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The Alternative Monetary Rule: Evidence from Russia

Galina G. Gospodarchuk*[a], Andrey V. Aistov[b] and Anton V. Zotov[a]
[a]National Research Lobachevsky State University of Nizhny Novgorod
Nizhny Novgorod, Russian Federation
[b]HSE University
Nizhny Novgorod, Russian Federation

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Abstract. The economic agents need to have a thorough understanding of the rules of decision making regarding the key rate in order to make effective financial decisions. The goal of the study was to identify the rules used by the Bank of Russia to make decisions regarding short-term key-rate adjustments. As a result, we propose a multinomial logit model that allows us to predict the probability of a change in the key rate depending on the behavior of the equilibrium level of one-day rates of the interbank lending market in the period between the previous and the next meeting of the Board of Directors of the Bank of Russia, as well as a linear model that allows us to predict the magnitude of the change in the key rate. Both models have been developed for the Russian money market. The information for the models was sourced from the data on one-day rates of the Russian interbank market MIACR and data on the key rate for the period of 2013–2022. The novelty of the study lies in clarifying the relationship between the key rate and money market interest rates. It has been discovered that the key-rate changes following the change in the equilibrium values of the one-day rates of the interbank lending market.

Keywords: monetary policy, monetary rule, key rate, key-rate forecasting.

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Research area: Social Structure, Social Institutions and Processes; Economy.

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* Corresponding author E-mail address: gospodarchukgg@iee.unn.ru

Альтернативное монетарное правило: опыт России

Г.Г. Господарчук[а], А.В. Аистов[б], А.В. Зотов[а]
[а]*Национальный исследовательский Нижегородский государственный университет имени Лобачевского Российская Федерация, Нижний Новгород*
[б]*НИУ ВШЭ Российская Федерация, Нижний Новгород*

Аннотация. Для принятия эффективных финансовых решений экономическим агентам необходимо досконально понимать правила принятия решений относительно ключевой ставки. Целью исследования было выявление правил, используемых Банком России при принятии решений о краткосрочной корректировке ключевой ставки. В результате предложена полиномиальная логит-модель, позволяющая прогнозировать вероятность изменения ключевой ставки в зависимости от поведения равновесного уровня однодневных ставок рынка межбанковского кредитования в период между предыдущим и очередным заседаниями Совета директоров Банка России, а также линейная модель, позволяющая прогнозировать величину изменения ключевой ставки. Обе модели были разработаны для российского денежного рынка. Источником информации для моделей послужили данные об однодневных ставках российского межбанковского рынка MIACR и данные о ключевой ставке за период 2013–2022 гг. Новизна исследования заключается в уточнении взаимосвязи между ключевой ставкой и процентными ставками денежного рынка. Выявлено, что ключевая ставка изменяется вслед за изменением равновесных значений однодневных ставок рынка межбанковского кредитования.

Ключевые слова: денежно-кредитная политика, монетарное правило, ключевая ставка, прогнозирование ключевой ставки.

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Introduction

The world today is constantly experiencing price spikes caused by the energy crisis and the international political situation. The high level of inflation demonstrated the vulnerability of the monetary policy of central banks and once again posed the need for further improvement.

Currently, 45 countries in the world use inflation targeting as a monetary policy regime (IMF, 2021), including Russia.

This regime is based on targeting the short-term key rate, which is formed on the basis of the dynamics of the main parameters of the economic environment (Taylor, 1999, Moiseev, 2002, Korhonen and Nuutilainen, 2017). However, the analysis of the theory (e.g., Vdovichenko and Voronina, 2006) and the practice of targeting the key rate indicate that there are some inconsistencies between the tools declared and the tools used to make decisions about its value. This discrepancy is manifested in the following.

First, the dominating idea in the world today is that the main monetary policy tool that ensures the achievement of the inflation target is the key rate (Bank of Russia, 2018, Gross and Zahner, 2021). However, the phenomenon of the price puzzle (Arestis et al., 2013, Ono, 2021) and the reaction of highly capitalized banks to changes in the course of monetary policy (Juurikkala et al., 2011) raises doubts regarding this assumption. Doubts that attempt to manage inflation through the direct regulation of the key rate may not lead to the de-sired result of attaining the target inflation rate.

