IMPACT OF CHANGES IN KEY NBS RATES ON CUSTOMER INTEREST RATES ON LOANS AND DEPOSITS

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Since February 2000, the National Bank of Slovakia has been applying a qualitative conduct of monetary policy through the setting of key interest rates for overnight sterilisation and refinancing operations, and, since May 2000, a limit rate for standard two-week repo tenders. Apart from stabilising the money market and enabling the Central Bank to regulate price level on this market, the change in the conduct of monetary policy has led to the gradual adaptation of customer interest rates on bank loans and deposits to the official rates of the NBS.

The reaction of average customer interest rates to changes in key NBS rates appears to be less pronounced than the response of money market rates, and is spread over a longer period of time. This results from the fact that average interest rates on total deposits and loans (stock of loans and new loans as well) represent a relatively wide aggregate expressing the weighted average of all deposit and loan products, including all maturities.

The subject of this article is an analysis of the reaction of customer interest rates to changes in key NBS rates, on the basis of a new, narrow interest rate aggregate[1], which applies to both deposits and loans. The new aggregate includes banks with a controlling share of the market (excluding home savings banks and banks that have been closed). The narrow aggregate makes it possible to obtain more unambiguous information about the behaviour of individual customer interest rates and to eliminate casual fluctuations. More valuable results have been obtained from the statistical point of view when using the aggregate, mainly in econometric analyses of customer interest rates.

The first part of the article gives a brief description of the structure of interest rates by term, a graphic analysis of short-term customer interest rates and their reactions, and/or adaptation to the key rates of the NBS. The second part is deals with the econometric parameterisation of the functional dependence of customer interest rates and money market rates on monetary-policy decisions.[2]

The most unambiguous information about the reaction of customer interest rates to changes in key NBS rates may be extracted from short-term rates, mainly in the case of new loans and deposits. Longer-term loans and deposits are usually affected by factors that reduce the possibility of extracting relevant information. Interest rates on the stock of loans are to some extent distorted as a result of loan portfolio restructuring at selected banks, the closure of several banks, etc..

Reaction of short-term customer interest rates to changes in key NBS rates

New loans[3]

Almost 90% of new loans are short-term loans. This means that the volumes of medium- and long-term loans are relatively small, which is reflected in the increased volatility of interest rates on these loans. Even a relatively small volume of loans, provided at a rate markedly different from the average of the previous month, caused fluctuations in the average interest rate. In addition, medium- and long-term interest rates are affected by the providing mortgage and home savings loans, the rates of which (mainly the lending rates of home savings banks) are less sensitive and/or insensitive to monetary-policy decisions. Interest rates on new loans were also affected by loan portfolio restructuring at commercial banks (in December 1999 and June 2000), which, however, caused no marked anomalies in their development in the long term.

For the analysis of interest rates on new short-term loans, a narrow aggregate has been created for the average lending rates of banks, which accounted for almost 65% of the total volume of new loans provided over the period September 2001 to August 2002. The average interest rate on new short-term loans in total is determined first and foremost by the level of interest rates in this aggregate, while the coefficient of correlation between changes in the average rate for short-term loans in total and its changes in the narrow aggregate reaches 0.85. Graph 1 shows that the average interest rate on new short-term loans in the narrow

[1] The narrow aggregate (group of selected banks) does not include banks that are identical in the analysis of new loans, volumes of loans and deposits.

[2] With regard to the fact that decisions concerning the level of key interest rates are usually made in the last week of the month (on Fridays), the new values of key interest rates appear in graph form in the month coming after the decision of the Bank Board of the NBS.

[3] New loans – flow variable, volume of new loans per month.

