considerably reduced the number of hours worked by employees (reduction of the working hours, shorter working hours, lower number of shifts), subsequently reduced the number of part-time employees only then dismissed the skeleton staff. A part of the employees dismissed and persons having return from abroad have employed themselves as sole-proprietors. That is also confirmed by data on the number of self-employed persons, whose number increased by 18 ths. quarter-to-quarter. Due to a deteriorating sentiment of households and fears of the expected development on the labor market, the households started to save more than spend, so that household consumption decreased significantly and savings started to grow. As to the price development, positive tendencies were recorded in first quarter, since the HICP inflation rate was gradually slowing down to 1.1% in May 2009. This was a reflection of the general trend in the world, where commodity prices decreased significantly and consumption demand fell. Two other important factors exerted influence on the price development during this year. The first one was a low imported inflation. The second factor was the reaction of stores – they decreased prices to prevent purchases abroad.

HOW DO WE SEE THE DEVELOPMENT OF THE ECONOMY IN THE MEDIUM-RUN?

The negative development in the first quarter will also influence the predicted indicators for the whole year 2009. Slovakia will record a decrease in the real GDP by 4.2% according to the current prediction. Within domestic demand, the final household consumption should decline only slightly this year, primarily as a result of the introduction of the car scrapping incentive. The slow growth of final consumption will be influenced by a deterioration of the situation on the labor market, where a decrease in the employment rate, and increase in the unemployment rate and a moderate growth of compensation per employee is expected. Another factor associated with the relatively slow growth of consumption should be a tightening of the credit standards and hence also a lower volume of granted loans. This is particularly documented by the current data and the expected development resulting from the bank lending survey. The investment decline from the first quarter should cease in the next period. In the second half of the year, we expect quarter-on-quarter investment increases, which should be associated with the beginning of the implementation of infrastructure projects and with investment in the automotive sector. However, an investment decline is expected for the year as a whole due to a considerable decline in the first quarter. Due to a decreasing foreign demand, production decreased in the first quarter and firms got rid of their inventories. This process is likely to subside in the following period. The change in inventories should have a dampening effect on the GDP growth in 2009. Foreign demand should be considerably weakened all over the year – the decline for the whole year should reach 12.1% as compared to 2008. For that reason, the current prediction for the whole year expects a negative contribution of the net exports to the GDP growth. As to the development of prices, Slovakia should record a positive trend in 2009. The decrease in the growth of the inflation rate should result primarily from a

2 *In this case, the comparison will be with the April prediction MTF-2009Q1, which is available at the web site of the NBS.*

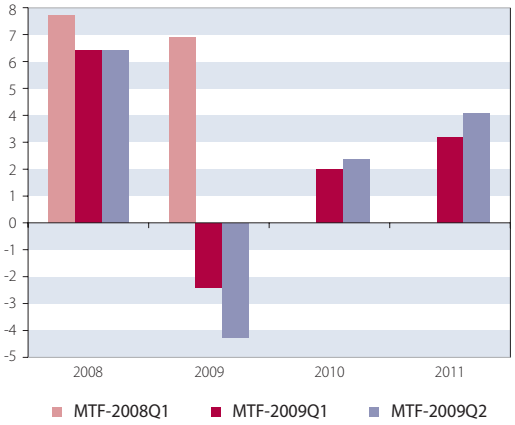
Table 1 Fundamental macroeconomic indicators

Indicator	2008	2009	2010	2011	2009	2010	2011
	Actual	Forecast			Difference with MTF-2009Q1		
Prices (year-on-year dynamics)							
HICP inflation (average)	3.9	1.3	1.8	2.5	-0.4	-0.2	-0.4
CPI inflation (average)	4.6	2.1	2.5	2.9	-0.3	-0.2	-0.4
ULC (compensation per employee at current prices/ESA 95 labor productivity at constant prices)	5.3	6.0	0.0	1.6	1.7	-0.9	-0.8
ESA 95 labor productivity (GDP at constant prices/ESA 95 employment)	3.5	-2.7	2.5	3.7	-1.6	0.6	0.6
Compensation per employee at current prices	9.0	3.1	2.5	5.4	0.0	-0.3	-0.2
Economic activity (year-on-year dynamics, unless otherwise indicated)							
Real GDP	6.4	-4.2	2.4	4.1	-1.8	0.4	0.9
Final consumption of households	6.1	1.0	0.3	3.6	0.0	-1.1	0.5
Final consumption of general government	4.3	2.2	2.1	2.8	-2.2	0.2	0.5
Gross fixed capital formation	6.8	-8.8	3.2	2.0	-8.4	0.7	-1.5
Exports of goods and services	3.2	-18.4	0.8	6.7	-10.1	0.5	3.3
Imports of goods and services	3.3	-17.0	0.3	5.2	-12.2	0.4	1.9
Real gross disposable household income	7.2	2.9	0.8	3.2	-0.4	-0.3	0.5
Output gap (% of the potential product)	0.5	-7.6	-7.3	-7.1	-1.7	-1.0	-1.0
Labor market							
Employment according to ESA 95 (year-on-year growth)	2.8	-1.6	-0.1	0.3	-0.3	-0.3	0.2
Unemployment rate according to the LFS (%)	9.6	11.5	12.0	12.1	0.4	0.3	0.4
Balance of payments							
Openness of the economy (% of GDP)	166.8	137.6	134.2	135.3	-11.9	-11.4	-9.0
Trade balance (% of GDP)	-1.1	-3.0	-2.5	-1.5	0.2	0.4	1.0
Services balance (% of GDP)	-0.7	-1.1	-1.0	-0.8	-0.3	-0.3	-0.2
Current account (% of GDP)	-6.5	-7.5	-6.4	-4.8	-0.2	0.0	0.8
Current and capital account (% of GDP)	-5.3	-5.9	-4.3	-2.8	-0.2	0.1	0.8

decrease in food prices, industrial goods, as well as the prices of services. The average rate of HICP inflation for the whole year should reach 1.3%. Despite a significant slowdown in the growth of prices, no negative inflation is expected this year. The lowest growth of prices should occur in October – it should be 0.6%. The growth should be further positively influenced by a change in regulated prices during this year.

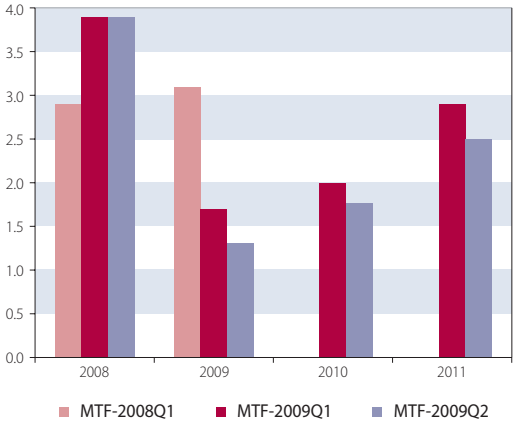
An end of the decline and a subsequent moderate recovery of world demand is expected in the medium-run. This should also influence the performance of our economy. The moderate rebound of the world economy along with investments and a growth of domestic consumption in connection with renewed confidence of households should have a stimulating effect on the GDP growth. The negative development from the contraction of the economy in 2009 should continue and subside in labor market in 2010. The employment rate should decrease insignificantly in 2010, which will be reflected in a growth of unemployment rate. This development will dampen pressures on a wage growth; therefore compensation per employee is expected to grow only slightly. The gradual rebound of the economy from 2010 should also be reflected in the development on the labor market in the following period. Therefore the current prediction expects a slight growth of the employment rate in 2011, as well as a moder-

Chart 1 Influence of the economic crisis on GDP prediction at constant prices (in %)



Source: NBS.

Chart 2 Prediction of the average rate of HICP inflation (in %)



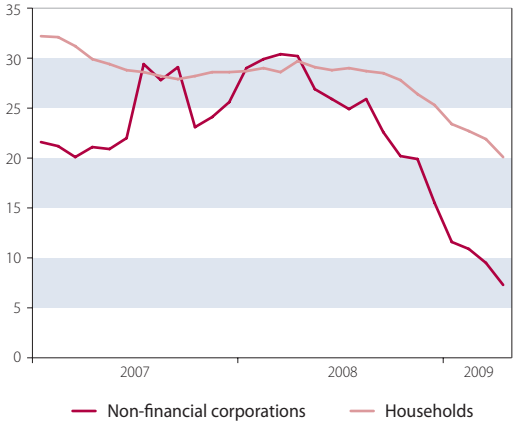
Source: Statistical Office of the Slovak Republic, calculations of the NBS.

ate acceleration of the growth of compensation per employee in the medium-run. The rebound of global economic activity in the medium-run is associated with a growth of commodities prices and imported prices. This should be reflected in a faster rise in prices in Slovakia. The average annual rate of HICP inflation should gradually accelerate from 1.3% in 2009 to 2.5% in 2011.

What has changed against the previous prediction?

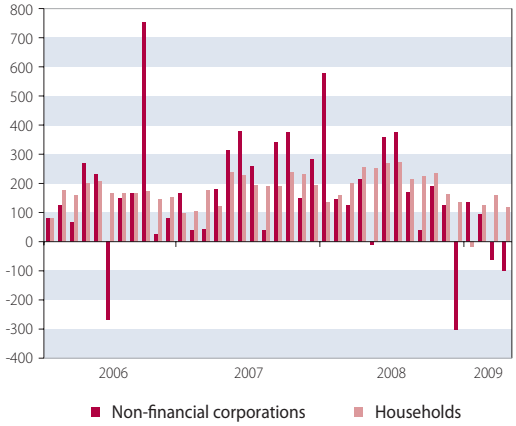
The current prediction expects a lower growth of world demand than in the previous prediction MTF-2009Q1 over the entire forecast horizon. That is the most important factor influencing the current MTF-2009Q2 prediction of the real economy. The most significant change has been the expected world demand for 2009, the deterioration for the following years was only very moderate. That is why a more significant contraction of the economy is expected in 2009 as compared to the MTF-2009Q1. Economic growth should accelerate slightly in the following years as a result of new information on investment plans in the automotive industry. The outlook for the structure of the GDP changed as compared to MTF-2009Q1. The growth of final household consumption should slow down in 2010 against MTF-2009Q1, which should reflect a more considerable slowdown of disposable income growth. The slowdown will result from a faster decrease in employment, a higher growth in the number of unemployed persons and a lower growth of compensation per employee. In 2011, the forecast expects a more positive development on the labor market resulting from a faster recovery of the economy. This should be reflected in a higher than expected growth of final household consumption. In the field of investment, there was a reevaluation of government investment in infrastructure projects as compared to MTF-2009Q1 in that the second PPP project package was explicitly included. Furthermore, a more negative outlook of the economy was taken into account in the form of

Chart 3 Development of the year-on-year dynamics of the growth of loans to households and non-financial corporations (in %)



Source: NBS.

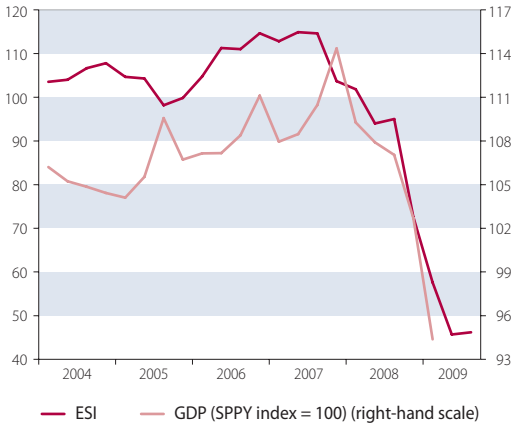
Chart 4 International increases in the credit volume (in m. EUR)



Source: NBS.

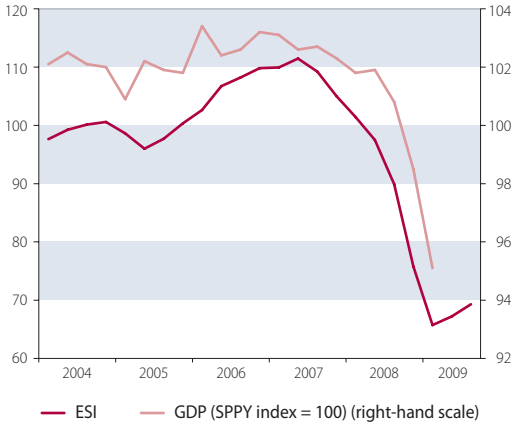
a decrease in profitability of businesses and the related decrease in investment in that sector. Those factors have caused an upward shift in investment growth in 2010 and a downward shift

Chart 5 Development of the GDP and the economic sentiment indicator in Slovakia



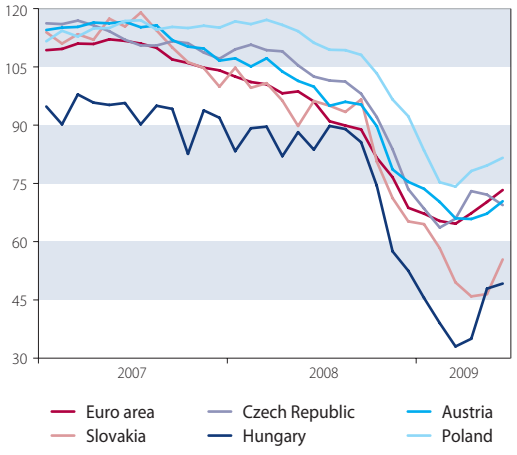
Source: Statistical Office of the Slovak Republic, European Commission.

Chart 6 Development of the GDP and the economic sentiment indicator in the euro area



Source: Eurostat, European Commission.

Chart 7 Development of the economic sentiment index



Source: European Commission.

in 2011 against MTF-2009Q1. The contribution of net exports remained the same in 2010 as in the MTF-2009Q1, but the launch of the production of a new car was taken into account for 2011. That should increase the export performance of the Slovak economy; therefore net exports should record a more positive contribution to the GDP growth in 2011. As regards inflation, a lower inflation growth is expected compared to the MTF-2009Q1, above all as a result of a slower recovery of the world economy and the resulting lower imported inflation.

From the charts above it is clear that the financial and economic crisis abroad has also become evident in Slovakia, particularly in the outlook for 2009. The world economic crisis has been primarily reflected in a lack of liquidity and contraction of world trade. Slovakia has been particularly influenced by a decrease in world trade. The financial crisis affected Slovakia only marginally, because the Slovak banking sector had sufficient liquidity. The financial crisis hit Slovak households and the business sphere in the form of tightened credit standards demanded by parent banks due to an increase in the perceived risk during the slowdown of economic activity. The lower economic activity influenced not only the loan supply, but also the loan demand on the part of non-financial corporations and households. The loan demand also contributed to a deceleration of the year-on-year dynamics of credit growth to both sectors. Month-on-month increases in loans to non-financial corporations reached negative values, too, in the last months, which means that a greater part of loans was repaid than granted.

Risks of the medium-term prediction

The medium-term prediction MTF-2009Q2 involves risks. In this period, uncertainties are even higher, because it is not sure when the world economy will rebound. For that reason, the most important risks in the current forecast include precisely a more considerable and longer than expected impact of the world crisis by means of lower foreign demand on the export performance of Slovakia, investment and domestic consumption, as well as a more considerable tightening of credit standards. Such a development can be reflected in a deeper GDP decrease or in its more moderate and later rebound. The predominant risk in the GDP growth prediction is a downward risk. Regarding the price development, the risk is more or less balanced downward and upward risk. On the one hand, there is the risk of non-recovery of economic activity, on the other hand the risk of a possible more considerable growth of commodity prices in the world markets.

Have we reached the bottom?

The sharp contraction of economic activity in the first quarter of 2009 does not have to indicate that the Slovak economy has reached its bottom. The recent forecast used recent up-to-date data of March, which already suggested an end to the contraction. However, further published monthly data for April show that the development of the economy could be even worse than presented in the current prediction. On the other hand the de-

velopment of the sentiment not only in the euro area, but also in Slovakia and the neighboring countries indicates the opposite trend (i.e. an end of the decline and a subsequent slight growth). This is documented by charts 5 to 7.

Although monthly economic data indicate tendencies of how the economy could develop in the next period, their development does not always correspond to published quarterly data, because only preliminary data for selected sectors is available on a monthly basis. This was also the case in the first quarter of 2009. High declines in industrial production and sales and a deteriorating development on the labor market have indicated an even worse decline of the GDP than published, but firms have also decreased costs associated with production. Therefore the monthly April data may, but do not have to, indicate a further deterioration of the development of the economy. However, great uncertainty continues and therefore only data for the following months will indicate if the risks outlined in the current prediction MTF-2009Q2 are materializing.

Conclusion

The NBS participates in the prediction process within the ECB, where the output is a forecast for the euro area as a whole. The forecast is obtained by aggregating prediction of individual countries. The basis for this process is the formulation of the prediction on the basis of the same technical assumptions and assumptions on the external economic environment. In the current spring prediction round, the NBS presented the basic tendencies and characteristics of the recent outlook to the public. Based on its communication strategy and for the sake of transparency, the NBS also prepares two other predictions, in which it publishes its predictions in the medium-run. All four predictions of the NBS are published on the web site of the NBS, they are also communicated at press conferences and their primary objective is to inform the public in an independent way on the expected economic development in Slovakia. The current NBS prediction is the medium-term forecast MTF-2009Q2 published in June. The published prediction shows the expected development of fundamental macroeconomic indicators, highlighting the risks of materialization of such a scenario. Only monthly indicators to be gradually published will indicate whether the Slovak economy has already reached its bottom.