Second, central banks tend to make decisions to adjust the key rate based on fore-casts of economic conditions (Bank of Russia, 2018). However, the predictive values, as noted in Boehm and House (2019), do not fully coincide with reality. In this regard, the use of forecasts of economic conditions for decision making around the key rate is very problematic.

Third, the comparative analysis of the change in the key rate and shifts in the parameters of the money market in Russia shows that decisions to change the key rate are based more on changes in interbank lending market (IBL) interest rates, rather than changes in economic conditions. Hence, it can be concluded that the Bank of Russia relies more on the money market than on the economic environment.

These inconsistencies lead to a limited understanding by the public of the essence and effectiveness of monetary policy. It is this desire to address the existing inconsistencies that motivated this study. The purpose of the study is to identify the decision-making framework employed by the Bank of Russia to adjust the key rate in the short term.

Theoretical framework

The analysis of scientific publications on the topic shows that targeting the inter-est rate is usually based on the so-called monetary rules. There are currently five major monetary rules set out in Federal Reserve Board (2023), Teryoshin (2023). They can be supplemented by numerous modifications developed by Boehm and House (2019) and other authors, as well as official versions of the rules used by central banks (Federal Reserve Board, 2007, Bank of Russia, 2015).

Analysis of the content of existing monetary rules reveals the following key points.

First, the proposed models use macroeconomic indicators as output gap, inflation, inflation expectations, exchange rate, oil prices, etc., as independent variables (Moiseev, 2002, Granville and Mallick, 2006, Dobrynskaya, 2008, Granville and Mallick, 2010, Mogilat et al., 2021, Orlov, 2021). Some authors, pro-pose to include variables that reflect financial stability (Gospodarchuk and Suchkova, 2019), money market trends (Kim and Shi, 2018), and asset prices (Adam and Woodford, 2021) of the monetary rule.

Second, the formulas underlying the rules for setting interest rate targets are very complex, especially in their current versions. In particular, the Taylor (1993) formula contains two initial indicators (deviation of real GDP from the long-term trend and inflation) and three other empirical coefficients. The more recent formula by Batini et al. (2002) already contains four indicators and four coefficients. The formula of the Bank of Russia includes another smoothing operation (Bank of Russia, 2015).

Third, the calculations of indicators and coefficients used in the models are poorly substantiated. The lack of economic significance behind the empirical coefficients de-rived by the authors renders it challenging to evaluate their practical adequacy and can lead to errors. Furthermore, the absence of the need to strictly justify the meaning and order of calculation of each coefficient greatly contributes to the growth of their number in each subsequent version of the formula.

Fourth, over time, the range of models expands not only through the introduction of new explanatory variables, but also through the use of different econometric methods, for example, neural networks and methods that take into account the nonlinear nature of the relationship between the key rate and independent variables, as well as the discrete nature of the source data (Feunou et al., 2017, Dellas et al., 2018). Nevertheless, a sufficiently long period of time, during which interest rates are targeted, unveils new patterns that serve as the basis for making decisions on the key rate, and the development of new models that effectively support the implementation of monetary policy (Teryoshin, 2023, Federal Reserve Board, 2023, ECB, 2021).

Fifth, as financial development progresses in various nations, the monetary rules implemented by central banks undergo an evolution. This has been substantiated by numerous research papers (Esanov et al., 2004, Granville and Mallick, 2006). In certain instances, inconsistencies exist between the stated and actual monetary policy regimes, rules, and instruments. These discrepancies pose a challenge to financial market participants as they attempt to predict central banks' decisions on the key rate.

The proposed models do not provide a completely reliable result in the analysis of the existing models. The simultaneous use of several forecasting models of the key rate by central banks does not solve this problem, as all these models are based on forecasts of the values of their parameters. However, the integrated application of the developed models has one significant advantage – it enables an explanation for any decision of central banks regarding changes in the key rate.

Thus, the presently available rules for the key rate are not very suitable for practical application. As a result, in practice, decisions on the key rate are not based solely on models, but are determined by the voting taking into account side effects (Tillmann, 2021, Federal Reserve Board, 2023). This circumstance complicates the task of financial market participants in predicting central bank decisions on adjusting the key rate, thereby hindering the transparency of monetary policy. This requires the creation of models that are adequate to the practice of implementing monetary policy.