Graph 1 Interest rates on new short-term loans

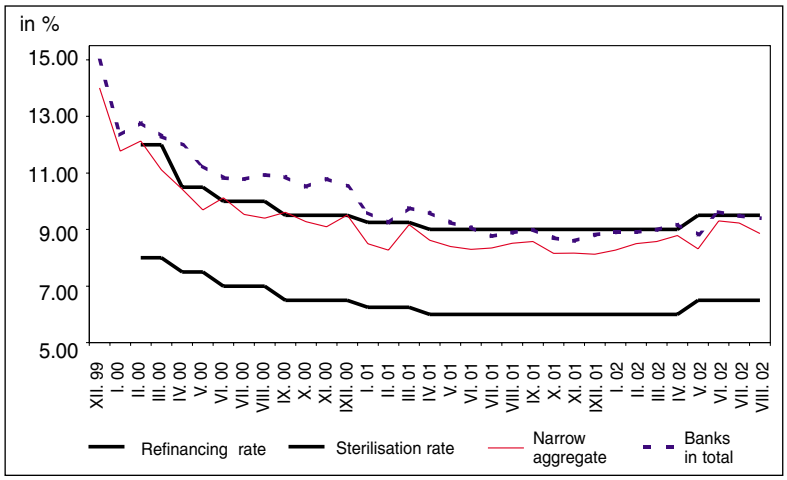


Table 1 Coefficients of correlation between the average interest rate on new short-term loans and selected interest rates

	1M BRIBOR	3M BRIBOR	REPO rate	Refinancing rate	Sterilisation rate
Narrow aggregate	0.88	0.89	0.82	0.93	0.92
Banks in total	0.82	0.81	0.82	0.90	0.93

Table 2 Coefficients of correlation between a change in the overnight refinancing rate of the NBS and a cumulative three-month change in the average interest rate on new short-term loans

Narrow aggregate	0.80
Banks in total	0.85

aggregate reacts sensitively to changes in key NBS rates and is gradually getting closer to the rate for overnight refinancing.

Within the narrow aggregate, the average interest rate on new loans is characterised by a relatively high correlation with both the level of key NBS rates and that of one- and three-month BRIBOR rates (Table 1).

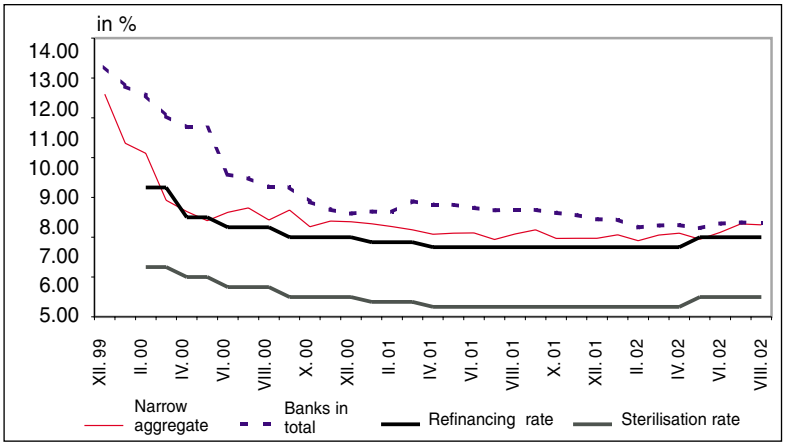
As in the case of correlation coefficients expressing the degree of correlation with a change in the overnight refinancing rate of the NBS, changes in average interest rates on new short-term loans and the narrow aggregate in the following three months show a significant relationship (Table 2).

Stock of loans [4]

In the case of the volume of loans, the problem of extraction of relevant information is more pronounced. Interest rates in the overall aggregate, as well as the individual maturities, are affected to a greater extent by transfers within the scope of loan portfolio restructuring at selected banks, changes in the rates of interest on restructured loans, and also by the closure of certain banks. Interest rates on the stock of loans also include the rates of interest on loans provided in previous periods. Although interest rates on the stock of loans of all maturities showed gradual convergence to the level of the overnight refinancing rate, the reaction to changes in key NBS interest rates cannot be identified.

In the period from June 2000 to March 2001, development in the banking sector was affected to a quite significant extent by loan portfolio restructuring at selected banks. In June 2000, loans were shifted into short-term loans within the scope of bank restructuring in the amount of more than Sk 30 billion. These loans have been converted into restructuring bonds (in January and March 2001), and are therefore no longer included in the loan statistics. The narrow aggregate includes banks, which had a share of more than 50% (on average) of the stock of loans in the period September 2001 to August 2002.