(An article by the staff of the Monetary Policy Department of Národná banka Slovenska)

A structural model of the Slovak economy

Branislav Reľovský, Jana Široká
Národná banka Slovenska

Slovakia's accession to the euro area terminated one phase of monetary policy in Slovakia. The model approaches used for forecasting and analytic purposes until 2008 do not meet the needs of the central bank resulting from its participation in the Eurosystem any more. For this reason, the NBS has been using a new model apparatus – a structural model of a small open economy – since the day of the adoption of the common European currency.

The cyclical (gap) model[1], used until recently, described the active role of monetary policy consisting in correcting the cyclical part of the economy (i.e. deviations of economic fundamentals from their long-term or equilibrium trends) under an inflation targeting regime. The new structural model, by contrast, is a stock-flow model (i.e. modelled economic quantities do not occur in the form of deviations from the equilibrium, but in absolute volumes, be it flow quantities such as deficit, investments and net foreign assets or their stock counterparts such as cumulative debt, capital stock and wealth) with an exogenous monetary policy consistent with the current euro area membership.

The new model is used to meet two basic needs resulting from this membership and from domestic requirements, too. It is used for *forecasting purposes* – twice a year, the process of producing a forecast for the Slovak economy is part of the forecasting process of the Eurosystem (Broad Macroeconomic Projection Exercise – BMPE) and, twice a year, the model is used to prepare the internal forecast of the central bank. Further, the model meets the *analytical needs* – it is used to simulate monetary-policy, fiscal, price or supply shocks, the reactions to which serve as inputs for analyses conducted by ECB and focused on the entire euro area or analyses related exclusively to the domestic economy.

The new model can be briefly characterised as a standard medium-sized econometric model based on a synthesis of the AWM model[2] used by European Central Bank. The model is backward-looking as it takes a simplified approach to expectations by including lagged values of the modelled economic quantities. Thus, only adaptive expectations actually occur in the model. The external environment is considered to be exogenous and since the model describes solely the domestic economy, it is a so-called *one-country model*. The aim of the presented model description is to provide a brief overview of its theoretical fundaments and a simplified description of its structure; detailed model documentation will be published independently.

With regard to the current trends in macroeconomic modelling, it is necessary to state that, looking ahead, the new model represents a kind of intermediate step on the road to the development of a complex model of the Slovak economy based on microeconomic foundations. The model apparatus of the central bank used for the above mentioned purposes should comprise a dynamic stochastic general equilibrium (DSGE) model in the future.

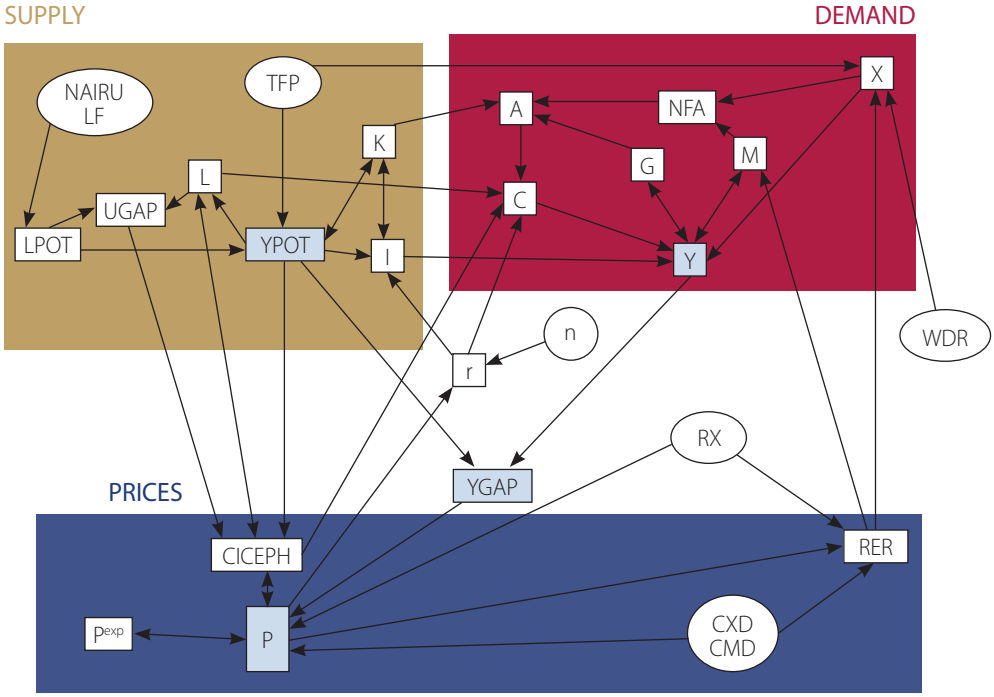
Model characteristics

The structural model of a small open economy is formulated in a way ensuring that a set of basic economic relationships holds in the long run. These relationships theoretically correspond to a so-called steady state, in which the production level is determined by the supply side of economy, i.e. by factors of production and their total productivity or technological progress. However, in the short run, economic performance, as measured by the gross domestic product, is determined from the demand side.

The model architecture ensures that, in the long run, the steady state is achieved and, in case of supply, demand or price shocks, returned to equilibrium. In most cases, the long-term model relationships are directly derived from theory (for example from the first order conditions for labour and capital resulting from maximisation of profit generated by production of aggregate product), while short-term dynamics are estimated to fit historical data as accurately as possible. In estimation, necessary restrictions were imposed ensuring the required model properties in the long run (convergence and homogeneity).

Households, firms and the government play the role of domestic agents in the model. Monetary policy is performed outside the domestic economy, which implies the absence of domestic monetary authority. Along with foreign economy, the monetary-policy setting is thus exogenously given. The households are owners of capital and labour. Both factors of production are offered to firms which produce the aggregate product, their production technology being described

1 *Gavura, M. and Reľovský, B: A simple model of the transmission mechanism of Slovakia's economy, its structure and properties. BIATEC, volume 13, 4/2005, National Bank of Slovakia.*
2 *Area-wide model; see Fagan, G., Henry, G. and Maestre, R.: An area-wide model (AWM) for the euro area. ECB Working Paper No 42, January 2001, European Central Bank.*



by a Cobb-Douglas production function.[3] The objective of the firms is to maximize the production profit, i.e. the difference between sales of the product produced at the given price level and labour and capital costs at the given factor prices.[4] The objective function of a representative firm in an above-described framework can be defined as follows:

maximize

$$YPOT.PY - CICEPHN.LPOT-(r + \delta + \lambda).K.PY$$

subject to technology

$$YPOT = TFP.K^{\beta}.LPOT^{1-\beta}$$

The objective function implies that firms maximize their profit if and only if the first order condition with respect to capital $K/YPOT = \beta/(r + \delta + \lambda)$ holds simultaneously with the first order condition with respect to labour $CICEPH.LPOT/YPOT=1- \beta$. The optimality conditions characterize the steady state of the modelled economy and are valid in the long run, when it also holds that the real production is equal to the potential product of the economy. However, deviations of reality from the equilibrium exist objectively in the short run, both in the sense of a non-zero output gap and, more importantly, in the sense of invalidity of the first order conditions. The temporary disequilibrium on the goods market is achieved in the model by determining the production from the demand side in the short run. The temporary invalidity of the first order conditions, but at the same time the necessity to fulfil them in the long run, is provided for by an error-correction formulation of the model equations.

The model consists of three blocks – the block of the supply side of the economy, the block of the demand side of the economy and the price block. The diagram above shows the structure of links within the individual blocks and illustrates which economic quantities ensure the links between blocks within the model as a whole (and how).

The block of the supply side of the economy describes the technology of production of the aggregate product and the way of accumulation or level determination of the factors of production. The Cobb-Douglas production function determines the volume of potential output (YPOT) as a function of[5] the capital stock (K), potential employment (LPOT) and total factor productivity (TFP), which is exogenous[6]. The capital stock in the economy increases from period to period by investment (I) and decreases by depreciation (the depreciation rate is determined by the parameter δ)[7]. At the same time, it holds that in the long run investment is given by the first order condition with respect to capital, the real interest rate (r) being unambiguously determined by projecting the price level (P) to the nominal interest rate (n), which is given exogenously due to the loss of independent monetary policy. Employment (L) is determined by an inverse production function in the long run, while the natural rate of unemployment (NAIRU) together with the labour force (LF) determine the potential employment (LPOT). The difference between the actual and the potential employment, or between the actual and the natural rate of unemployment, defines the labour market disequilibrium (UGAP).

While the block of the supply side of the economy determines the level of production achieved in the long run, the block of the demand side of

3 The volume of production, or potential GDP (YPOT), depends on the total factor productivity (TFP), the capital stock (K) and the number of persons which can be involved in the production process – i.e. the potential employment (LPOT). The parameter β determines the relative weights of capital and labour in the production process.

4 Sales, expressed in nominal terms, depend on the volume of production (YPOT) and the price level (PY denotes the GDP deflator). The wage costs are determined by the number of working persons (LPOT) and the level of nominal compensations per employee (CICEPHN). The costs of capital are determined by the nominal value of employed capital (K.PY) and by effective costs per unit of capital r+δ+λ (r stands for the real interest rate, δ stands for the rate of capital depreciation and λ is the risk premium).

5 The arrows show links between individual quantities occurring in the model; for example: X → Y means that the X variable directly influences the Y variable.

6 The variable names framed by round line are exogenously given, while those framed by broken line are endogenous model variables.

7 A more detailed view on the individual identities as well as behavioural equations of the model is provided by the overview box below, which provides an abbreviated notation of all of the model equations. The above diagram captures only the most important links within the model.

Box 1

The block of the supply side of the economy

$YPOT = TFP \,.\, K^{\beta} \,.\, LPOT^{1-\beta}$

$K \equiv (1-\delta) \,.\, K_{-1} + I$

$I = I\,(I_{-1}, Y, r, I^*(r, \delta, \lambda, Y/K))$

$LPOT \equiv LF \,.\, (1 - NAIRU)$

$L = L\,(LPOT, Y/TFP, CICEPH/TFP, L^*(Y/(TFP \,.\, K^{\beta})))$

$YGAP \equiv Y/YPOT$

$UGAP \equiv (LPOT - L)/LF$

The block of the demand side of the economy

$Y \equiv C + G + I + X - M$

$C = C\,(C_{-1}, DISPY, r, C^*(DISPY, A))$

$DISPY = DISPY\,(CICEPH, L)$

$A \equiv K + D + NFA$

$D \equiv D_{-1} + G - \tau \,.\, Y$

$NFA \equiv NFA_{-1} + X - M$

$G = G\,(G_{-1}, Y, G^*(D/YPOT))$

$X = X\,(WDR, WDR_{-1}, RER, TFP, X^*(WDR, RER, TFP))$

$M = M\,(WDI, RER, M^*(WDI, RER))$

$WDI = WDI\,(C, G, I, X)$

The price block

$CICEPH = CICEPH\,(LPROD_{-1}, PC/PY, UGAP, CICEPH^*(LPROD))$

$PY = PY\,(PY_{-1}, PM, YGAP, PY^*(ULC))$

$PC = PC\,(HICP)$

$HICP = HICP\,(HEG, HEX)$

$HEG = HEG\,(POIL, RXUSD, PY)$

$HEX = HEX\,(HEX_{-1}, CMD, RXEUR, PY, YGAP_{-1}, HEX^*(PY))$

$PG = PG\,(PG_{-1}, PI, PC, PG^*(PC, PI))$

$PI = PI\,(PI_{-1}, PY_{-1}, PI^*(PY, PM))$

$PM = PM\,(CMD, RXEUR, POIL, RXUSD, PM^*(PY, CMD, RXEUR, POIL, RXUSD))$

$PX = PX\,(PY, CXD, RXEUR, PX^*(PY, CXD, RXEUR))$

the economy formalises the assumption that the level of economic activity in the short run is determined only by demand. The gross domestic product (Y) thus equals the sum of the individual demand components – private consumption (C), general government consumption (G), investment (I) and net exports (X-M). The consumption of households (C) depends on the level of disposable income (DISPY) and accumulated wealth (A), but the interest rate (r) also influences its level through the channel of deciding on what portion of disposable funds is directed to savings and what portion goes to immediate consumption. As regards the general government, its consumption spending follows a simple fiscal rule of maintaining a given debt to GDP ratio. The imports (M) are determined by production activity (Y) via import intensity, while the exports (X) are driven by external demand (WDR). The net foreign assets (NFA) increase by net exports (X-M) each period, and the sum of NFA, capital stock (K) and government debt (D) defines wealth (A)[8], which together with disposable income determines private consumption.

Within the price block, the domestic price level (P) is unambiguously determined by the unit labour costs (ULC) in the long run. Besides that, competitors´ prices on the import (CMD) and the export side (CXD) as well as the exogenous nominal exchange rate (RX) and the output gap (YGAP) are reflected in the price level. The price level and the price of labour (CICEPH) significantly influence each other, because on the one hand higher wages exert demand pressures on inflation by means of higher consumption, while on the other hand the higher prices put higher pressure on the growth of compensations as demanded by employees during wage negotiations. Of course, when negotiating the wages, the households take into account consumer inflation (PC), relevant to them, while production prices (PY) are crucial for the firms in their decisions. Such differentiation is reflected in a considerable degree of disaggregation of the price block in the model, the uniform price level for the whole economy (P) being replaced by a set of deflators for all GDP components. The basic deflator, in the sense of anchoring the price level, is the GDP deflator (PY); other deflators depend on it and are derived from it. More detailed information about links within the price block is shown in the above box providing an overview of all model equations.[9]

The individual model blocks are not isolated from each other. The connection between the supply block and the price block is provided for by the labour market disequilibrium (UGAP), which plays a crucial role in wage negotiations, because the amount of compensation for work (CICEPH) determines the actual labour demand (L) and vice versa, the number of competing job candidates

8 *The model assumes that both capital and government bonds are owned by households.*

9 *To provide an accurate elucidation of the error-correction specification, the abbreviated equation notations express both short-term dynamics (the list of function arguments begins with the quantities which occur in short-term relations) and the long-term links (the function argument indicated as the last one, marked with an asterisk, denotes the value of the function in the long run – the brackets after the argument contain a list of variables on which this long-term level depends). For example, the notation C = C (C–1, DISPY, r, C* (DISPY, A)) means that current private consumption (C) is determined by the level of consumption in the last period (C–1), the value of disposable income (DISPY) and real interest rate (r), as well as the deviation from its equilibrium value (C*), which, in turn, depends on disposable income (DISPY) and accumulated amount of wealth (A).*

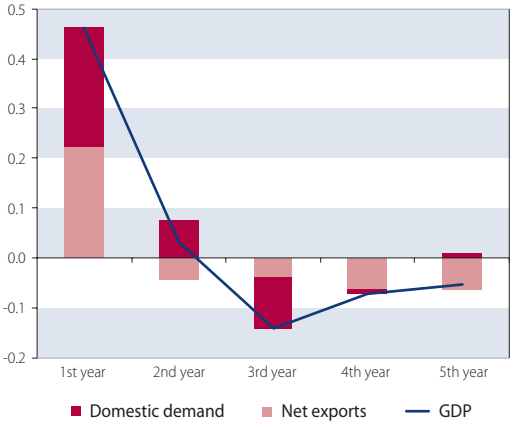
determines the strength of a successful candidate in wage negotiations. Wages are governed by the first order condition in the long run according to which the growth of wages must correspond to the growth of labour productivity in the steady state.

The supply block is interconnected with the demand block through the link of exports (X) to total factor productivity (TFP). This link represents a formulation of the real convergence hypothesis supposing that a faster growth in labour productivity (and thereby also in TFP) as compared to foreign countries provides the domestic economy with a competitive advantage, from which domestic exporters benefit. Other interconnections are provided for by the capital stock (K), determining the wealth (A) and thus ultimately household consumption (C); and the employment (L), which together with compensations (CICEPH) defines the disposable income of the population (DISPY) determining its final consumption again (C).

The interconnections between the price block and the demand block are provided for by wages (CICEPH) determining the level of private consumption (C) by means of disposable income (DISPY). An important link is also constituted by the domestic price level (P), which – adjusted for the nominal exchange rate (RX) and foreign prices (CMD, CXD) – defines the real exchange rate (RER) determining foreign trade competitiveness and performance (both X and M). While nominal convergence (a faster growth in domestic price level compared to the trading-partner economies) causes an appreciation of the real exchange rate and deteriorates net exports by weakening the exports and increasing the import attractiveness, real convergence, a faster growth in labour productivity and a positive differential in the development of domestic and foreign TFP have the opposite impact on the development of net exports. As mentioned previously, the growth of total factor productivity supports the exports and thereby eliminates the negative influence of nominal convergence.

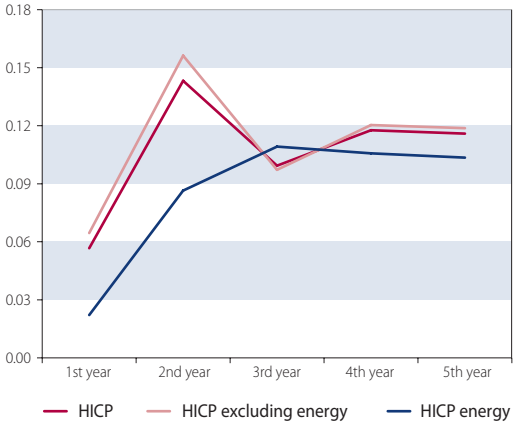
Due to a missing domestic monetary authority, it is not possible to close the model by a monetary policy rule. Therefore, disequilibrium between aggregate supply (YPOT) and demand (Y)

Chart 1 Demand shock – GDP and its components (p.p.)