Statement of the problem

The hypothesis of this study is that the decision to change the current key rate, cr, made by the Bank of Russia can be predicted on the basis of information on the behavior of the trend line, er, characterizing the equilibrium level of one-day rates in the interbank lending market, r. At the same time, the value by which the key rate changes, Δcr, is well predicted by the value of the gap between the actual (on the last date be-fore the date of the meeting of the Board of Directors) value of the one-day rate in the interbank lending market, r, and the current value of the key rate, cr.

This hypothesis is based on the observation of daily values of interbank market rates and the key rate. The behavior of interbank lending rates suggests that the interbank market responds more quickly to news than the Bank of Russia. It is noteworthy to mention that such news is propagated without the direct involvement of the Bank of Russia. In accordance with Bank of Russia, 2018, the Bank of Russia is obligated to observe a "Week of Silence" prior to the next meeting of the Board of Directors concerning the key rate. During this period, all statements or publications the Bank of Russia representatives that might affect the expectations of financial market participants with regard to the upcoming decision are prohibited.

Consequently, changes in interbank lending rates can be considered as reliable predictors.

To enhance the understanding of the hypothesis, a graphical representation of its content has been provided.

Fig. 1 schematically illustrates the first part of the proposed hypothesis. It shows four possible scenarios:

a – the trend line, *er*, is ascending, but does not cross (reach) the line characterizing the level of the current key rate, *cr*;

b – the trend line, *er*, is ascending and crosses (reaches) the line characterizing the level of the current key rate, *cr*;

c – the trend line, *er*, is descending, but does not intersect (does not reach) with the line characterizing the level of the current key rate, cr;

d – the trend line, *er*, is descending and crosses (reaches) the line characterizing the level of the current key rate, *cr*.

In addition, it should be noted that options "a" and "b" characterize the ascending nature