Graph 2 Interest rates on the stock of short-term loans



Interest rates on the total stock of short-term loans are characterised by a trend of gradual fall, towards the level of the overnight refinancing rate of the NBS.

The values of the coefficients of correlation between the average interest rate on the stock of short-term loans and the level of NBS rates for overnight operations are relatively high, for both the narrow aggregate and banks in total.

However, the coefficients of correlation between a change in the overnight refinancing rate and a cumula-

[4] Volume of loans – stock variable, total volume of loans provided and outstanding at any one time.

Table 3 Coefficients of correlation between the average interest rate on the volume of short-term loans and selected interest rates

	1M BRIBOR	3M BRIBOR	REPO rate	Refinancing rate	Sterilisation rate
Narrow aggregate	0.71	0.56	0.56	0.84	0.87
Banks in total	0.77	0.80	0.50	0.91	0.90

Table 4 Coefficients of correlation between a change in the overnight refinancing rate of the NBS and a cumulative three-month change in the average interest rate on the volume of short-term loans

Narrow aggregate	0.55
Banks in total	0.58

tive three-month change in the average interest rate on the stock of short-term loans indicate that mutual correlation is less significant.

Deposits

Although interest rates on deposits were not affected by such factors as loan portfolio restructuring at commercial banks, the most readily available information may be obtained from short-term deposit rates. This is connected with the dominant share of short-term deposits in the total volume of time deposits (approximately 80 %) and with the gradual cancellation of the system of progressive interest on medium- and long-term deposits at selected banks. Long-term deposits are dominated by home savings deposits (96%), which are rather rigid in relation to the key rates of the NBS due to their nature as a bank product.

In the period under review, the narrow aggregate accounted for 50% of short-term deposits in total. Graph 3 indicates that interest rates on short-term deposits tend to adapt gradually to the level of the Bank's overnight sterilisation rate. The reaction of deposit rates to changes in key interest rates is less pronounced.

The coefficients of correlation between average interest rates on short-term deposits and key NBS rates (mainly the rates for overnight transactions) show relatively high values (Table 5).

The relatively significant relationship of short-term deposit rates is also documented by the coefficients of correlation between a change in the overnight sterilisation rate of the NBS and a cumulative three-month change in the average interest rate on short-term deposits (Table 6).

On the whole, it is possible to say that interest rates in the narrow aggregate (on both new loans and the stock of loans) show relatively pronounced convergence to the level of the Bank's overnight refinancing rate. In the case of deposits, short-term deposit rates gradually approach the level of the overnight sterilisation rate; the year 2002 saw some deviation from the level of the overnight sterilisation rate in a downward direction.

Table 5 Coefficients of correlation between the average interest rate on the volume of short-term deposits and selected interest rates

	1M BRIBOR	3M BRIBOR	REPO rate	Refinancing rate	Sterilisation rate
Narrow aggregate	0.79	0.81	0.70	0.95	0.94
Banks in total	0.81	0.84	0.74	0.95	0.95

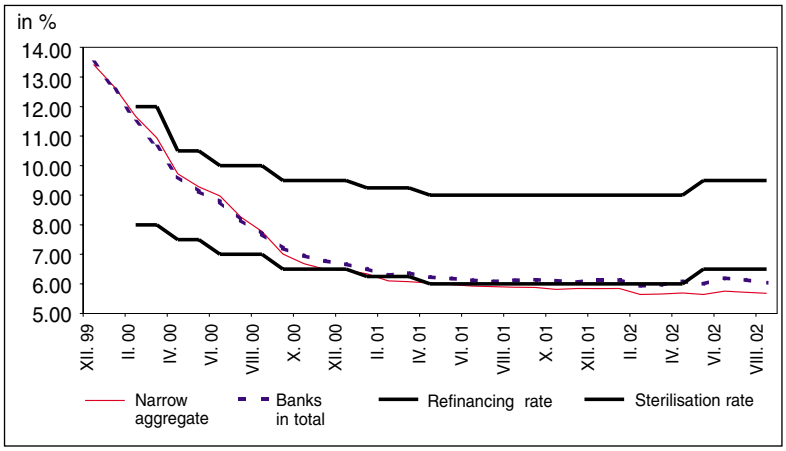
Table 6 Coefficients of correlation between a change in the overnight sterilisation rate of the NBS and a cumulative three-month change in the average interest rate on short-term deposits