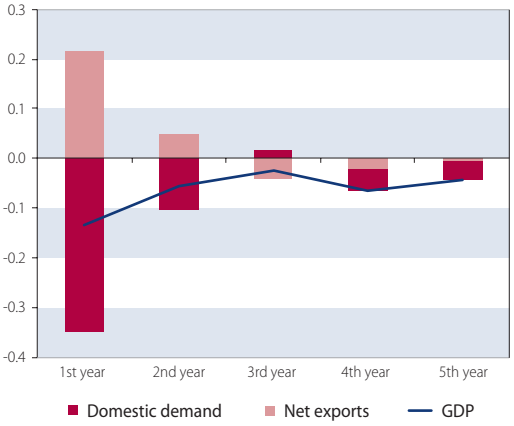
Source: NBS.

Chart 2 Demand shock – HICP and its components (p.p.)



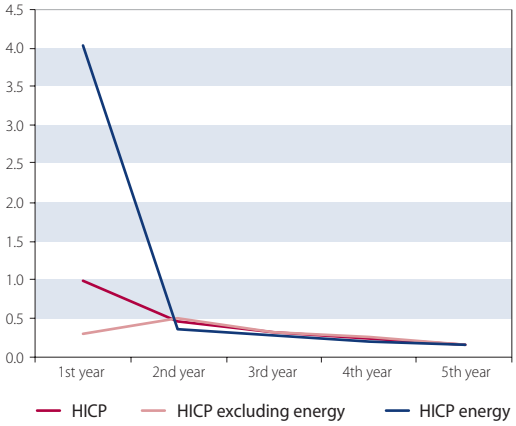
Source: NBS.

Chart 3 Supply shock – GDP and its components (pp.)



Source: NBS.

Chart 4 Supply shock – HICP and its components (p.p.)



Source: NBS.

provides for a closure of the model in that the cyclical position of the economy (YGAP) is reacted to directly by the price level (P or PY). In simplified terms, the mechanism of establishing the equilibrium consists in the correction of domestic price level causing such a shift of the real exchange rate and terms of trade that the subsequent reaction of net exports brings the demand side in line with the supply side and thereby leads to equilibrium on the goods market.

Model properties

To verify the predictive and analytical model qualities, testing on series of shocks is used as a standard. The testing confirms not only the model's proper structure, but also the estimated model parameters. Two types of shock are simulated on quarterly data – a demand shock is simulated by increasing external demand and a supply shock by an increase in oil prices. The results are presented on annual data in the form of differences between year-on-year growth rates of the shock scenario and the baseline scenario (in percentage points (p.p.)).

The demand shock – an increase in external demand

This shock simulates a permanent increase in external demand by 1%. Such an impulse stimulates foreign trade immediately. Exports grow immediately and imports grow as well due to import intensity of exports. The growth of external demand is reflected in a growth of labour productivity and real wages, which also stimulates domestic demand. By means of investment, the capital stock is increasing and thereby the supply side of the economy is also getting higher permanently. The GDP growth will rise by 0.45 p.p. in the first year of the shock; both domestic and external demand components exhibit positive contributions to this. The GDP growth is higher by approximately 0.05 p.p. in the second year. Domestic demand exhibits a positive contribution to the growth, but the contribution is negative on the part of foreign trade, since export performance is already stagnating and imports are increasing because of domestic demand. In the following years, the GDP dynamics slows down due to both domestic demand and foreign trade. The price development in the given shock is influenced by a faster growth of demand than of the supply side of the economy. HICP inflation will increase approximately by 0.06 p.p. in the first year of the shock, its dynamics will accelerate subsequently and it will be 0.14 p.p. higher in the second year. In the remaining years, the price level growth dynamics is approximately 0.1 p.p. higher.

The supply shock – an increase in oil prices

This shock simulates a permanent increase in oil prices by 20%. The increase in oil prices causes a growth in energy expenditures of businesses and households. Such an increase in prices immediately induces a contraction of demand and thereby also of production. Labour productivity is on the decline along with real wages. Domestic demand drops sharply and negatively affects the GDP growth. Net exports, by contrast, stimulate GDP growth, because the decline in imports exceeds the decline in exports. However, the GDP as a whole is on the decline; the GDP growth is expected to contract by 0.13 p.p. in the first year of the shock and up to 0.1 p.p. in the remaining years. Regarding the price development, a noticeable item is the growth of energy prices, as the growth in oil prices is gradually translating to the energy prices and secondarily also to other HICP components. Overall, the HICP growth will rise by about 1 p.p. in the first year of the shock, energy prices (HICP energy inflation up by 4 p.p.) significantly contributing to the rise. In the second year of the shock, the growth in prices is not as significant as in the first year, but secondary effects due to the growth in oil prices are gradually going to become evident in other consumer basket items, too. The dynamics is still higher; the HICP inflation will rise approximately by 0.5 p.p. in the second year. In the remaining years, the dynamics of the growth in prices is gradually decelerating; however, it is still above its pre-shock level.

Conclusion

The structural model implemented by Národná banka Slovenska simultaneously with the introduction of the euro represents another important milestone in econometric modelling at the NBS. The requirements resulting from the Eurosystem membership, as well as the efforts to extend the analytical apparatus used so far, have created room for a new tool, which makes it possible not only to solve complex tasks in the field of forecasting and monetary policy, but also to analyze various economic policy instruments. The model created will be further developed and extended, representing a natural continuation of this work.

List of abbreviations used:

A – wealth
C – private consumption
CICEPH – compensations per employee
CICEPHN – nominal compensations per employee
CMD – competitors´ prices on the import side
CXD – competitors´ prices on the export side
D – government debt
DISPY – disposable income of the households
G – public consumption
HEG – HICP index of energy prices
HEX – HICP index excluding energy prices
HICP – HICP index
I – investment
K – capital stock
L – employment
LF – labour force
LPOT – potential employment
LPROD – labour productivity
M – imports of goods and services
n – nominal interest rate
NAIRU – natural rate of unemployment
NFA – net foreign assets
P – price level
PC – private consumption deflator
P^{exp} – inflationary expectations
PG – public consumption deflator
PI – investment deflator
PM – import deflator
POIL – oil price
PX – export deflator
PY – GDP deflator
r – real interest rate
RER – real exchange rate
RX – nominal exchange rate
RXEUR – nominal exchange rate (SKK/EUR)
RXUSD – nominal exchange rate (SKK/USD)
TFP – total factor productivity
UGAP – unemployment gap
ULC – unit labour costs
WDI – composite import demand indicator
WDR – foreign demand
X – exports of goods and services
Y – gross domestic product
YGAP – output gap
YPOT – potential gross domestic product
β – capital share of income
δ – capital depreciation rate
λ – risk premium
τ – ratio of government revenues to GDP

Asymmetric fan chart – a graphical representation of the inflation prediction risk

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A prediction of macroeconomic indicators is the first step in providing information on where the economy is heading. However, any such prediction involves a certain degree of uncertainty or risk.

Asymmetric distribution of the prediction risk

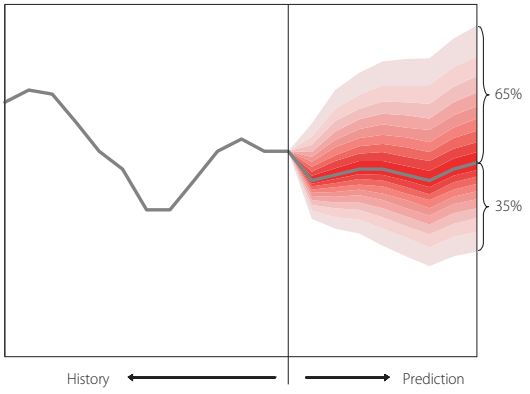
The uncertainty of a prediction is related to the risk in the input assumptions for exogenous variables, to the use of simplified econometric models, but it can be also related, for example, to data revision. All such risks cause a deviation of the actual values for individual indicators from their point predictions. It is therefore obvious that a point prediction does not have to be sufficient to get a complex picture of the expected development of the individual indicators. Instead of point predictions, risks are allowed for in the form of publishing interval predictions in practice. In recent years, a modern information tool for the communication of uncertainty resulting from the prediction of macroeconomic indicators has been a graphical output showing an estimate of the probability distribution of the prediction of the indicator under consideration – the fan chart. Fan charts were used for the first time by the Bank of England in 1996 and several central banks started to use them subsequently thanks to their obviousness and easy to comprehend form.

A fan chart is currently used in the forecasting process of the NBS when presenting an estimate of the development of inflation within a medium-term prediction.[1] It is based on a simple empirical approach, in which the uncertainty of inflation prediction (the width of the interval around the point prediction) is estimated based on historical prediction errors. In this case it is assumed that the probability of reaching higher inflation compared to the point (baseline) prediction is the same as the probability of reaching a lower inflation. In the graphical form, this is represented by the same width of the interval below and above the baseline prediction. This is called symmetric distribution of risk or a symmetric fan chart.

Although a symmetric fan chart resolves the issue of uncertainty, it does not enable to take into account current (real) risks of shocks in the economy (for example a higher then expected foreign demand, changes in oil prices or a higher then expected growth of nominal wages). These are risks that can bring about an asymmetric upward or downward bias of the uncertainty prediction, for there are many real situations, where it is necessary (indispensable) to allow for such risks. A risk factor, for example in the form of a possible faster growth of oil prices as compared to the assumptions of the baseline prediction, would represent a unilateral pro-growth risk in reality. Materialization of such a risk would mean that inflation should be higher than forecasted with a higher (more than 50%) probability. At the same time, this reduces the probability (less than 50%) that inflation will be below its forecast level. There would be also a shift, but not a widening, of the intervals towards higher levels. However, it has to be emphasized that the baseline prediction does not change this way and it will continue to represent the most probable scenario of the development of inflation.[2] It will not be, however, in the middle of the expected interval anymore. A graphical representation of the prediction allowing for such a type of risk represents a shift from a symmetric to an asymmetric fan chart.

Consequently, the main benefit of using asymmetric fan charts should be an extension of the view on existing risks accompanying the predic-

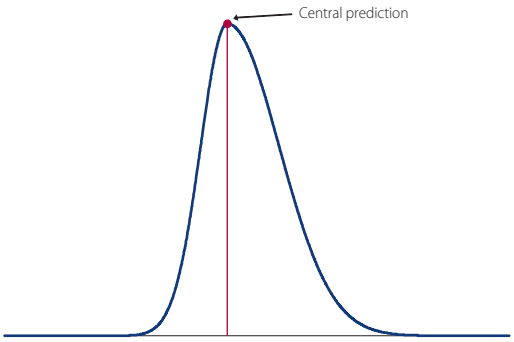
Chart 1 An illustrative example of an asymmetric fan chart with prevailing pro-growth risks



Source: NBS.

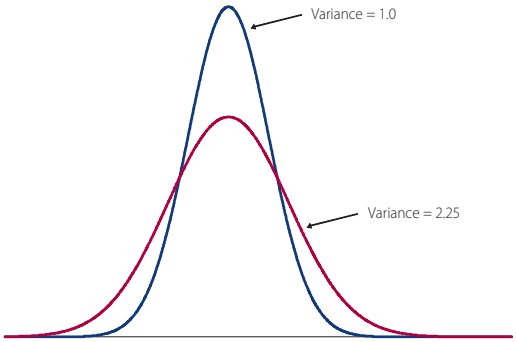
1 For more information on the issue of symmetric fan charts and their application at the NBS see the article: T. Oparty, M. Gavura: Estimating the probability distribution of an inflation forecast. The fan chart – a graphical presentation, BIATEC, volume 13, 5/2005, Národná banka Slovenska.
2 The baseline prediction represents the mode of the assumed probability distribution.

Chart 2 The density of a skewed normal distribution



Source: NBS.

Chart 3 Density of a normal distribution with various variances



Source: NBS.

tion. These are primarily risks that increase or decrease the probability of reaching higher or lower inflation as compared to the baseline prediction. This approach should also contribute to a comparison of the risks between two predictions. The extension of the fan chart used so far by adding risk analysis should contribute to increased transparency in the area of formation of expectations. It enables to provide information on expected asymmetric risks in a more comprehensible form. In addition to a graphical form, it is, of course, possible to present numeric values of the probability intervals or the probability of meeting or failing to meet the inflation target.

A fan chart, as a way of graphical representation of the development of confidence intervals for the forecast of inflation by quarters in time, is actually a kind of simplification of the actual probability distribution. When preparing an asymmetric fan chart, the primary issue to be dealt with is the construction of an asymmetric probability distribution of the inflation forecast in one point of time. For simplicity and a wide use, an asymmetric normal distribution is used, the construction of which is based on a normal symmetric distribution. To put it simply, it is necessary to estimate how the uncertainty (risk) of the prediction is distributed below and above the baseline prediction. Three main parameters have to be known for the construction of the asymmetric fan chart: the central prediction, the prediction uncertainty and asymmetry, which are actually economic interpretations of a non-symmetric normal distribution with the parameters μ-mode, σ-volatility estimate – the so-called standard deviation, and γ-skewness of the distribution.[3]

The **central prediction** is a forecast based on the baseline scenario (of the central prediction, Chart 2). In our case, the central prediction is a forecast of year-on-year inflation from the medium-term forecast. In terms of probability, it is a prediction, which is considered the most probable, i.e. from a mathematical point of view it is the mode of the distribution (μ). However, this does not rule out the alternative that the actual value of future inflation will not be higher or lower. It is always assumed, however, that the central prediction represents an inflation development consistent with the most probable paths of economic factors. The idea that the central prediction is the mode is based above all on the process of preparation of the medium-term forecast, where, after several meetings, the final prediction is set as the alternative assumed to be the most probable one. If the prediction process had a different direction, for example if several possibilities were considered – because there is the conviction that each of those alternatives will have its weight in future inflation, it would be more suitable to take the prediction as a weighted average of alternatives. The resulting prediction could be considered an approximation of the mean value of an asymmetric normal distribution.

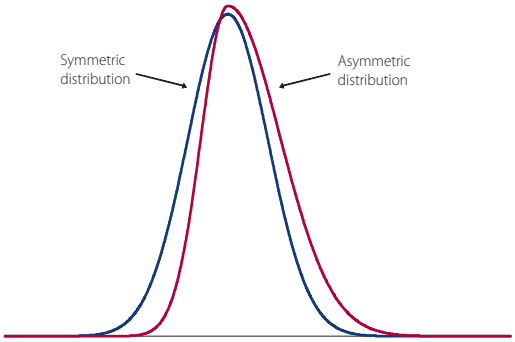
The **prediction uncertainty** gives the probability that actual inflation will differ from the forecast. The higher the uncertainty, the higher the growth of probability that the difference between the actual value of inflation and central prediction will be large (Chart 3). The forecast uncertainty is approximated by the variance (σ) of the probability distribution and is estimated by means of the standard deviation of the variance of past prediction errors (RMSE – root mean square error)[4]. There are also other possibilities of how to determine the risk of prediction, for example using an econometric model for the simulation of the inflation development and the subsequent estimation of the risk of inflation. The disadvantage of such a procedure is the risk of error of the model itself, in which the simulations are performed. Based on its simplicity, as well as the fact that the variance of inflation prediction errors does not depend on the model applied, it has been decided to use it as the method to measure prediction uncertainty.

Prediction asymmetry defines how uncertainty is distributed below and above the central prediction, i.e. whether there is higher probability that inflation will be higher or lower than determined by the medium-term forecast (Chart 4). Asymmetry can be set in two equivalent ways – using lower probability or using an alternative prediction. The following properties, which the

3 A simple and elegant way to introduce skewness is to define a two-piece normal distribution (TPN), which is composed of two normal distributions with the same mean value and different variances. More on this can be found in a separate technical note at the end of this article.

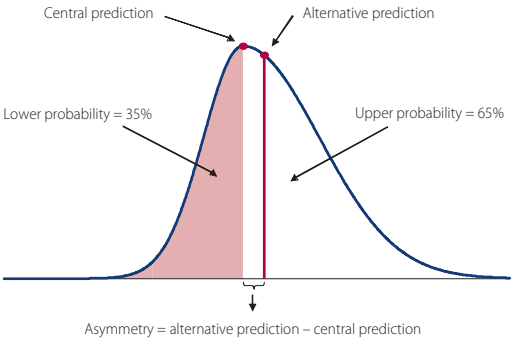
4 Because the fan chart is set up 8 quarters ahead of the period of creation of the current medium-term forecast, the standard deviation has to be estimated for each probability distribution in the given quarter. For the first 4 future quarters, the standard deviation is always estimated with the corresponding time lag, i.e. the estimation of the deviation for the 1st future quarter is computed from the standard deviations of errors of past predictions, which were performed for a period of 3 months; the estimate for the 2nd quarter is computed from the deviations of the errors of past predictions for a 6 month period etc. The remaining estimates for the 5th to 8th quarter are approximated by a logarithmic trend. This procedure has been selected, because the highest degree of uncertainty occurs in the first four quarters. For the remaining periods, it is assumed that behavioral bonds considerably decrease the growth of uncertainty.

Chart 4 Density of a normal distribution



Source: NBS.

Chart 5 Density of a skewed normal distribution – alternative prediction and lower probability



Source: NBS.

desired estimate should have, have been decisive for the concrete selection of one of the ways. First of all, the parameter should be comprehensible, because the setting of asymmetry requires primarily an expert estimate on the distribution of risk in the future. The second property needed for the estimate is the relative simplicity of the transformation of information from the parameter to the asymmetry of the probability distribution. In both cases, the data has to be gained from several respondents by means of a questionnaire[5].

For the lower probability, it is necessary to know how to determine the probability, with which inflation will be below or above the central prediction. In the case of symmetry, the risk is distributed equally below and above the central prediction (meaning that in 50% of the cases, inflation will be below the central prediction and in 50% of the cases above the central prediction). In the case of asymmetry, uncertainty is not distributed in an equal way, e.g. it is possible that 35% of the inflation realizations are below the central prediction and 65% are above it. Hence the lower probability is 35%. This way of determining asymmetry is, at first sight, less clear, because does not provide a particular respondent a direct idea of the impact or level of inflation in the event of materialization of the risk, i.e. the respondent has to know the answer to the question: "What is the probability of inflation being above or below the central prediction of inflation provided that there is a shock not included in the central prediction?"