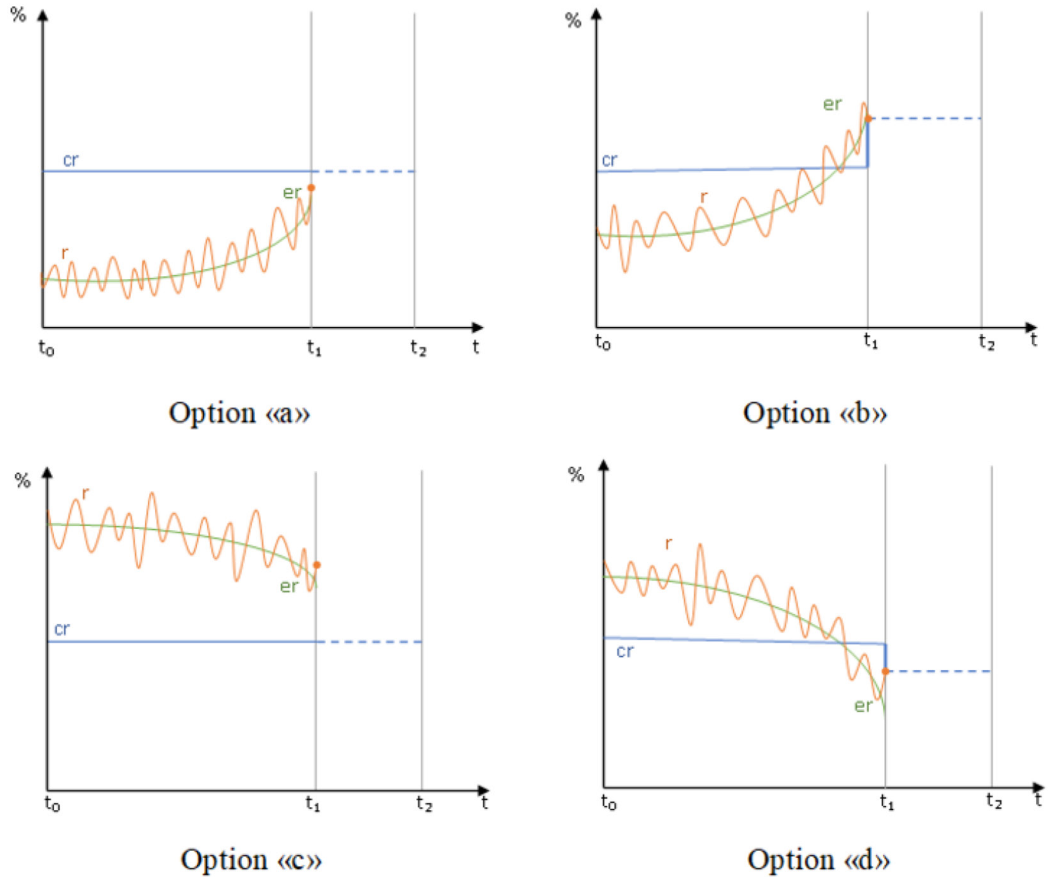

Fig. 1. Key-rate decisions
Source: Compiled by the authors
Note: Different colors denote one-day rates in the interbank lending market, r, its trend line, *er*, and the key rate, *cr*, respectively.
The dashed line is the key rate after the Board of Directors meeting

of the trend, *er*, and options "c" and "d" its descending nature.

Methods

Proof of the proposed hypothesis involves solving several problems:

1. The first problem involved identifying the relationship between the options (a – d) for the key rate with the change in the equilibrium level of overnight rates in the interbank lending market, *er*. This will be conducted in two ways (specifications). In the first case, the signal to raise/cut *cr* will be the intersection of the level of the key rate, *cr*, with the upward/downward trend, *er*. In the second case, the signal to raise/cut *cr* will be the nature of the trend, *er* (ascending/descending, respectively).

2. The second problem centers on identifying the relationship between the magnitude of the change in the key rate, Δ*cr*, and the magnitude of the gap between the actual value of the rate in the interbank lending market, *r*, and the current value of the key rate, *cr*.

4.1. Identification of the relationship between the change in the equilibrium level of overnight rates in the interbank lending market, er, and central bank decision on the key rate, cr

To estimate this relationship, a multinomial logit model is proposed (Maddala, 1983).

The choice of the model is explained by the nature of the problem being solved. The justification of using the model is as follows. During the *j*-th meeting of the Board of Directors, there are three options ($k = 3$) for decisions on the key rate, cr: cut cr ($y_j = 1$), keep cr ($y_j = 2$), and raise cr ($y_j = 3$). Using the specified notations, it is possible to write the probability of the *i*-th decision (decision on the key rate $i = 1,2,3$) during the *j*-th observation (*j*-th meeting of the Board of Directors) in the following form:

$$P_i = \Pr(y_j = i) = \begin{cases} \dfrac{1}{1+\sum\limits_{m=2}^{k}\exp(x'_j\beta_m)}, \text{ if } i = 1 \\ \dfrac{\exp(x'_j\beta_i)}{1+\sum\limits_{m=2}^{k}\exp(x'_j\beta_m)}, \text{ if } i > 1 \end{cases}, \quad (1)$$

where the 1st response ($i = 1$) is a base category; x_j is the column vector of explanatory variables (the dash indicates transposition); β_m is the column vector of estimated parameters.

In the specifications of Model (1), we use a set of binary explanatory variables that identify the intersection of the key-rate line, cr, with the trend component of the smoothed values of the one-day rates of the interbank lending market, er.

The choice of one-day rates is made on the basis of the maximum volume of transactions in the interbank lending market, which falls in this time period, compared to the volume of transactions in other time periods.

To smooth the values of the overnight rates of the IBL, we use the Hodrick–Prescott filter (HP):

$$\min_{er}\left(\sum_{t=1}^{T}(r_t - er_t)^2 + \lambda\sum_{t=2}^{T-1}[(er_{t+1} - er_t) - (er_t - er_{t-1})]^2\right), \quad (2)$$

where r_t is the value of the IBL market rate on day t ($t = 1,2,\ldots, T$).

$$r_t = er_t + c_t, \quad (3)$$

where er_t is the trend component, c_t is the cyclical component.

The value $\lambda = 1600$ is used as a smoothing parameter. The interbank rate is filtered for all observations of the rate until the day of the regular meeting of the Board of Directors (the date of the meeting is excepted). The examples of such filtering are presented in Fig. 2.