Narrow aggregate	0.77
Banks in total	0.75

Quantification of the reaction of customer interest rates (short-term) to changes in key NBS rates

The reaction of customer interest rates on loans and deposits to changes in key NBS rates is an important component of the transmission mechanism of monetary policy. According to economic theory, customer interest rates, especially short-term rates, should be determined by central bank rates and money market rates. In relation to interest rates on loans, money market rates represent an approximation to the alternative limit cost of bank lending. In relation to deposits, however, they express the limit cost incurred in connection with the acquisition of resources (mainly in an environment marked by excess liquidity in the banking sector and low dependence on NBS refinancing). For the use of the official reserves of the central bank as a vari-

Graph 3 Interest rates on short-term deposits



able explaining the fluctuations in customer interest rates, there are a number of reasons. Under certain conditions, the official rates may express the limit cost of the funds obtained, while they are less volatile than money market rates and may also be used by banks as reference rates in setting the rates of interest for customers.

The relations between customer interest rates and key NBS rates may be best illustrated in graphs (graphs 1 – 3). For a more exact expression and parameterisation of the impact of a change in the official rates of the NBS on short-term customer interest rates and the length of time in which this impact is transferred into the customer rates, however, econometric methods are required.

On the basis of these assumptions, a functional relationship was tested for short-term interest rates on new loans, the stock of loans and deposits in total, and for the narrow aggregate of these rates, in the form of an Error Correction Model with the following general specifications:

$$d(i) = \gamma[i_{-1} - \alpha(ip)_{-1}] + \beta_1 d(bribor3M)_{-1} + \beta_2 d(bribor3M)_{-2} \\ ... + \beta_n d(bribor3M)_{-n}$$

The above equation assumes a long-term relationship between customer interest rates and the official rates of the NBS, and a short-term relationship between customer interest rates and money market rates.

i – customer interest rate (short-term interest rates on new loans, the stock of loans and deposits);
ip – key NBS interest rates (with the overnight refinancing rate being used for interest rates on loans, the overnight sterilisation rate for interest rates on deposits; the limit rate for standard two-week REPO tenders was not used owing to the small number of observation);
bribor3M – three-month money market rates BRIBOR (monthly averages);
α – coefficient of long-term elasticity;
γ – coefficient of adaptation;
β – coefficient of short-term elasticity to changes in BRIBOR rates;
d – the first difference.

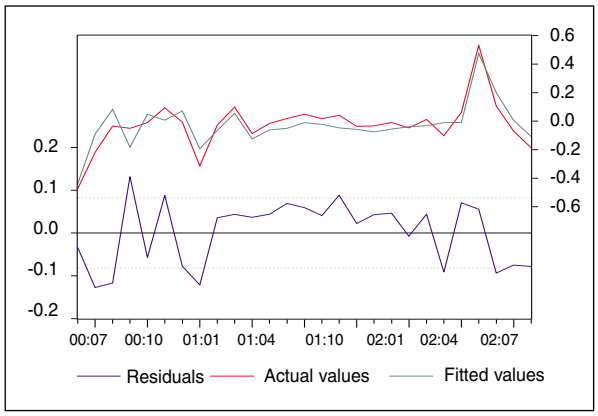
Statistically significant results were obtained from the above equation for two and/or three independent variables. In the case of interest rates on new short-term loans, a statistically significant result was obtained only for the narrow aggregate (which, however, affects the overall rate of interest to a great extent), while interest rates on the stock of loans produced no significant result from the statistical point of view. In the case of interest rates on deposits, a functional relationship was identified not only for the narrow aggregate (with a share of more than 50% in total deposits), but also for short-term interest rates on total deposits. The individual estimates are, however, affected by the shortness of the time series. The information capacity of the estimated parameters may also be distorted by the fact that key NBS interest rates were cut several times (five times) but raised only once[5], which does not make it possible to identify a possible asymmetry in the reaction of customer interest rates (a different reaction is recorded in the case of a rise than in the case of a fall in the official rates).