A more appropriate way of measuring asymmetry is to use an alternative prediction, which is actually an inflation forecast based on an asymmetric shock[6]. For the respondent, the alternative prediction thus represents the answer to the question: "How the inflation forecast will change provided that there is a shock not included in the central prediction?". This method is more transparent and easier to identify for the respondent, because the alternative prediction can be determined by means of an expert estimate or by simulation from a model. The technical simplicity of this method for the subsequent derivation of the particular shape of the asymmetric normal distribution has to be also pointed out.

Asymmetry expressed by means of an alternative prediction can be translated to a lower probability and vice versa, asymmetry expressed by means of lower probability can be translated to an asymmetry characterized by the alternative prediction (Chart 5). It is possible to create a conversion table, which will translate the individual percentages of the lower probability at a fixed uncertainty to a better readable estimate – namely to an alternative prediction.

Evaluation of the prediction risks MTF-2009Q2

To determine possible risks of inflation prediction, a questionnaire has been set up. It serves for getting an expert estimate of the distribution of risk (asymmetries) of prediction of future inflation in the medium run. It contains selected indicators (from domestic and foreign environment), which directly or indirectly influence inflation. Average impacts of inflation in individual indicators are calculated from the filled-in questionnaires. The impacts for the individual years are subsequently

5 In the case of the NBS, these are primarily the employees of the monetary policy department (involved directly or indirectly in the preparation of the forecast).

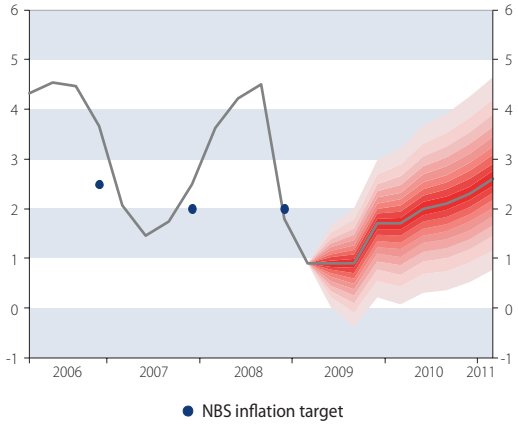
6 In terms of mathematics, the alternative prediction is the mean value in this case.

Table 1 Central prediction and alternative prediction

	III. 2009	VI. 2009	IX. 2009	XII. 2009	III. 2010	VI. 2010	IX. 2010	XII. 2010	III. 2011
Central prediction	0.90	0.90	0.90	1.70	1.70	2.00	2.10	2.30	2.60
Alternative prediction	0.90	0.85	0.82	1.60	1.64	1.99	2.14	2.38	2.71

Source: NBS.

Chart 6 Asymmetric risk distribution, fan chart – Medium-term HICP inflation forecast MTF-2009Q2 (%)

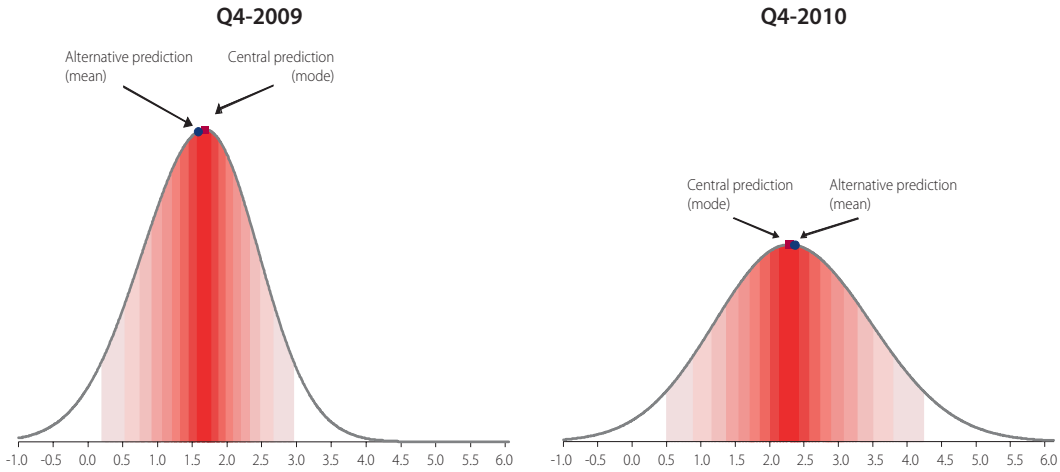


Source: NBS.

added up and they thereby make up the resulting impact (i.e. how much the predicted baseline inflation would change, if all these risks would materialize). Information obtained this way is used directly to construct an asymmetric fan chart using an alternative prediction. In addition, the questionnaire evaluation itself will provide much information for a deeper analysis of the risks of individual factors influencing inflation.

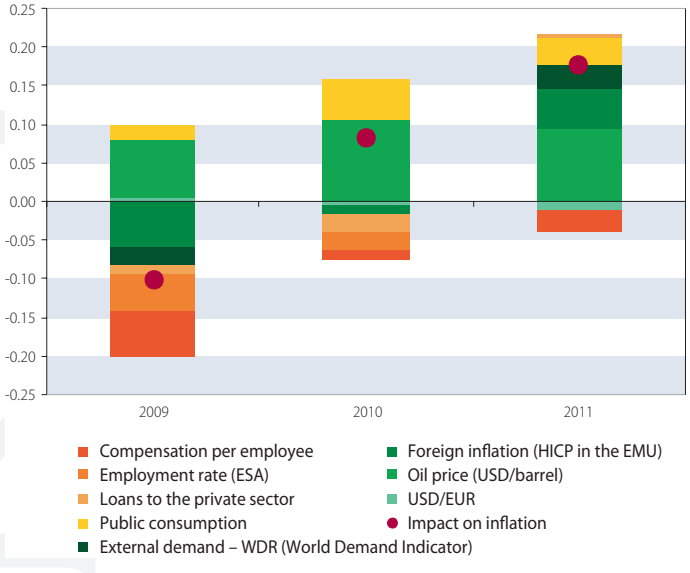
The outputs of the symmetric and asymmetric risk distribution can take the form of a (numerical) table and a graphical form. While the numerical form primarily represents values obtained by the questionnaire survey, the graphical form provides a vivid idea of the distribution of risks around the central prediction, emphasis being put on the fact that the baseline prediction is the most probable level of inflation.

Chart 7 A cross-section of the fan chart for the Q4-2009 and Q4-2010



Source: NBS.

Chart 8 Impact on inflation by risk factors (%)



Source: NBS.

It can be assumed based on the evaluation of the inflation prediction questionnaire from MTF-2009Q that the inflation forecast is realistic, when no higher risks have been identified in any of the selected factors. All risks can be considered low or even negligible with a minimum impact on inflation. Overall, at the end of 2009, the risk factors could increase inflation slightly (by 0.10 p.p.), and in 2010 and 2011 by contrast there are moderate pro-growth risks (0.08 p.p. at the end of 2010 and 0.18 p.p. at the end of 2011).

Table 2 describes the differences in the probabilities of reaching inflation values in the case of a baseline prediction and in the case that prediction risks, i.e. the risk scenario for defined cases, would materialize. The values, as well as the charts, confirm a higher probability of a decrease in inflation as compared to the central prediction at the end of 2009 and of a growth at the end of 2010.

In 2009, the most significant, albeit low, risks are considered to be the employment, employee

Table 2 Probabilities of reaching selected inflation values

MTF-2009Q2	Q409		Q410	
Distribution of risks	Asymmetric risk	Symmetric risk	Asymmetric risk	Symmetric risk
Probability of exceeding 2%[7]	32%	36%	63%	60%
90% confidence interval	(0.22; 2.97)	(0.32; 3.08)	(0.52; 4.25)	(0.44; 4.16)
Risk of inflation decreasing below the central prediction	54%	50%	48%	50%
Deflation risk	3.2%	2.1%	1.6%	2.1%

Source: NBS.

7 Reference value ECB.

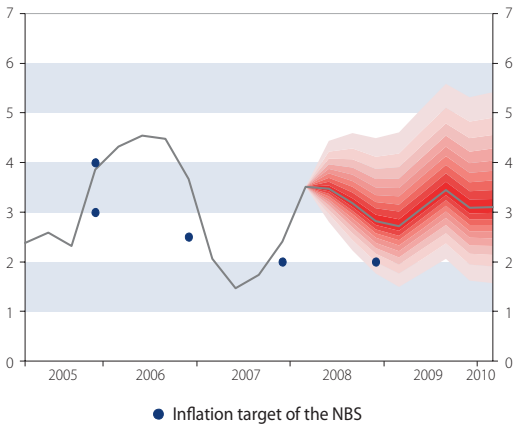
compensations and foreign inflation with a damping impact on inflation. The oil price represents the highest pro-growth risk among all selected factors. In addition to the oil prices, public consumption is also a pro-inflation factor. The two factors together influence the disinflation influence of the other factors only to a low extent.

In 2010, the oil price and public consumption should be the greatest, albeit still low, pro-inflation risks. Their risk level will outweigh all other disinflation factors in the given year. The result is an overall pro-growth risk.

In 2011, a considerable majority of factors will be already pro-growth factors with respect to inflation. The highest risk for inflation growth might consist in the oil price and in foreign inflation.

Because at the first sight, the low risks in MTF-2009Q2 do not provide a vivid idea of asymmetry, we are adding Chart 9 from the Medium-term forecast MTF-2008Q2, where more considerable risks (also in terms of graphical representation) towards higher inflation have been identified, which is shown by a broader zone above the baseline of the prediction. This means that in the prediction horizon, there has been a higher probability that inflation will reach rather high than low values. The expected risks have ultimately materialized in that HICP inflation was estimated to be 2.8% at the end of 2008, but it reached a value of 3.5% in reality.

Chart 9 Asymmetric risk distribution, fan chart – Medium-term HICP inflation forecast MTF-2008Q2



Source: NBS.

Conclusion

In conclusion, it can be said that the extension of the probability distribution by adding asymmetry provides the National Bank of Slovakia with a step forward in terms of transparency and formation of expectations for the professional public. It provides a more vivid and more real picture of the distribution of risks, enables to include ex-post new information, not available at the time of setting up the prediction, in the prediction. In addition to a graphical representation, it also provides the possibility to express the probability of reaching inflation within a certain interval or above or below a certain value, if possible risks materialized. Last but not least, it has to be pointed out that the said procedure with examples can be also applied to other macroeconomic variables, which would also contribute to a more vivid idea of the uncertainty and distribution of prediction risks.

Based on the said advantages, demonstrated using illustrative and concrete examples, the National Bank of Slovakia has decided to publish an asymmetric fan chart as part of its medium-term prediction from the second half of 2009 onwards.

Technical note

Derivation of the TPN distribution

This part describes the method of derivation of a TPN (two-piece normal) distribution from the estimated parameters. In our methodology, the asymmetric distribution has been created by putting together two symmetric normal distributions with the mean value μ and the variances σ_1 or σ_2. To get

$$\int_{-\infty}^{\infty} f(x)dx = 1, \qquad (1)$$

Technical note

both density functions must be reweighted in an appropriate way. Thus the random variable X has a continuous TPN distribution, if its density function takes the shape (2), where μ does not have to be the mean value now anymore.

$$f(x) = \sqrt{\frac{2}{\pi}} \cdot \frac{1}{\sigma_1 + \sigma_2} \cdot \exp\left[-\frac{(x-\mu)^2}{2\sigma_1^2}\right], \quad if \ x < \mu$$

$$f(x) = \sqrt{\frac{2}{\pi}} \cdot \frac{1}{\sigma_1 + \sigma_2} \cdot \exp\left[-\frac{(x-\mu)^2}{2\sigma_2^2}\right], \quad if \ x \geq \mu \qquad (2)$$

In general, it is more correct to consider μ to be the mode, according to the definitional formula for the mode of a continuous distribution (3) σ_1, σ_2 are the remaining parameters of the TPN distribution, which contain information both on the variance and on asymmetry.

$$\left.\frac{df(x)}{dx}\right|_{x=\mu} = 0 \qquad (3)$$

A special case is the absence of asymmetry, if $\sigma_1 = \sigma_2$. Then the TPN distribution transforms into a "classical" normal distribution with a variance $\sigma_1 = \sigma_2$ and the mode and mean value of the distribution are identical. In the case of asymmetry, this is not the case and the mean value, mode and median are not equal, as shown by the chart.

If the upper risk dominates, it will hold mean > median > mode, and in the case of lower risk, by contrast, the sequence will be reversed (mean < median < mode). The mean value and the 2nd and 3rd central moment of the TPN distribution can be written according to (4)[8]:

$$E(x) = \mu + \sqrt{\frac{2}{\pi}} \cdot (\sigma_2 - \sigma_1) \qquad (4)$$

$$Var(x) = \left(1 - \frac{2}{\pi}\right) \cdot (\sigma_2 - \sigma_1)^2 + \sigma_1\sigma_2$$

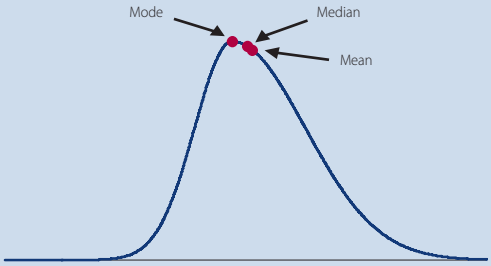
$$T(x) = \sqrt{\frac{2}{\pi}} \cdot (\sigma_2 - \sigma_1)\left[\left(\frac{4}{\pi} - 1\right)(\sigma_2 - \sigma_1)^2 + \sigma_1\sigma_2\right]$$

Because T(x) is proportional to E(x) – μ, – this part also defining its sign (T(x) can be also written as (E(x) – μ).k, k>0), asymmetry can be also determined from the difference E(x) – μ. This way of characterization of asymmetry has been used in the following, because it is easier to work with than with the third central moment. For the construction of the distribution, it is necessary to determine the values of μ, σ_1, σ_2 from the system

$$E(x) - \mu = \sqrt{\frac{2}{\pi}} \cdot (\sigma_2 - \sigma_1)$$

$$Var(x) = \left(1 - \frac{2}{\pi}\right) \cdot (\sigma_2 - \sigma_1)^2 + \sigma_1\sigma_2 \quad , \ \sigma_1, \sigma_2 > 0 \qquad (5)$$

Location of the statistics in case of asymmetric distribution



Source: NBS.

μ is estimated as the central prediction. Provided that the central prediction is the mode, the mean value in a discrete case is the weighted probability average of all possible realizations of inflation for the given alternative shock scenario. The mean value is estimated by means of an alternative prediction. There are two possibilities for setting up the alternative prediction:

1. The alternative prediction is the only estimate of inflation in the case of the shock variant. In such a case, the prediction also represents an estimate of the mean value of the distribution. (An example is a single expert estimate of the alternative prediction or a consensual estimate.)
2. For a given type of shock, there can be several possible estimates of impacts on inflation (several expert estimates from the questionnaire). In such a case, the alternative prediction is determined as the weighted probability average of all predictions. It is to be weighed whether all probability weights will be the same or higher probability is assumed for some inflation realizations. An alternative prediction determined using this procedure also represents an estimate of the mean value of the distribution.

The variance of the distribution is approximated by the variance of past prediction errors, as has been described in the part on asymmetric risk distribution of the prediction. The system's solution is then a quadratic equation (5), from which it is possible to calculate a solution for σ_1. The common condition for the solvability of an equation in real numbers and for strict non-negativity of the solutions yields the formula (6).

$$\sigma_1^2 + \sigma_1 \cdot \sqrt{\frac{\pi}{2}}(E(x) - \mu) + k\frac{\pi}{2}(E(x) - \mu)^2 - Var(x) = 0 \text{, where } k = 1 - \frac{2}{\pi} \qquad (6)$$

$$|E(x) - \mu| \cdot \sqrt{\frac{\pi}{2} - 1} < \sqrt{Var(x)} \qquad (7)$$

8 John, S. (1982): „The three Parameter Two-Piece Normal Family of Distributions and Its Fitting", Communications in Statistics – Theory and Methods, 11(8), 879-885.

Technical note

Strict non-negativity is required both for the solutions of the equations and for the solution of the system (5). Condition (7) means that the parameters for the construction of the TPN distribution cannot be chosen arbitrarily, but, on the contrary, it is necessary that this formula comply with in the estimation. Equivalently, the condition can be understood in such a way that under a fixed variance there is an open interval (E_{min}, E_{max}), within which the estimate of the mean value by means of an alternative prediction must fall. In practice, however, an even somewhat narrower interval of alternative predictions has to be chosen. E_{min} or E_{max} are determined so that they to a lower probability of 65% or 35%, respectively. The restriction is done because a too large asymmetry makes the central prediction untrustworthy.

The asymmetry formula can be derived in a similar way by means of lower probability. If we understand $P(x \leq X)$ as a cumulative distribution function of a TPN, the lower probability can be understood as $P(x \leq \mu)$. If lower probability is denoted Z, it can be expressed:

$$z = \int_{-\infty}^{\mu} f(x)dx = \frac{\sigma_1}{\sigma_1 + \sigma_2} \qquad (8)$$

If Z is obtained according to an expert estimate, both relevant standard deviations for the construction of the TPN distribution can be derived using the variance formula under (5) and the Z formula under (8). After setting σ_1, σ_2 this way, a corresponding alternative prediction from the mean value formula under (5) can be assigned to each lower probability. If, by contrast, the standard deviations are set by means of an alternative prediction, then it is possible to assign to it the corresponding lower probability from equation (8).

Sources:
1. Anděl J. (1993): Statistické metody. Matfyzpress, KU Praha 1993.
2. Erik Britton, Paul Fisher, John Whitley (1998): The Inflation Report projections: understanding the fan chart. Bank of England, Quarterly Bulletin, February 1998.
3. John, S. (1982): The three Parameter Two-Piece Normal Family of Distributions and Its Fitting. Communications in Statistics – Theory and Methods, 11(8), 879-885.
4. Kenneth F. Wallis (2004): An Assessment of Bank of England and National Institute, Inflation
5. Oparty Tomáš, Gavura Miroslav (2005): Estimating the probability distribution of an inflation forecast. The fan chart – a graphical presentation. BIATEC, volume 13, 5/2005, Národná banka Slovenska

Current macroeconomic forecast of the Ministry of Finance of the Slovak Republic (June 2009)

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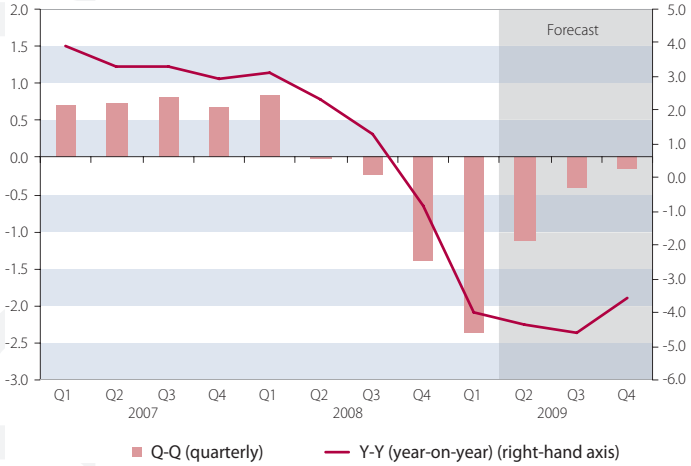
In its regular update to the macroeconomic forecast, the Ministry of Finance of the Slovak Republic (MF SR) decreased the forecast for the 2009 GDP development to a level of -6.2% and expects a slower pace of recovery in the years to come. The deterioration of external environment and its influence on the domestic economy are the main causes of the current forecast changes. Due to the high degree of uncertainty about the future, the Ministry of Finance of the Slovak Republic has endorsed a conservative view on macroeconomic developments. The decision is mostly due to the need of creating a framework for responsible fiscal policy. Members of the Macroeconomic Forecasting Committee have evaluated the Ministry of Finance forecast as realistic to conservative. Members of the committee are domestic banking and academic institutions from the public and private sector.

Assumptions of the forecast – external environment

The forecast of the Ministry of Finance is mostly based on the current development of external environment, the world economy having been in the worst economic crisis since the end of World War II. The crisis, which started on financial markets, passes to the real economies of developed countries, and the globalized economy helps to spread the crisis. Most developed economies are in a recession and emerging economies have experienced significant contractions of economic activity. The world trade is slumping and international financial flows are declining. The world financial system is expected to face further pressure after a certain stabilisation, as the negative developments in real economy will be re-reflected in the financial system by means of impaired ability to pay on the part of businesses and households. Updated International Monetary Fund financial stability report suggests further deterioration of the conditions and risks influencing financial stability in the world. Credit standards in the USA and in the euro area continue to deteriorate and the growth of mortgage and consumer credits in the euro area is close to zero. The European Commission, which published its forecast on 3 May 2009, expects a considerable deterioration in the economies of our most important trade partners.[1] The synchronized drop in economic activity in EU economies will have the greatest impact on export-oriented economies influenced by the collapse of industrial production in the world. The economies of our most important trade partners should drop by 4.0% in 2009; the European Commission expects the greatest year-on-year contraction in the third quarter of 2009. The economies of our trade partners should stagnate in 2010 and the demand is thus expected to recover during 2011. The first quarter of 2009 indicated a slight deterioration against the expectations, as the economy of our trade partners contracted by 4% year-on-year, while the European Commission forecast expected a 3.5% decline.

Chart 1 Development of the weighted average of the GDP of our most important trade partners[2]



Source: The European Commission, autumn forecast, own calculations.

Outlook atmosphere

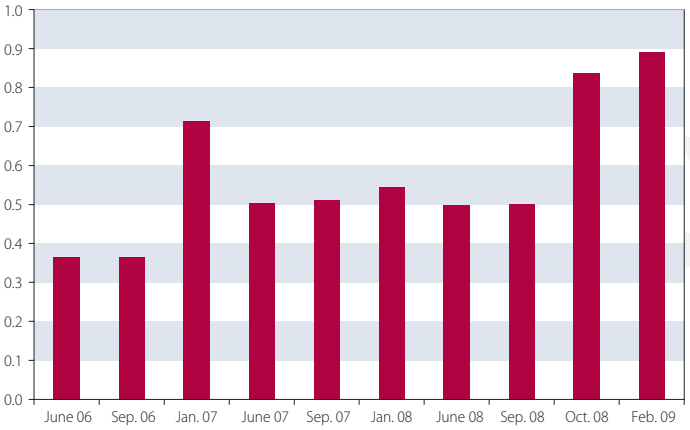
The great intensity of the financial and economic crisis brings considerable uncertainty regarding future economic developments. In their forecasts,

1 Assumptions on economic developments of our most important trade partners as well as the development of commodity prices have been taken over directly from European Commission's Economic Forecast, Spring 2009.

2 The weighted average of 10 major trade partners based on their respective export shares (Germany, the Czech Republic, Italy, Austria, Hungary, Poland, Spain, USA, France, United Kingdom, 75% of total exports).

international institutions highlight the extraordinary uncertainty and risks situated mostly on the negative side. The uncertainty is also documented by the fact that the spread of forecasts made by members of the macroeconomic committee increased. Over the last three years, the standard deviation of GDP forecasts for the next year was the highest precisely during the crisis. While the difference between the highest and the lowest GDP estimate for the next year was oscillating at an average level of 1.5 p.p. prior to the crisis, the difference has been almost twice as high (2.8 p.p.) since October 2008. Due to the considerable uncertainty, the Ministry of Finance has decided to stick to a conservative view on economic developments.

Chart 2 The standard deviation of real GDP growth forecasts of the macroeconomic committee members valid at the time of publishing the forecasts of the Ministry of Finance of the Slovak Republic



Source: Macroeconomic Forecasting Committee and the Ministry of Finance of the Slovak Republic.

The estimated development

The estimate of real GDP growth has decreased for the whole forecasted period. The main reason for a lower growth in Slovakia is the slowdown of our trade partners' growth, which leads to a reduction of the demand for Slovak exports and the resulting secondary effects – a fall in employment, consumption and investment. The economy should contract by 6.2% in real terms in 2009, which is a deterioration by 8.6 p.p. compared to the February forecast. Foreign demand contributed to the contraction by 2.2 p.p., the fall in domestic demand accounted for the other 4 p.p. As regards the quarter-to-quarter development, the data for the first quarter of 2009 show a considerable drop in GDP, which is going to be replaced by a moderate growth in the second quarter according to the Ministry of Finance of the Slovak Republic. This development is influenced by several factors – a lower base value in the 1st quarter, the influence of car scrapping incentive programmes in Western European countries, as well as a certain adjustment of one-time influences from the 1st quarter (the gas crisis). The economy should stagnate in the third and fourth quarter, which, however, will deepen the year-on-year decrease in GDP as a result of high growths at the end of 2008. From 2010, the economy is also expected to recover at a 1.1% growth rate, which will be accelerating gradually.

Foreign trade

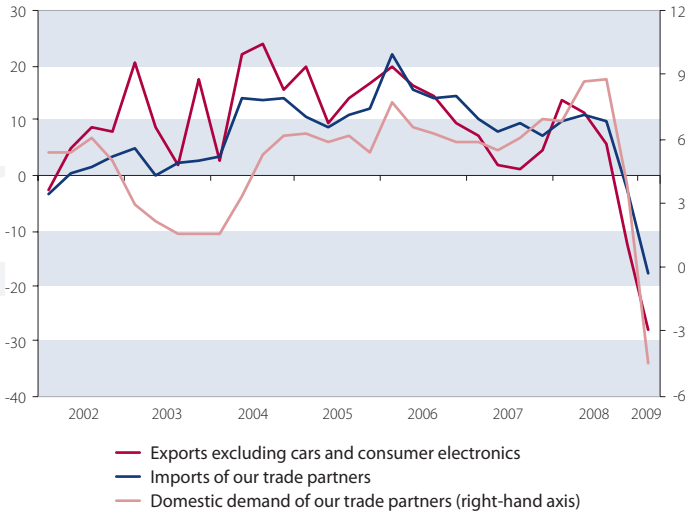
The most significant influence of the world economic crisis on the Slovak economy is expected in foreign trade. The decrease in foreign demand should have an adverse influence on the development of the exports with a negative impact on the balance of trade. The decrease in real exports of goods and services should fully reflect the expected fall in real imports from abroad. According to European Commission data, the weighted decrease in real exports of our major trade partners should reach the level of 10.8% in 2009 and drop to an expected level of 0.6% is expected for 2010. The impact of foreign demand on exports exclud-

Table 1 Forecast of the Ministry of Finance of the Slovak Republic – the main economy indicators (June 2009)

	Indicator (in %)	Reality	Forecast			
		2008	2009	2010	2011	2012
1	GDP, real growth	6.4	-6.2	1.1	3.4	4.8
2	Consumption of households, real growth	6.1	-1.7	0.9	2.1	3.3
3	Investment, real growth	6.8	-5.1	1.9	2.5	3.3
4	Exports of goods and services, real growth	3.2	-19.2	-1.0	6.2	8.5
5	Imports of goods and services, real growth	3.3	-17.4	0.3	4.4	5.9
6	Employment (LFS), growth	3.2	-3.2	-0.9	0.7	1.3
7	Unemployment rate (LFS)	9.6	12.5	13.4	13.2	12.6
8	Real wage, growth	3.3	0.3	0.2	1.4	2.2
9	Inflation (annual, average; HICP)	3.9	1.4	2.5	3.3	2.9
10	Balance of trade (ratio to GDP)	-1.1	-2.0	-3.3	-2.8	-1.5

Source: Statistical Office of the Slovak Republic, Ministry of Finance of the Slovak Republic.
Note: LFS – Labour Force Sample Survey.

Chart 3 Comparison between nominal exports and the development of foreign demand



Source: Ministry of Finance of the Slovak Republic.

ing cars and consumer electronics is considerable and was stronger than the fall in imports and domestic demand in the countries of our trade partners in the first quarter. Products of the automotive industry react to the slump in foreign demand even more sensitively, as they recorded a decline of 46.3% at current prices. At the same time, the Ministry of Finance of the Slovak Republic surveyed selected exporting corporations as in the previous years. The survey data confirmed an expected decrease in production and a deterioration of the expected development compared to the February estimate in some firms. The level of export orders, published by the European Commission, also indicates no improvement so far. Based on these assumptions, we expect the real decrease in exports to reach a level of 19.2% in 2009, while the decrease should continue at a level of 1% in 2010 and thereby reflect the still negative foreign demand development. A change in the development trend is expected from 2011 and 2012, as the expected begin of production of announced investment projects will accompany the foreign demand recovery. Due to high import intensity, the imports will reflect the development of the exports in the following period; however, it will be reduced by investment activity of the announced investment projects. Hence the imports should drop by 17.4% in 2009 and should grow slightly at a level of 0.3% in 2010. In the following years, it should grow at 4.4% or 5.9%. As a result of this development, the balance of trade will reach a deficit of 2.0% and 3.3% in 2009 and 2010 respectively. The trade deficit should decrease from 2010 onwards.

Domestic demand

The considerable decrease in foreign demand for Slovak products will be reflected in a decrease of upward pressures on wages through a decrease in unemployment and demand for labour force; both factors will influence the consumption of households, whose forecast declined by 4.8 p.p. to -1.7% in 2009. The decline in household consumption can also be seen in falling retail sales and in 2009 Q1 data. As a reaction to a gradually improving labour market situation, consumption should grow in the following years, however at a slower pace than expected in the February forecast – only by 0.9%, 2.1% and 3.3% in 2010, 2011 and 2012, respectively. Gross fixed capital formation should experience a considerable decline – up to 5.1% in 2009. This development is also suggested by a sharp contraction of the Business Climate Indicator, which is about two or three quarters ahead of the investment development. In the following years, investment should start growing again slowly – 1.9%, 2.5% and 3.3% in 2010, 2011 and 2012 respectively – along with a recovery of foreign demand and an overall economic growth. The forecast of growth of investment does not include assumptions regarding construction of motorways by means of PPP projects, but announced investment projects are included. The change in inventories will also contribute to the fall in GDP in 2009 considerably. The inventories are being significantly reduced this year after high increases in inventories in 2008. Their overall contribution to the GDP growth in 2009 is -2 p.p. The forecast of governmental consumption is based on a multiyear budgetary framework for the years 2009 – 2011; it will be the only GDP component to grow by 1.4% in 2009. The growth will speed up to 2.5% in 2010.

The labour market

The deterioration of the real economy development and the decrease in foreign demand started to be reflected also in the Slovak labour market with a time lag. While in the fourth quarter of 2008 the previous positive developments in unemployment growth and fall in employment came to halt, the 2009 first quarter data already shows a sharp deterioration of the situation. In the first quarter, the economy lost the same amount of jobs as it had created over the previous four quarters. The Ministry of Finance of the Slovak Republic adjusted the forecast of the development of the main indicators of the labour market considerably downwards.

We expect a decrease in employment, as measured by the LFS (labour force sample survey), by 3.2% in 2009 and by 1.5% in 2010. The main factor is the previously mentioned contraction in demand for Slovak exports abroad and the subsequent decline in demand for work mainly in the industrial sector and related sectors. Lay-offs of employees abroad and their return to Slovakia also contribute to the decline in LFS employment. However, the statistics are improved by a better utilisation of activating jobs in the regions, a rise of the number of self-employed persons and an increase in internal flexibility of firms that are able to maintain the employment rate due to an adjustment of the wage costs and of the number

of hours worked. Negative economic forecasts of the development of our main trade partners suggest that the quarter-on-quarter fall in employment will continue during the whole year 2009. We expect stagnation or even a rebound of moderate growth in the second half of 2010. The slowdown of job creation and the increased amount of lay-offs will increase the unemployment rate. The Ministry of Finance expects the LFS unemployment rate to increase by 1.9 p.p. to a level of 12.5% against 2008 and to a level of 13.9% in 2010. The participation rate should stagnate in 2009 and 2010.

The worsening labour market situation and the downward pressure on labour costs will be also reflected in the historically lowest nominal growths of wages in 2009 and 2010. The Ministry of Finance of the Slovak Republic expects wage growth of 3.2% this year and 4.0% next year. Despite the pressure to significantly reduce wages, relatively small wage rigidities[3] and a 2.8% contraction of labour productivity this year, we do not expect a significant decrease in real wages over the forecasted period. The reasons are: partial indexation of wage negotiations to the high inflation (CPI) of the last year at a level of 4.6%, a faster growth of wages in general government and defence in 2009 and the fact that lay offs relate mainly to low-qualified workers with a low average monthly wage. Moreover, less seasonal job opportunities, with lower value added, will be created in the third quarter of 2009.

The price development

The moderate inflation in 2009 and 2010 is significantly influenced by the economic crisis. This manifests itself in a stagnation of prices mainly in the food sector and marketable sectors. Average HICP will reach only 1.4% in 2009, the CPI will be 2.2%. The difference between the indicators, which is likely to decrease only slowly in the years to come, consists in the double-digit growth of owner occupier housing costs (imputed rent)

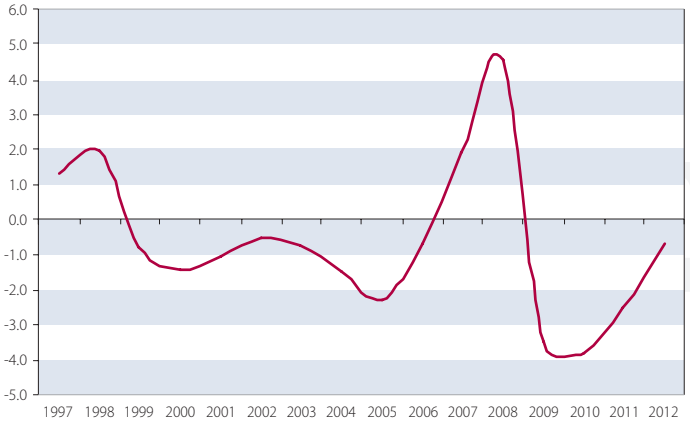
As for the relation between labour productivity growth and wage growth, the relationship between both indicators will reverse in 2009. However, the negative gap will not affect prices in the economy negatively, because the crisis will also make the output gap position reverse. The negative output gap will compensate for the opposite influence resulting from the negative gap between productivity growth and wage growth.

The higher inflation in 2010 compared to 2009 is based on the assumption of a modest recovery of the economy in the second half of the year, on the termination of dual display of prices, as well and from the fading out of the basic effect from price declines in 2009. Further adequate increase in inflation due to a faster price convergence of Slovakia to the price level of the EU because of the absence of the exchange rate channel is expected after 2010.

The cyclical development

The Slovak economy will be below its potential during the entire forecasted period. After a period of high growth rates, when the real GDP (even after adjusting for one-time influences such as pre-stocking with cigarettes) was increasing faster than the potential product, the output gap will reach a negative value of -3.5% in 2009. It will continue falling until 2010, when it will reach its lowest value since 1997 – minus 3.8%. The output gap will start to close along with the expected re-

Chart 4 Development of the output gap in Slovakia (% of potential product)



Source: Ministry of Finance of the Slovak Republic.