Table 7 Values of the individual parameters of estimated equations

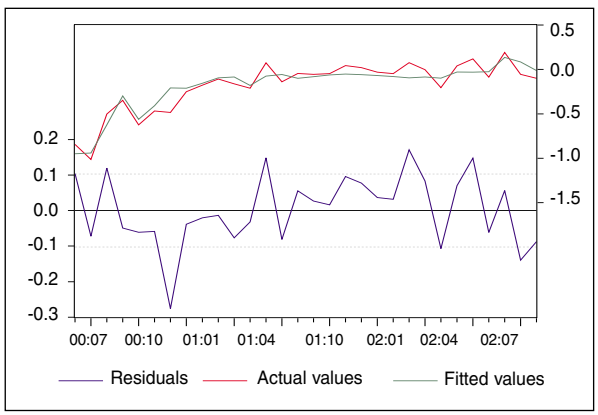
	α	γ	β_1
New short-term loans (narrow aggregate)	0.94	-0.87	0.69
Short-term deposits in total	0.96	-0.20	0.32
Short-term deposits (narrow aggregate)	0.88	-0.15	0.44

Based on equations estimated for the individual variables, we may say that the long-term elasticity of customer interest rates to changes in the key NBS rates has a value close to one in all cases. In the case of interest rates on new loans in the narrow aggregate, the rate of adaptation to an equilibrium level (long-term elasticity) is much higher than in the case of deposit rates. In the short term, lending rates are more sensitive to changes

Graph 4 Short-term interest rates on new loans in the narrow aggregate (changes)

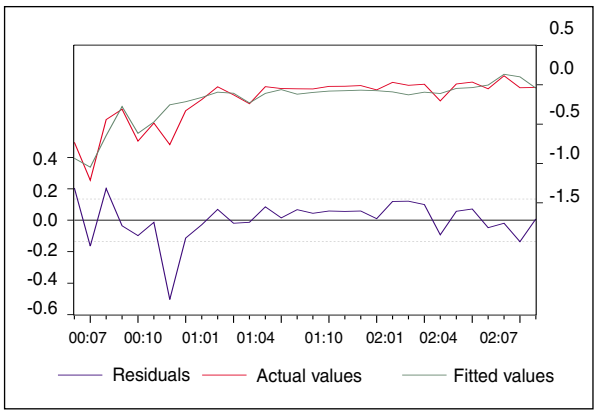


Graph 5 Short-term interest rates on total deposits (changes)



[5] Period under review: up to August 2002

Graph 6 Short-term interest rates on deposits in the narrow aggregate (changes)



in money market rates as well. In the case of deposit rates, short-term elasticity to changes in BRIBOR rates in the narrow aggregate is higher than in the case of total deposits. In all equations, statistically significant short-term elasticity to money market rates was identified only for time t-1.

The results obtained from an Error Correction Model (ECM) for individual variables are presented in graphs 4 – 6.

The analysis of the effects of changes in key interest rates on customer interest rates may also be applied to an estimate of the functional relationship between official central bank rates and money market rates (which are part of the explanatory variables in the equations of customer interest rates – short-term relationship).

$$d(bribor1M) = \gamma[bribor1M_{-1} - \alpha ip_{-1}] + \beta_1 d(bribor1M)_{-1} + \\ + \mu_0 d(ip) + \mu_2 d(ip)_{-2}$$

$$d(bribor3M) = \gamma[bribor3M_{-1} - \alpha ip_{-1}] + \beta_1 d(bribor1M)_{-1} + \\ + \mu_0 d(ip) + \mu_2 d(ip)_{-2}$$

μ – coefficients of short-term elasticities to changes in key NBS interest rates.

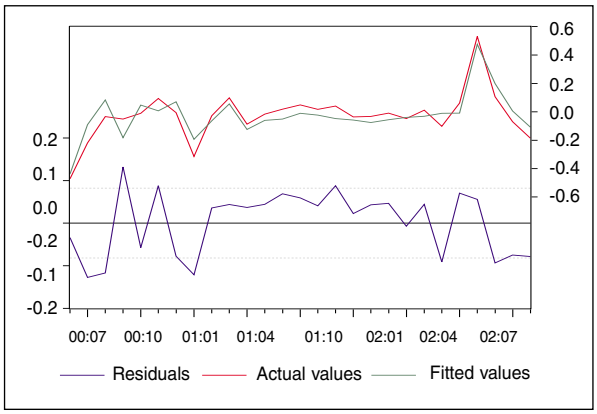
The estimates of the functional relationship for one-month and three-month BRIBOR rates parameterised in the form of an Error Correction Model, confirmed a statistically significant relationship (Table 8, graphs 7 and 8).