3 Gertler and Senaj (2008): Downward wage rigidities in Slovakia, WP 7/2008, NBS.

Assessment of the Ministry of Finance forecast in the forecasting committee

Committee member	Forecast characteristics
NBS	conservative
VÚB	realistic
UNI Credit	moderately conservative
SLSP	realistic
Tatra banka	moderately conservative
INFOSTAT	conservative
ING Bank	realistic
SAV	realistic 47%, conservative 23%, optimistic 22%
ČSOB	realistic

Source: Macroeconomic Forecasting Committee and the Ministry of Finance of the Slovak Republic.

covery of economy; but the economy will be still slightly below its potential as late as in 2012.

However, the economic crisis will also influence potential growth. One of the channels is a slowdown of the growth of capital supply due to a lower gross fixed capital formation. A slowdown of the growth of or even a decrease in total factor productivity (TFP) is also a significant effect. The risk of increasing structural unemployment or of decreasing the participation rate is also important in the medium run. It might be appropriate to point out that the methodology for estimates of TFP development, used by the European Commission and the Ministry of Finance of the Slovak Republic, i.e. the HP filter, does not capture the productivity growth in the years 2004-2008 in the best way. The method considers the high productivity growth brought by foreign investments to Slovakia to be a cyclical development; and it could be argued that this is partly also a change of the growth trend of TFP. It is precisely the use of this methodology that, even after additional expert adjustments to the TFP growth, causes the high positive output gap in 2008 (4.6%).

Evaluation of the forecast of the Ministry of Finance

The mid-term forecast of the macroeconomic development compiled by the Ministry of Finance of the Slovak Republic has been characterised as realistic and conservative by members of the Committee. Five committee members have characterised it as realistic, two members as conservative and two members as moderately conservative.

Forecasts of Česká národní banka (Czech National Bank)

Branislav Saxa
Česká národní banka

The paper summarizes the initial conditions, assumptions and the message of the forecast prepared for the May monetary policy meeting of the Bank Board of Česká národní banka. In addition, the forecast includes a commentary to data published after the completion of the forecast as well as a description of the recent credit development.

Initial conditions and assumptions

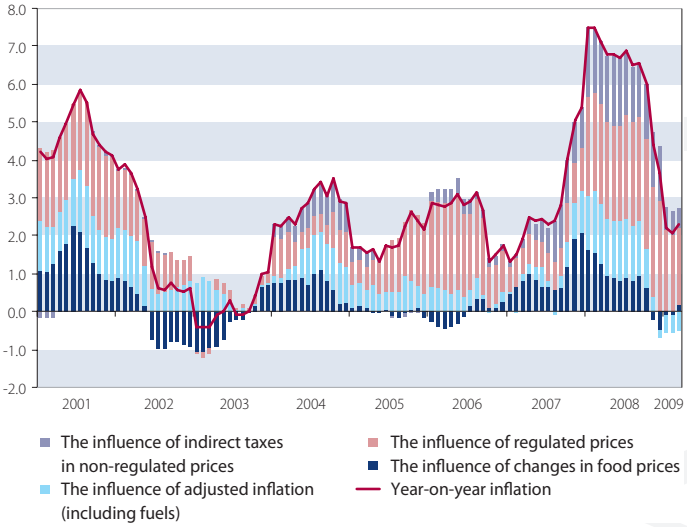
Headline inflation continued to decline in the 1st quarter of 2009, reaching 2.1% and thus getting close to the lower boundary of the tolerance band of the inflation target. Monetary policy inflation, i.e. inflation adjusted for the primary impact of changes in indirect taxes, fell to 1.6%. The lower than expected decrease in inflation as compared to the expectation of the last forecast was particularly due to a less significant slowdown of the growth of food prices and a more moderate decline in fuel prices. As demonstrated in Chart 1, year-on-year inflation was thus made up mainly by growth in regulated prices and changes in indirect taxes. The contribution of those two components to total inflation was 2.5 p.p. in March.

The expansion of economic activity sharply decelerated in the last quarter of 2008, as the year-on-year GDP growth contracted to 0.7%. The slowdown is particularly due to the contribution of net exports, which became negative after a long period of time. The Czech Statistical Office has published a GDP growth revision for the previous quarters together with the data for the last quarter of the last year. The revision suggests that the transition of the economic cycle into a decline phase started sooner than indicated by hitherto data, namely as early as around mid-2007. The development of economic activity is followed by that of the labour market with a time lag. The rate of employment started to fall and the seasonally adjusted rate of unemployment increased sharply to a level of 7.5% in the first quarter of the current year.

One of the basic forecast assumptions is the expected development abroad. It is approximated by effective developments in the euro area countries by means of data of the publication Consensus Forecast combined with market outlooks. In the context of Slovakia's accession to the euro area, the base for the calculation of the effective indicators GDP, CPI and PPI of the euro area was extended by adding Slovakia, Slovenia and Cyprus, when preparing the forecast described. The forecast expects the effective euro area GDP to drop by 3.3% in 2009 and to rise by 0.6% in 2010. The slowdown of foreign growth will also exert influence on a drop in effective euro area inflation forecasted to reach the level of 1% in the current year and to grow to 1.5% in 2010. As for the prices of foreign producers, the forecast expects a decline by 1.6% in the current year followed by a 1.3% increase in 2010. The average 3 month EURIBOR interest rates are assumed to reach 1.3% and 1.9% in the years 2009 and 2010, respectively. The USD/EUR exchange rate is assumed to fluctuate slightly above 1.3 USD/EUR in this year and in the next year, the Brent oil price is expected to grow from a level of 52 USD/barrel in the second quarter of the current year to a level of 66 USD/barrel in 2010.

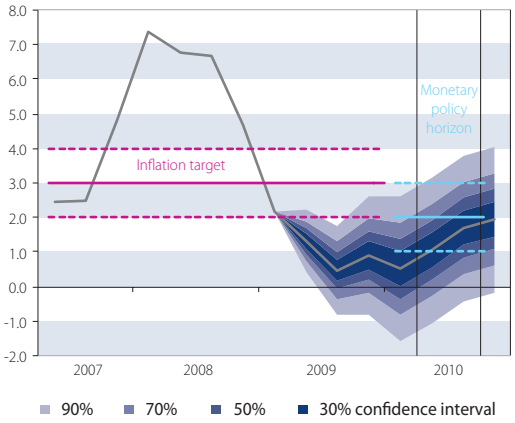
Another forecast assumption is the growth of regulated prices, expected to fall from the level of 9.8% in the second quarter to a level of 3.4% by the end of the current year. The growth in regulated prices will be slightly negative in the first three quarters of the next year and it will rise to 2.8% in the last quarter. The growth in regulated prices is mainly driven by a growth in the regulated rent. As to electricity prices, a growth in 2009 followed by a drop in 2010 is expected. The prices of natural gas for the households are expected to fall in both years.

Chart 1 The structure of year-on-year growth of consumer prices



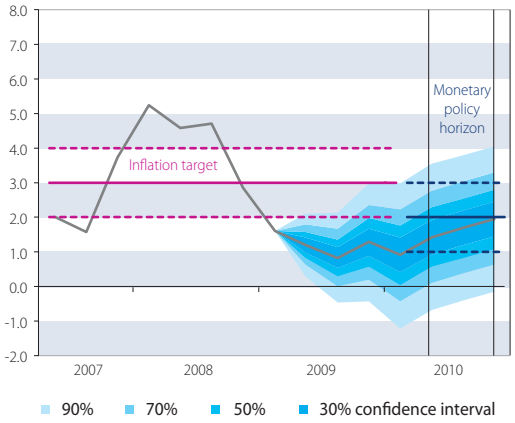
Source: ČNB.

Chart 2 Total inflation forecast



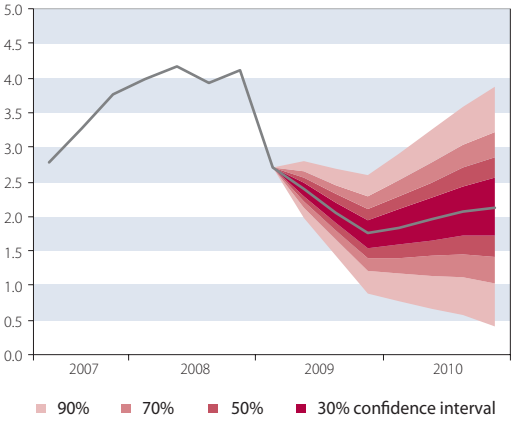
Source: ČNB.

Chart 3 Monetary policy inflation forecast



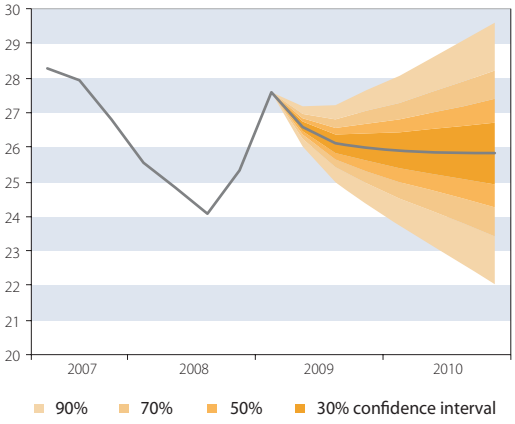
Source: ČNB.

Chart 4 Interest rates forecast



Source: ČNB.

Chart 5 EUR/CZK exchange rate forecast



Source: ČNB.

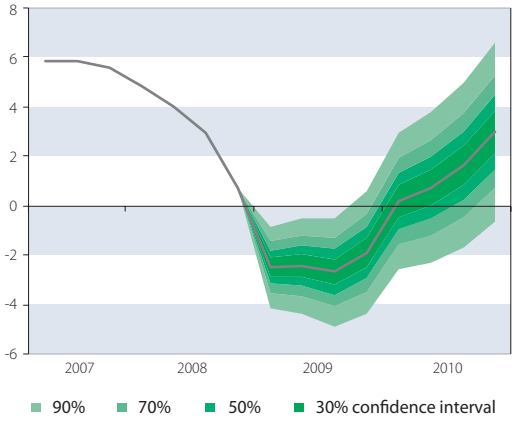
The deteriorated macroeconomic outlook and incorporation of announced anti-crisis budgetary measures sharply deteriorated the estimate of the budget deficit. The current estimate of the budget deficit for 2009 is 4.3%, its further deterioration to 5.4% of GDP is expected for 2010.

Message of the forecast

According to the forecast, headline inflation will continue falling in the current year and will stay at positive values. In the next year, inflation is going to rise again and at the end of the year it is going to oscillate close to the new 2% inflation target valid from the beginning of 2010. Total inflation will oscillate in the lower half of the tolerance band of the inflation target (Chart 2) over the monetary policy horizon, i.e. in the second and the third quarter of 2010.

Monetary policy inflation, i.e. inflation adjusted for the primary impact of changes in indirect taxes, will have a development similar to that of total inflation (Chart 3). The level of monetary policy inflation is supposed be below the level of headline inflation as a consequence of a past change in excise taxes on cigarettes, and later on it will get above the headline inflation path due to a move of selected services to the reduced VAT rate.

Chart 6 GDP growth forecast



Source: ČNB.

Note: A fan chart shows uncertainty of future development. The darkest band around the middle of the forecast corresponds to the development that will occur with a probability of 30%. The increasingly wider bands successively reflect the development with 50%, 70% and 90% probabilities.

The initially considerable positive contribution of regulated prices to inflation will be gradually fading away and will become negative in the first three quarters of 2010. The contribution of the primary impacts of changes in indirect taxes will

be slightly positive in the second quarter, but it will become negative later, until mid-2010. Anti-inflationary pressures from the domestic economy will predominate in the other inflation components first; later, however, the pro-inflationary influence of the weakened exchange rate will predominate.

Consistent with the forecast is a fall in market interest rates in the current year and their slight rise in 2010 (Chart 4). The fall in domestic rates is mainly influenced by a worse outlook for foreign interest rates and foreign inflation, as well as by a lower path of the growth of wages over the forecast horizon.

In the second and third quarter, the Czech koruna to euro exchange rate will reverse its losses from the end of the last and the beginning of the current year (Chart 5). This will happen due to an increasing positive interest rate differential. Appreciation pressures resulting from an expected external demand recovery will then start to become visible as the differential disappears.

Domestic economic activity is expected to contract sharply according to the forecast, the GDP being expected to decline at a level of 2.4% in 2009 (Chart 6). The forecast expects the domestic economy to grow again subsequently by more than 1% in 2010 due to a recovery of external demand. As regards the labour market, the contraction of the domestic economy will be accompanied by a sharp slowdown of the growth of nominal wages, a fall in employment and a rise in unemployment. The growth in household consumption will slow down this year due to a slower growth in wages and lower employment and it will become negative. The household consumption should start to recover gradually in 2010, also as a result of anti-crisis measures. Gross capital formation will also decrease sharply quarter-on-quarter in the current year. The decrease is mainly due to the fall in external demand, increased cost of investment financing and its low return. The net exports will be also affected by the drop in external demand, as real exports will decrease by 10% in the current year and real imports by approximately 7.5%. The negative foreign influence will be partly compensated for by a rising competitiveness of Czech exporters due to a weaker exchange rate and by the effect of the introduction of the car scrapping incentive in some euro area countries. Government consumption will be the only component of domestic demand to continue to exhibit a positive growth in the current year. On the one hand, the government anti-crisis measures create room for higher investment activity and higher household consumption, on the other hand, the growth of needed debt financing is forecasted to increase the country's risk premium.

THE IMPACT OF NEW DATA

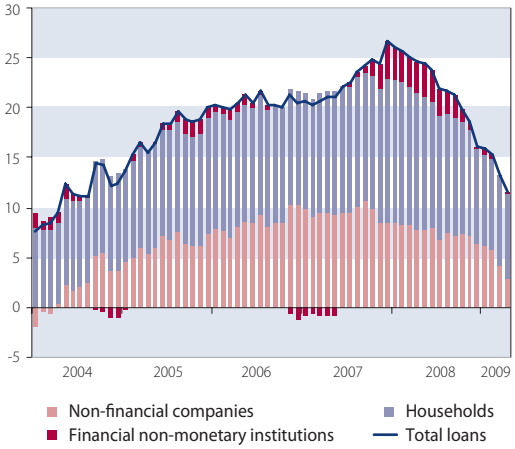
New data has been published since the preparation and publication of the last forecast; some of the data influence the outlook of the future development of the economy as compared to the last forecast. The domestic economy contracted by 3.4% in the first quarter of this year as compared to the forecasted level of 2.5%. This has been partly due to a revision of the GDP data for the years 2005 – 2008 indicating that there has been a year-on-year drop of GDP as early as in the last quarter of the last year. The structure of domestic economy growth also changed as compared with the forecast. While the growth of household consumption as well as the growth of government consumption exceeded the forecast expectations, gross capital formation fell more sharply as a consequence of the development of both investment and inventories.

The observed total inflation differed from the forecast only slightly in April and May. The 0.1 p.p. higher inflation was due to higher fuel prices together with adjusted inflation excluding fuels, the growth of food prices had the opposite effect.

THE CREDIT DEVELOPMENT

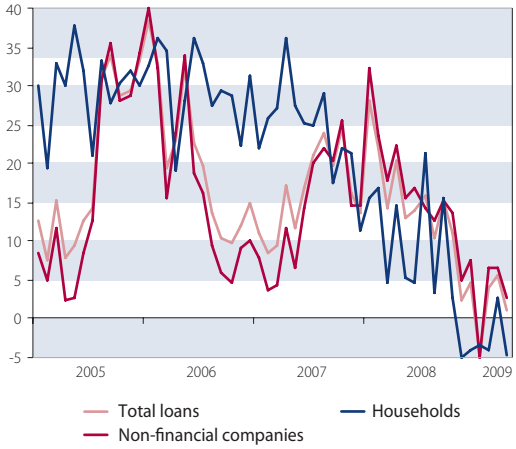
The growth of loans to businesses, households and financial non-monetary institutions by monetary financial institutions was gradually slowing

Chart 7 The structure of year-on-year credit growth



Source: ČNB.

Chart 8 Newly granted loans



Source: ČNB.

down from January 2008 onwards, reaching the level of 11.6% (Chart 7) in April of the current year. The year-on-year growth is gradually approaching zero for new loans; in the household sector, new loans fell by 4.7% year-on-year (Chart 8) in April. On the demand side, this development is due to the contraction in domestic economy accompanied by a drop in wages, a lower rate of employment and a rising rate of unemployment. On the supply side, there is the impact of a more cautious approach of banks; further tightening of the credit conditions due to risk profiles of the clients cannot be ruled out.

For households, the ratio of debt granted by monetary financial institutions to GDP increased to a level of 24.2% in the first quarter of the current year. Signs of difficulties with repayment are mostly evident in consumer credits, where the ratio of defaulted loans to total consumer credits increased from 6.7% in December 2008 to 7.4% in April 2009. In businesses, the ratio of debt towards monetary financial institutions to GDP increased to 27.1% in the first quarter of 2009. The share of defaulted loans in companies increased from 4.3% in December 2008 to 5.3% in April 2009.

The global financial tsunami flooded Hungary

Agnes Csermely
Magyar Nemzeti Bank

Since the outset of the sub-prime mortgage market crisis in 2007, the global economic environment has progressively deteriorated in several waves. Declining risk appetite and loss of confidence resulted in a downward spiral of risky asset prices. At one point it reached a level, where investors were striving to unload assets they perceived to be risky, irrespective of the price and magnitude of the losses realised. After the default of Lehman Brothers in September 2008, the financial crisis entered a new phase. Liquidity dried up in financial markets and problems with the adequacy of bank capital came to the fore, driven by a general lack of confidence, increasing risk aversion and rapid deleveraging of balance sheets. Real economic performance also weakened sharply.

During the first phase of the crisis, up to September 2008, demand for the currencies and bonds of emerging market countries did not decline, as can be seen in the appreciation of their currencies and the decline in the risk premium on their foreign exchange bonds, as opposed to the developments in equity prices. However, from September, the dramatic deterioration in investors' risk tolerance influenced price developments in emerging market assets to a great degree as well. The situation of European emerging market currencies was rendered even more difficult by the currency crisis in Iceland, which highlighted the risk of significant capital outflows from countries struggling with major imbalances.

Under these circumstances, due to its high external and government debts as well as its low growth, investors also considered Hungary to be a vulnerable country, despite the fact that some of its balance indicators (the current account and government deficits) have improved considerably in recent years. In this environment, uncertainty about the country's debt-servicing ability gave rise to severe capital outflows. The Hungarian foreign exchange, stock and government securities markets came under severe pressure.

Risk appetite declined further at the beginning of 2009 due to growing fears of a recession. This wave of market turbulence had a stronger impact on regions heavily dependent on the global economic cycle and international financial market developments, including Central and Eastern Europe, than on others. The deterioration in sentiment towards the CEE region was reflected in several markets: currencies weakened more markedly, government securities markets faced greater operational disruptions and spreads on credit default swaps providing protection in the event of default on foreign currency sovereign bonds rose more sharply than in other emerging regions.

As the regional banks were virtually free from toxic assets, the regional banking sector developments did not play a central role in the first phase of the crisis. Later, due to the severe deterioration in financial market conditions and the adverse economic environment, the domestic banking sector became more exposed to increasing liquidity and solvency risks. They refinanced their outstanding debts at higher costs and at shorter maturities than previously, due to decreasing international investor risk appetite. Meanwhile, the economic downturn and the depreciated forint exchange rate were adding to the burden of households whose debts were denominated mainly in foreign currency. These developments put downward pressure on the domestic banking sector's profitability through a deterioration in the quality of the loan portfolio. As a result, banking sector vulnerability became a key concern for foreign investors.

Policy reactions

The immediate challenge faced by the Hungarian authorities after the onset of the crisis was to prevent a disruption of capital flows and ensure the smooth functioning of the financial intermediary system. To stop speculation against the currency the MNB raised its official interest rates by 300 basis points to 12.5% at the end of October 2008. The government and the central bank jointly initiated negotiations with international organisations on the conditions of a credit facility to be provided to Hungary. The International Monetary Fund and the European Union approved a joint financing package of nearly EUR 20 billion for Hungary. The main objectives of the package are to help to finance the balance of payments, to boost foreign exchange reserves and to set up a bank support scheme. The funding from the international organizations also enabled the government to

meet all its financial obligations despite the malfunctioning government bond market.

In order to restore market confidence, the government launched a large scale fiscal austerity package in October, and later it announced further tightening measures in order to stem the deterioration in the fiscal position resulting from a worsening outlook for growth. The total impact of the adjustment package implemented through government expenditure cuts amounts to 4 percentage points of GDP in two years' time. The measures include reductions in public sector wages followed by a nominal freeze, restrictions on social transfers to households, and the dismantling of price subsidies. On the expenditure side, a tax restructuring will be implemented: the increase in indirect and wealth taxes and the termination of some tax exemptions will finance the reduction in taxes on labour (social insurance burdens + personal income tax). Beyond its immediate impact, the package improves longer-term debt dynamics through several factors. The measures restrict eligibility for some transfers: the retirement age will increase to 65 years from 62, maternity leave will be reduced to two years, the criteria for disability retirement will be tightened, and, furthermore, the 'Pathways to work' program will require the unemployed to cooperate more closely with the labour office. Financial incentives reinforce the impact of tighter administrative restrictions on transfer status, for example: the pension replacement rate was cut by 8%, as the 13th month pension was abandoned, and stringent penalties for early retirees were also introduced. The change to the indexation of pensions also boosts activity by influencing the labour-leisure choice.

Regarding financial markets, higher reserves and a repo facility from the ECB enabled the central bank to promote the smooth operation of the domestic banking sector by introducing new instruments providing forint and foreign currency liquidity. The MNB also broadened the range of eligible collateral for its operations, extended the maturity of tenders for forint loans and FX swaps, and reduced the mandatory reserve ratio. Recently, we have seen some improvement in the various liquidity indicators and risk tolerance measures in the domestic financial markets. Despite this, there is no firm evidence yet of significant strengthening in investors' demand for HUF denominated assets. The partial improvement in market indicators created some room for gradual and cautious rate cuts; however, the easing cycle was stopped in January due to a further deterioration in market sentiment.

The commitment of foreign parent banks towards their Hungarian subsidiaries is also a key factor in maintaining financial stability. So far, banks with foreign parents have had no difficulty in rolling over their foreign funds and FX swaps. For the domestic banks the government offered medium-term credit, in order to limit their exposure to the volatile interbank market conditions.

Since last October, the Hungarian authorities managed to stabilize the funding base of the banking system and prevented large-scale outflows of capital. As a result, liquidity factors do not seem to play a important role in banks' lending decisions. Bank lending, however, remains subdued: in line with global developments, domestic banks are attempting to reduce loan-to-deposit ratios and slow the growth of their risky asset portfolios.

Macroeconomic outlook

The international financial market crisis and the associated global economic recession have imposed significant stress on the Hungarian economy to adjust. The general reappraisal of risk, coupled with a dramatic decline in demand for risky assets, has forced a rapid reduction in the country's external financing requirement. The combination of tighter credit conditions, budgetary measures to maintain fiscal balance and the recent real depreciation of the forint has resulted in a significant reduction in external imbalance and, consequently, the vulnerability of the domestic economy. However, in terms of its impact on economic activity, Hungary has no room for manoeuvre to smooth the impact of the global recession. On the contrary, the required procyclical behaviour of both the financial sector and fiscal policy is likely to cause the current downturn to be deeper and more protracted in Hungary than the average of neighbouring countries or the EU.

Preliminary data indicate a significant, 5.8%, year-on-year decline in gross domestic product in 2009 Q1, and the Hungarian economy has been shrinking continuously for a year. The extent of the decline is historically comparable to the recession observed during the years following the political transition. This poor growth performance can be attributed to three main factors. First, international economic conditions have deteriorated significantly in recent quarters, inhibiting manufacturing on the production side, and investment and exports on the consumption side. Second, a sharp decline in bank lending activity has affected household consumption and investment. Finally, further fiscal tightening has also put downward pressure on household and government consumption. These effects were partly offset by a decline in import demand, and thus net exports may have made a positive contribution to growth.

The sharp decline in sales has had a devastating effect on firms' profitability. The private sector has reacted to rising unit labour costs by layoffs and wage cuts. While the private sector has seen a massive decline in the wage bill in recent months, this process must continue in order to restore corporate profitability. Wage adjustments initially appeared in restrained bonus payments at the end of 2008. Since January 2009, regular wages have been frozen as well.

As a result of labour market adjustment and the government's tightening measures, households are facing a significant decline in disposable income. Household behaviour in the coming years will not only be determined by the decrease in income, as the relationship between income and

consumption may also change compared to previous years. Looking ahead, as opposed to recent years' abundance of loans, the drop in consumption is expected to exceed the decline in income. Households will have much more limited opportunities to smooth their consumption through borrowing and, as a result of increasing economic uncertainty and fear of lay-offs, precautionary savings will also increase.

Corporate sector investment has also been hit by the weak external prospects and financing difficulties, as well as the increase in general economic uncertainty. We hope that better utilisation of development funds received from the EU may stimulate corporate and government sector investment. Overall, investment dynamics may show a decline of around 10% this year, exceeding the rate of decline in GDP. Modest growth is expected only from next year on.

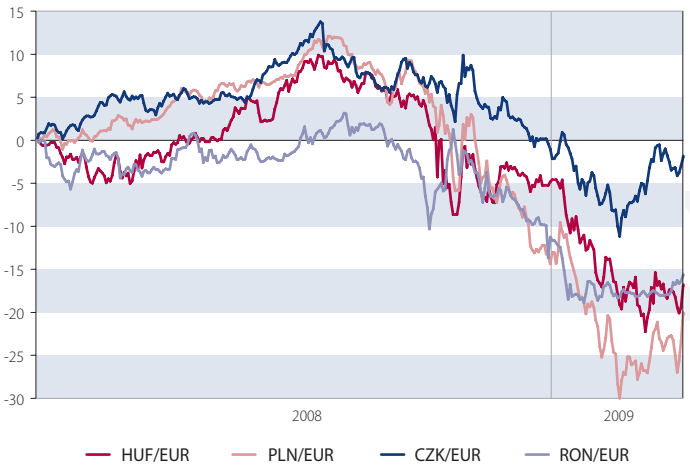
All these factors indicate an extremely deep, nearly 7% economic slowdown for the current year. The turning point in the growth outlook is mainly determined by external factors. Domestic demand components will remain subdued, as fiscal consolidation, banking sector deleveraging and the reduction in the external financing requirement should continue for a longer period in order to reduce the country's vulnerability to external financing conditions.

As to external demand, the latest information suggest that the positive effects of the wide-ranging economic policy interventions are becoming tangible, and the world economy may be approaching a turning point in the economic cycle. These favourable signs are less apparent in the actual data yet, although they can already be traced in economic agents' expectations, the rise in major stock exchanges and in euro area – especially German – confidence indicators, which are decisive for Hungarian exports.

However, it is important to add that for the time being the favourable indicators should be treated with caution. Based on the experience of previous recessions, downturns caused by bank crises and those affecting several regions tend to be deeper and longer than the average. As both properties are typical of the current global economic recession, the most recent forecasts (e.g. IMF, OECD, European Commission) only project a slow recovery starting in 2010.

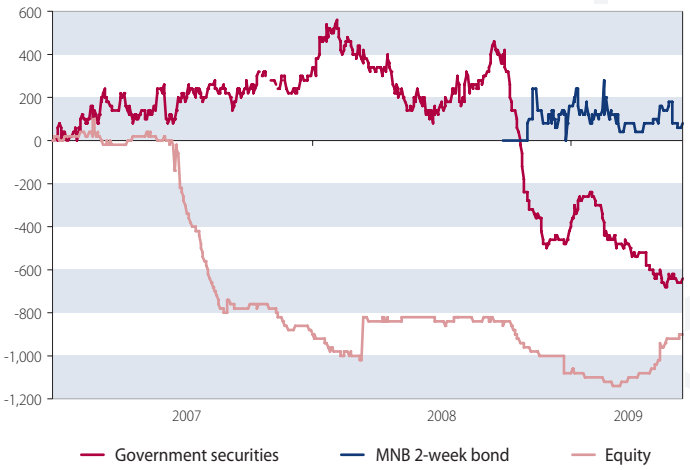
In the current situation, near the trough of the cycle, there is considerable uncertainty about the longer-term prospects. Nevertheless, we think that during the economic crisis so much capacity will be freed up that, in an international environment becoming more favourable, strong adjustment might take place starting from 2011, serving as a foundation for economic growth above 3%. The reduction in the tax wedge on labour and the permanently weaker forint exchange rate together foster export competitiveness, which may result in a relatively strong expansion of Hungary's export market share in an accelerating global economy.

Graph 1 Regional exchange rate developments



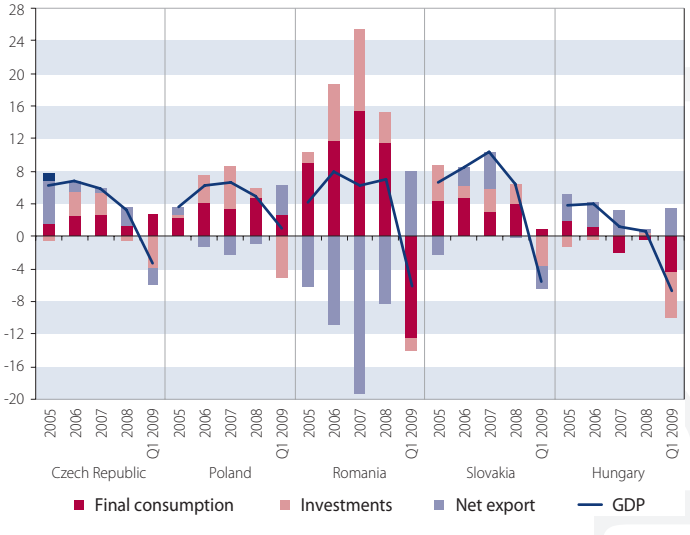
Source: MNB.
Note: HUF – Hungarian forint, PLN – Polish zloty, CZK – Czech koruna, RON – Romanian leu.

Graph 2 HUF assets owned by foreign investors



Source: MNB.

Graph 3 Regional GDP patterns



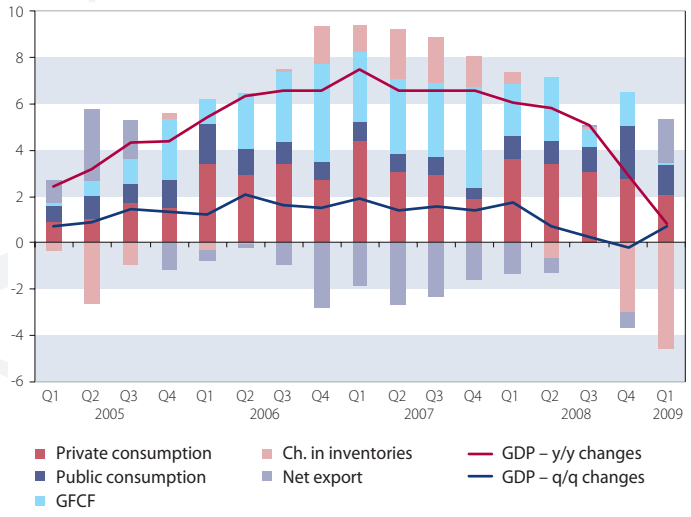
Source: MNB.

The consequences of the financial crisis for the Polish economy

Michał Gradzewicz, Piotr Kasprzak
Narodowy Bank Polski

The euro area was one of the regions of the world that have been hardest hit by the global financial and economic crisis, with its GDP growth rate falling from 2.7% in 2007 to 0.7% in 2008 and -4.9% y/y in 2009 Q1. This triggered a sharp contraction in the demand for exports of the Polish enterprise sector. Falling demand was accompanied by a sharp depreciation of the Polish currency (by 42% between July 2008 and February 2009, followed by a 5% appreciation till May 2009). The contraction in the euro area negatively affected the performance of the Polish economy, with the most apparent effect being the decline of GDP growth form the high level of 5.9% y/y in 2008 Q2 to 0.8% y/y in 2009 Q1 (still being one of the highest among European countries).

Graph 1 GDP development in Poland



Source: NBP.

Sources of growth

The composition of GDP growth in 2009 Q1 is relatively favourable, as the decline of growth rate is negatively influenced mostly by a sharp decline of inventories, contributing to GDP growth of -4.5pp. Private consumption grew relatively strongly by 3.3% y/y, although slower then in 2009 Q4 (5.3%)[1], similarly to public consumption (6.1% growth in 2009 Q1 compared to almost 14% in 2008 Q4). Rising government expenditure together with declining revenues due to lower collection of taxes, which can be partly attributed to the activity of automatic stabilisers, induced an increase of public sector deficit (from 1.9% of GDP in 2007 to 3.9% in 2008) and growing debt (47.1% of GDP in 2008). In consequence, the government recently announced that the budget deficit for 2009 will be higher than previously planned and the government is seeking additional savings.

The investment demand increased in 2009 Q1 by 1.2%, which is remarkable given the strong investment contraction during previous slowdowns experienced by the Polish economy. The investment growth is supported by an increase of public investments, mainly oriented at infrastructure development projects partly financed with EU funds, as the private and housing investments are relatively weak. Additionally, monthly data on construction output, which is slightly positive (e.g. construction output grew by 0.2% y/y in May 2009), confirm that the investment demand should not drop significantly in the near future.

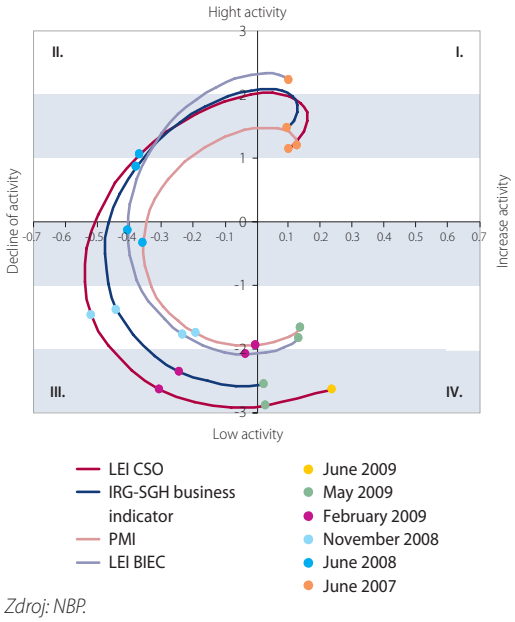
The fall of external demand, despite some exchange rate depreciation, triggered a considerable contraction in exports, which declined by 14.6% y/y in 2009 Q1. Weaker domestic demand, combined with exchange rate depreciation and the fact that export production is relatively import-intensive, translated into a fall in imports of 17.6% y/y in 2009 Q1. Stronger contraction of imports than exports results in a positive contribution of net exports to growth (1.9 pp) and, together with improving balance on income, in a rise of an estimate of current account deficit to GDP ratio from 5.4% in 2008 Q4 to 4.3%in 2009 Q1.