Based on the estimated relationships for customer interest rates and money market rates as well, it is possible to express the impact of changes in key NBS interest rates on such variables. Graph 9 illustrates the reaction of selected customer interest rates and money market rates to an increase of 1 percentage point[6] in key NBS rates. Changes in the official rates of the Central

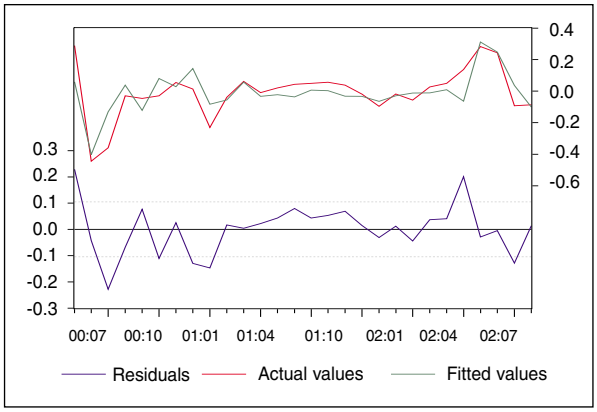
Table 8 Values of estimated parameters for the equation of money market rates

	α	γ	β_1	μ_0	μ_2
BRIBOR 1M	0.84	-0.54	0.48	0.88	0.13
BRIBOR 3M	0.85	-0.35	0.69	0.16	0.49

Graph 7 One-month BRIBOR (changes)



Graf 8 Three-month BRIBOR (changes)



Bank are first reflected in BRIBOR rates and consequently in customer interest rates[7].

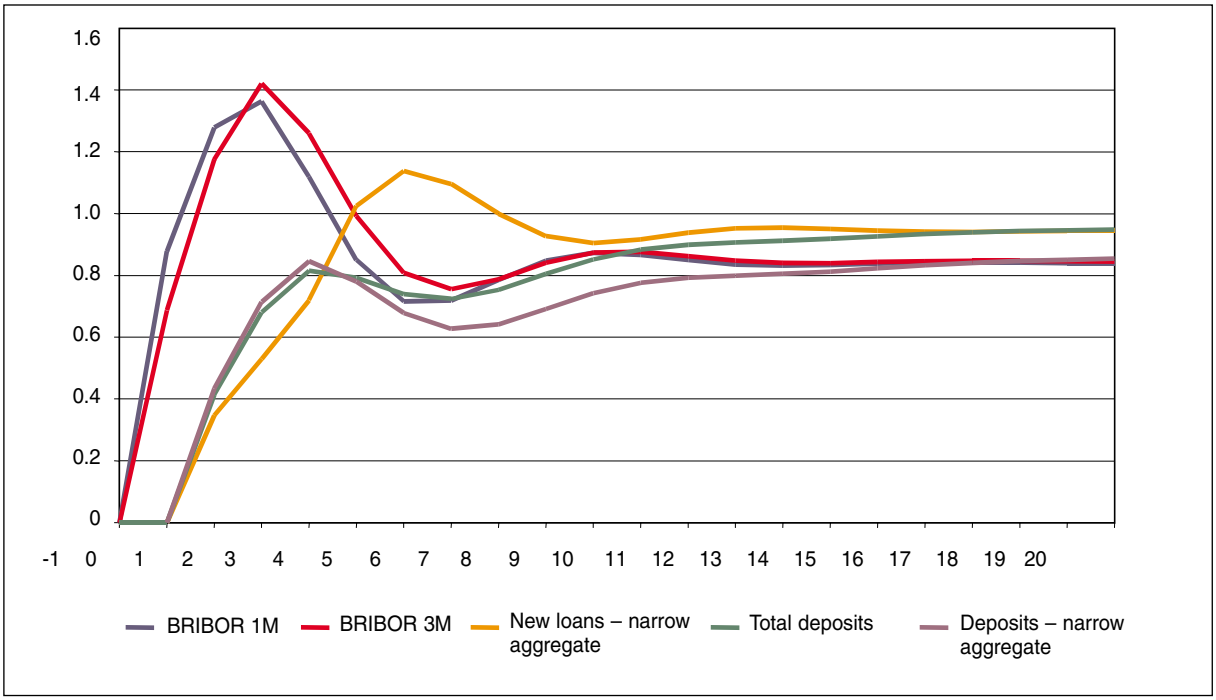
Money market rates (BRIBOR) react to changes (increase/reduction) in key interest rates more or less immediately, while the reaction in the first months is usually more pronounced than the change in the official rates of the central bank (culmination in the second month following the monetary-policy decision). In ensuing months, a certain correction takes place towards a state of equilibrium (long-term elasticity).