Enterprise sector

The growth slowdown is unevenly distributed across the economy and concentrated in export-oriented enterprises, e.g. industry, where gross value added declined by 5.9% in 2009 Q1, whereas construction and market services only experienced some growth slowdown (to 3.4% and 3.1%, respectively). The monthly data also show a continuing deterioration of industrial output with a tendency to moderate. Also the results of the enterprise survey conducted by the National Bank of Poland for 2009 Q1 indicate the worsening economic climate, especially in export-ori-

1 *The monthly real growth of retail sales has oscillated around 0 since the beginning of the year, without any significant downward trend (in May sales declined by 0.5%), which suggests that the expected decline of consumption growth in 2009 Q2 should be moderate.*

Graph 2 Business climate indicators



Zdroj: NBP.
Notes: Evolution of cyclical components of business climate indicators, extracted using Christiano-Fitzgerald band-pass filter

ented enterprises, with some signs of possible moderation of export decline in the future, despite increasing demand anxiety (partly due to the positive impact of exchange rate depreciation for the profitability and competitiveness of export activity, implying the rise of profit margins). The survey results also suggest that the domestic demand is weakening, but the worsening economic situation has not yet induced the liquidity shortages or disrupted the ability to meet obligations in the enterprise sector, which was observed during the recession that Poland experienced at the beginning of this decade. The declining demand and investment activity also induced a considerable drop in capacity utilisation, from high levels close to 80% observed till the end of 2008, to 69% in 2009 Q2.

The rapid exchange rate depreciation implied some shifts in the financial results of the enterprise sector, which recorded a huge negative outcome on financial operations (approx. PLN 16.4 billion in 2008 Q4, going down to 10 billion in 2009 Q1), as a result of the revaluation of external debt and losses on FX options (the latter used both for hedging and speculative purposes when the currency had appreciated for a few years). The enterprises' operational results are still relatively high – the profitability rate of gross turnover declining to 3% in 2009 Q1.

As a result of both more stringent credit policies of corporate banks and a lower demand for credit due to low demand and investment activity, the growth of credit for the corporate sector is on a decline (the annual growth rate fell form 28.8% in December 2008 to 17.7% in May 2009), especially in the case of loans on current account (the annual growth rate decreased form 28% in December 2008 to 9.5% in May 2009).

Expectations in the corporate sector

The most important business climate indicators (e.g PMI or CSO indexes) were decreasing rapidly till approximately the beginning of the 2009 Q2 and are now on a rising trend. Taking into account that their cyclical components (extracted using the Christiano-Fitzgerald filter) are also improving, this indicates that the Polish economy is likely to be at the bottom of the current business cycle.

Labour market

The falling level of economic activity also triggers a decline in the demand for labour. Employment in the enterprise sector dropped by 1.4% y/y in May 2009, concentrating in manufacturing (-7.5% y/y), but it was positive in construction (4.4%) and majority of services. The LFS data for 2009 Q1 indicate that the number of employees in the whole economy is growing slowly (by 1.3% y/y, compared to 3% in 2008 Q4). The decline of average hours (-2.5% y/y) and a tendency of enterprises to decrease the employment of temporary workers (-1.6% y/y) rather than permanent ones (2.6%), together with some evidence from the procyclicality of productivity and labour market flows, suggest that enterprises tend to hoard labour during the crisis. Falling labour demand is accompanied by rising labour supply – the participation rate grew from 53.7% in 2008 Q1 to 54.5% in 2009 Q1, both of these effects translating into an increase of the unemployment rate from 6.7% in 2009 Q4 to 8.3% in 2009 Q1 (with monthly data suggesting a rising tendency) and a slight falling tendency of wages – though the quarterly data point to the stabilisation of wage growth (6.8%) in 2009 Q1, the latest monthly data suggest further decline (in May wages rose by 3.8% y/y). The ULC indicators are growing by 6–7% y/y.

CPI Inflation

CPI inflation has been increasing in Poland since February 2009, partly due to higher import prices resulting from exchange rate depreciation from the second half of 2008 and relatively high ULC in recent quarters, but also due to the base effect of energy and food prices. In May 2009 inflation decreased to 3.6% y/y (from 4% y/y in April 2009), amid lower energy and food prices growth, but also as a result of declining domestic demand. The short-term inflation forecast suggests a further decline in annual inflation, additionally supported by relatively stable inflation expectations of the household sector.

GDP and inflation outlook

According to the NBP's macroeconomic projection (under assumption of constant interest rates) of June 2009, the GDP growth rate will be the lowest in the 2009 Q3. In line with the June projection, there is a 50-percent probability of the annual GDP growth within the range of -0.4–1.1% in 2009, 0.2–2.5% in 2010 and 2.4–4.5% in 2011. There is a 50-percent probability of inflation running within the range of 2.8–3.5% in 2009,

2 Irregular loans at banks applying Polish accounting standards stand for: loans classified as substandard, doubtful, loss loans; at banks applying IFRS: impaired loans, as recognised by the bank on the basis of objective circumstances.

1.1–3.2% in 2010 and 0.8–3.4% in 2011. The growth in the Polish economy will be mitigated by the drop in foreign demand, caused by the recession in the developed countries, and the tightening of banks' credit policies and, consequently, private sector activity. There will be a significant reduction in investment made by private enterprises, with a positive effect on the overall investment demand coming from public investments stimulated by the inflow of EU structural funds.

In 2009 the scale of domestic demand decline will be curbed by a stable increase in private consumption, whose growth in average annual terms will be ranging close to 2.5%. Thereafter, private consumption growth will deteriorate due to both the slower growth of disposable income resulting from weaker labour market climate, and the decline in the value of household assets, because of the earlier strong zloty depreciation and the current slump in the housing market. As the unfavourable tendencies will be reversing, in particular in the foreign exchange and housing market, the growth of private consumption will start to consolidate again starting from mid-2010.

The slowing wage growth and the reduction in the number of working persons in reaction to deteriorating economic situation will translate into a deceleration of ULC growth. This growth will remain negative starting from the end of 2009 till mid-2011, when the improving economic condition will feed the rebound of ULC. As a consequence, the rate of CPI inflation will be gradually decreasing till the end of 2010 (reaching the NBP's inflation target in mid-2010). Despite a rebound in the inflation rate from mid-2010 till the end of 2011, it will most probably stay below the inflation target of 2.5%

IMPACT OF THE GLOBAL FINANCIAL CRISIS AND RECENT DEVELOPMENTS IN THE BANKING SECTOR

Until September 2008 the Polish banking sector had been relatively unaffected by the global financial crisis. This was due to a rather traditional model of the banking activity in Poland. Polish banks were not engaged in complex structured financial instruments. Therefore, the size of exposure of domestic financial institutions towards US sub-prime market risks, either in the form of holding structured financial instruments, or other instruments issued by the largest investment banks, was negligible.

The bankruptcy of the Lehman Brothers has started a major increase in the risk aversion of participants of the global financial markets. As majority of Polish banks are members of foreign banking groups (in terms of assets the share of foreign-owned banks amounted to 72.3% at the end of 2008), the turbulences in the global market caused a major fall in mutual confidence between the Polish banks – an 'imported' crisis of confidence. As a result, the liquidity of the interbank market significantly diminished and transactions were made on the shortest tenors (mainly O/N and T/N). Polish banks had problems with correctly assessing the risk of their counterparties, including the risk associated with unfavourable financial standing of numerous parent entities of Polish banks.

Lower availability and higher costs of funding via interbank market forced banks to seek another source of financing. The majority of banks that are members of foreign banking groups received an increased amount of funds from their parent entities. The amount of liabilities towards foreign banks grew by 65% between August 2008 and the end of May 2009. It has to be stressed, however, that a substantial part of this growth can be attributed to the depreciation of the zloty. Taking this into account, the growth would amount to about 32.5%. The highest increase in foreign funding was observed in September and October – during the largest turbulences in the interbank market. After the stabilisation of domestic money market and actions undertaken by the NBP, the growth of foreign funding was halted, and the amount of liabilities towards foreign banks now stands at a stable level.

In the conditions of lower availability and higher costs of market funding, banks started intensified competition for deposits of the non-financial sector (mainly households' term deposits). This resulted in higher costs of obtaining this kind of funding, but at the same time, banks increased their stable deposit base, which is favourable for the stability of funding.

Banks have tightened their lending policies. The results of the lending survey conducted by the NBP, proved that both in 2008 Q4 and 2009 Q1 banks tightened their terms and conditions for granting all types of loans. The decreased lending supply is mainly the result of deteriorating economic conditions and uncertainty about future economic developments. In consequence, the credit risk has considerably risen. Another reason behind the limited motivation to lending is the capital constraint.

The tightening of lending policies affected the lending growth, which has diminished in recent months. Due to the strong depreciation of the zloty, part of the nominal lending growth results from exchange rate differences (an increase in the zloty value of loans denominated in foreign currencies). The year-on-year lending growth to non-financial resident customers in May 2009 amounted to 30.6%; after adjusting for exchange rate changes it was 18.8%. In particular, the growth amounted to 11.2% for corporate loans, 27.0% for housing loans and 23.9% for consumer loans (adjusting for exchange rate changes).

Throughout the 2008 the quality of loans – defined as the ratio of irregular loans[2] to total loans – was improving. The ratio reached its historical low of 4.4% at the end of the year. However, the amount of irregular loans increased in 2008 Q4 and, especially, in 2009 Q1. In the case of corporate loans, the amount of irregular loans rose in 2009 Q1 by 41% and the ratio reached 7.9% (at the end of 2008 it stood at 5.8%). Also in the case of loans to households the amount of irregular loans has increased in the recent period, however,

to a lesser extent than in the case of corporate loans. As a result, the ratio reached 3.8% in March 2009, standing at 3.5% at the end of 2008. Finally, the overall irregular loans to non-financial sector ratio increased to 5.3% at the end of March 2009.

At the beginning of 2008 the funding gap[3] of the banking sector became positive and then was gradually growing, reaching its high of 14.3% at the end of February 2009. However, the rise of the gap in the 2008 Q4 and 2009 Q1 was mainly caused by the strong depreciation of the zloty, triggering growth of the zloty value of foreign currency assets (mainly housing loans to individuals). The recent slowdown in lending, together with increased competition for deposits, has contributed to a slowdown in the widening of the excess loans over deposits. Since February the funding gap has been falling reaching 12.2% at the end of May 2009.

In 2008 Polish banks posted record-high earnings. However, since Q4 the profits have been decreasing due to the growing value of impaired loans. As a result, in 2008 Q4 banks' profits were two times lower than the average profits of the first three quarters of the year. Despite exceptional profits of 2008, profitability indicators have decreased, but they are still relatively high. At the end of March 2009 return on assets (ROA) amounted to 1.30% (at the end of 2007 and 2008 it was 1.84% and 1.62%, respectively) and return on equity (ROE) amounted to 16.8% at the end of March 2008 (in comparison to 24.83% at the end of 2007 and 20.7% at the end of 2008). It is very likely that future profits of the banking sector will be affected by increasing costs of credit risk, higher financing costs and deceleration in lending.

At the end of April 2009 the average capital adequacy ratio in the banking sector stood at 11.7%. At the end of 2008 it was 11.2%, and at the end of 2007 at 12.1%. The decrease in average adequacy ratio in 2008 occurred despite an increase in regulatory capital (due to, inter alia, strong credit growth and deprecation of the zloty in the second half of the year). Very good financial results of 2008 enabled banks to increase their capital level. Also the Financial Supervision Authority, in order to strengthen banks' capital, recommended that they do not pay out the dividend.

Dealing with crisis

Measures undertaken by the government

On 30 November 2008 the Polish government announced the stability and growth plan, which, together with additional bills, introduced various measures aimed at stabilising the negative consequences of the economic crisis on the Polish economy. The measures included e.g.:

- supporting financial institutions threatened with liquidity problems,
- increasing guarantees for bank deposits,
- increasing credit guarantees for the corporate sector (including SMEs),
- increasing investment relief for SMEs and new start-ups,
- supporting investments in renewable energy sources,
- increased utilisation of EU funds and acceleration of EU supported projects,
- central government budget savings,
- support for mortgage payments for newly unemployed.

Some steps are also planned, although not yet implemented, to alleviate the consequences of the crisis for employees and entrepreneurs, aimed at avoiding lay-offs and helping to manage labour utilisation during the slowdown and decreasing labour costs in enterprises experiencing temporary financial difficulties.

Undoubtedly, measures undertaken by the government are stabilising the economic and labour market situation, but it is very hard to assess the exact positive impact they have on the banking, enterprise and households sectors.

Measures undertaken by the National bank of Poland

In response to the turmoil in the interbank market, on 14 October 2008 the National Bank of Poland introduced the "Confidence Pact". The aim of the pact was to support the banks with PLN liquidity (in particular the possibility of obtaining PLN funds for maturities longer than one day) and FX liquidity. The main instruments of the pact are:

- 3-month and 6-month (after the extension of the pact) repos: fine-tuning operations supporting banks with PLN liquidity.
- repos offered by the NBP are of favourable price terms and, thus, commonly used by banks as a source of obtaining PLN funding. Introduction of the repos created the possibility of arbitrage in the market of interbank deposits and treasury bills, which contributed to a fall in WIBOR 3M rate in line with the NBP's reference rate, improving the conditions in the money market.
- FX swaps: EUR/PLN, USD/PLN and CHF/PLN swaps creating the possibility of hedging the FX risk.

The NBP's FX swaps were introduced in order to be a 'last resort' instrument for banks that were unable to hedge the risk in the market or to roll over FX funding. Therefore, price conditions of the NBP's FX swaps are rather tight. As a result, the usage of NBP FX swaps is limited as banks prefer obtaining FX funding in the market at a lower cost. Still NBP FX swaps constitute a guarantee of FX risk hedging in case of any significant turbulence occurs in the markets.

Additionally, in January 2009 the NBP conducted an earlier redemption of the NBP's 10-year bonds issued in 2002 and the Monetary Policy Council decided to decrease the official reserve requirement from 3.5% do 3%.

Moreover, in April, May and June 2009 the NBP held a series of meetings with the representatives of the banking sector and public institutions, which were supposed to develop measures and solutions favourable for the maintenance of positive credit growth.

3 *Funding gap – the difference between loans and deposits divided by loans. Loans and deposits include operations with non-financial and general government sectors.*

The silver collector coin "Protection of Nature and Landscape – Veľká Fatra National Park"

Ing. Dagmar Flaché
Národná banka Slovenska

The coin produced according to the design of Mgr. art. Roman Lugár

The latest collector coin, the issue of which has been prepared by Národná banka Slovenska in June 2009, presents the Veľká Fatra National Park. It is the eighth coin of the thematic series about Slovak national parks.

The Veľká Fatra National Park was declared in 2002 and covers an area of more than 40,371 ha. Up to 85% of its area is covered by forest, frequently primeval type. A unique feature of the park is the abundant natural occurrence of the common yew, a protected wood species rare in European nature today. The main ridge is formed by the Hôľna Fatra, characterised by meadows and pastures. Its highest mountain called Ostredok is 1,592 m high. Typical of the Bralná Fatra relief are karstic phenomena, such as rocky walls, towers, windows and canyon-like valleys – the Gaderská, Blatnická, Belianska and Bystrická valleys. More than 50 caves, which are important bat hibernacula, were discovered in the mountains. The only cave accessible to the public is the Harmanecká jaskyňa. Veľká Fatra features more than thousand higher plant species. A rare endemic species – the Fatra cyclamen (*Cyclamen fatrense*) – can be found here as well. The plants martagon lily, perennial honesty, narcissus-flowered anemone and the Slovak pasque flower (*Pulsatilla slavica*) are very interesting due to their beauty. The deep forests provide shelter to many animal species. The most valuable species include the brown bear, the gray wolf and the lynx; the golden eagle and the peregrine falcon nest in the rocky walls. Of extraordinary importance is the occurrence of our most valuable gallinaceous birds – the capercaillie and the black grouse.

Fourteen authors took part in an anonymous public competition for the artistic design of this coin. They submitted a total of seventeen competition works. The expert commission recommended for production the artistic design by Mária Poldaufová, which was placed first. The commission appreciated the balance and harmonic connection of all components of the proposed artistic design in terms of modelling, composition and visual impression, including optimal letters. The obverse depicts the golden eagle, the reverse the common yew and the Fatra cyclamen.

Despite the fact that the commission recommended this design for implementation, the governor of the NBS made use of his right resulting from the competition conditions, which enable him to make a decision differing from the recommendation of the commission, and, by his decision based on an authorization by the Bank Board of the NBS, approved for production an art design that had been awarded a reduced third prize. The author of the design is Mgr. art. Roman Lugár. Motifs of characteristic representatives of the national park's flora – the valuable endemic species Fatra cyclamen, Clusius' gentian (***Gentiana clusii***) and common yew – have been chosen for the obverse. He placed a golden eagle flying over the Kráľova skala on the reverse.

The second prize was not awarded in the competition. Reduced third prizes were awarded to two other designs created by Karol Ličko. The obverse of the first one depicts a valuable representative of the fauna of Greater Fatra, the capercaillie, and the reverse shows a valuable representative of the flora, the Fatra cyclamen. The second one contains typical fauna and flora representatives, the lynx on the obverse and the common yew on the reverse. The depicted plants and animals are surrounded by a pertinently chosen landscape motif in both designs.

The collector coin in nominal value of 20 €, with a diameter of 40 mm and a weight of 33.63g has been minted of silver with a 925/1000 fineness in the Kremnica Mint in a quantity of 9,900 pieces in brilliant uncirculated quality and 12,600 pieces in proof quality. The coin edge contains the inscription "OCHRANA PRÍRODY A KRAJINY" (Protection of Nature and Landscape) preceded by a flower-shaped mark.

1st prize Mária Poldaufová

Reduced 3rd prize Karol Ličko

Photographs:
Ing. Štefan Fröhlich

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