The reaction of short-term interest rates on new loans (narrow aggregate) to changes in key NBS rates is somewhat slower than in the case of money market rates. The gradual rise in lending rates takes place with a delay of one month. After the first five months, the increase in interest rates on loans culminates, and exceeds the original change in the official rate of the central

[6] The reaction of selected customer interest rates and money market rates to an increase of 1 percentage point in key NBS rates was simulated with the help of an impulse-response function on a simple three-equation model for one-month BRIBOR, three-month BRIBOR, and individual customer interest rates, consistent with the estimates of relevant ECM equations.

[7] In the case of a cut in the rates, a reverse reaction would be recorded.

Graph 9 Reaction of selected interest rates to a change of 1 percentage point in key NBS



bank. In the following period, the excessive reaction moderates towards an equilibrium state. The similarity between the reaction of interest rates on new loans and BRIBOR rates (delayed) is due to the relatively high value of short-term elasticity of these interest rates to money market rates (0.69).

In the case of interest rates on short-term deposits (in total and within the narrow aggregate of banks), the reaction also takes place with a delay of one month. In contrast with lending rates and money market rates, however, the reaction of deposit rates is not excessive (which would exceed the change in the official rate). After a relatively marked increase in deposit rates in the first three months following the monetary-policy decision, the course of deposit rates is corrected to some extent by money market rates in a downward direction (roughly form the fourth to the sixth month). The next period is marked by gradual convergence towards an equilibrium state (long-term elasticity).

The monetary-policy decisions of the National Bank of Slovakia, made in the form of changes in key interest rates, have a relatively marked effect on money market rates and, with a short delay, on customer interest rates on new loans and deposits. Even if a statistically significant relationship was identified only for the narrow aggregate in the case of new loans, this accounts for almost 65% of total new loans and affects the overall rate to a significant extent. Hence, the expected reaction of short-term interest rates on new loans may be judged by their reaction in the narrow aggregate. Although statistically significant results were not achieved in the case of short-term interest rates on the stock of loans, we can say that interest rates have gradually stabilised on the whole and that this will increase the probability of their functional dependence on NBS rates in future. Short-term interest rates on deposits also showed a relatively flexible reaction to changes in key NBS rates, and a statistically significant relationship was identified not only for the narrow aggregate, but for total deposits as well.

When the reaction of money market rates and customer interest rates to an increase of 1 percentage point in the official rates of the NBS is simulated, all variables show gradual convergence towards a state of equilibrium (long-term elasticity). In the case of BRIBOR rates and interest rates on new short-term loans, the rate of adaptation is higher than in the case for deposit rates; the cumulative change in these interest rates stabilises at the level of long-term elasticity after approximately 11 – 12 months of the change in the official rates. In the case of deposits, the cumulative change stabilises at equilibrium level only after a longer period, i.e. approximately 17 – 19 months.

At the first sight, the period of time in which the reaction of customer interest rates (after a change in key NBS rates) converges to an equilibrium state may seem to be too long from the point of view of monetary policy. However, up to two-thirds of the impulse arising from a change in the official rates of the Central Bank is transmitted into the reaction of customer interest rates as early as 2 – 3 months after the change.