In the first specification of Model (1), we use two binary explanatory variables. One of them is equal to 1 in the case of option “b” (Fig. 1)–upward crossing, the other is equal to 1 in the case of the “c” option (Fig.1)–downward crossing. No crossing is a base category.

The second specification of Model (1) corresponds to any variants of the trend behavior, even when it does not cross the cr line. This model uses the average value, $\overline{\Delta er_t}$, of the first order difference of the trend, $\Delta er_t = er_t - er_{t-1}$, as an explanatory variable. Values Δer_t are averaged over all days between the previous and the current meeting of the Board of Directors.

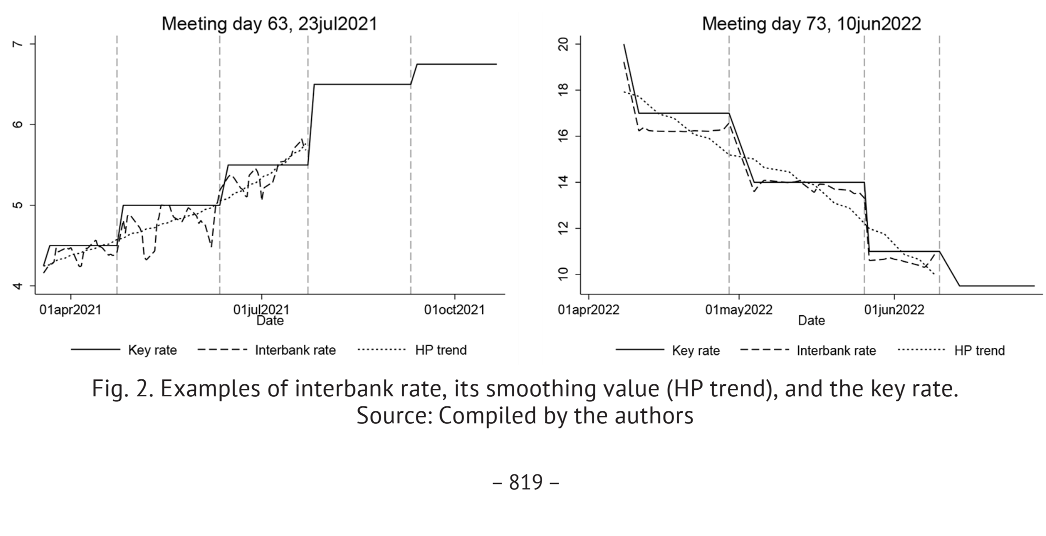

Fig. 2. Examples of interbank rate, its smoothing value (HP trend), and the key rate.
Source: Compiled by the authors

4.2. Dependence of the magnitude of the change in the key rate, Δcr, on the magnitude of the gap between the actual value of the rate in the interbank lending market, r, and the current value of the key rate, cr

The following model can work with different coefficients of the relationship between dependent and explanatory variables in the case of positive and negative HP trends:

$$\begin{aligned}\Delta cr_t = \beta_1 + \beta_2(r_{t-1} - cr_{t-1}) + \\ + [\beta_3 + \beta_4(r_{t-1} - cr_{t-1})]\mathrm{I}_+(t) + \varepsilon_t\,,\end{aligned} \quad (4)$$

where cr_t is the value of the key rate, $\Delta cr_t = cr_t + cr_{t-1}$ is the change in the key rate compared to the previous value; $I_+(t)$ is the indicator function equal to one in the case of a positive trend of the interbank rate (the average value of the daily first difference of the HP trend, $\overline{\Delta er_t}$, was positive in the period between the previous and the current meeting of the Board of Directors), ε_t is an error term.

4.3. Data collection

The study was carried out based on the data on the key rate, the results of the meetings of the Board of Directors on the key=rate adjustment, and the value of the overnight rates of the interbank lending market (MIACR) in the Russian Federation for the period from September 17, 2013, to June 29, 2022. This particular period of analysis was selected so that it encompassed the sub-periods of preparation (starting September 2013), introduction (since 2014), and functioning of the inflation-targeting regime in Russia. Data on the key rate and the results of the meetings of the Board of Directors on the question of the key rate were taken from the Bank of Russia website (Bank of Russia, 2023), and data on the value of the overnight rates of the IBL market from the Bank of Russia website (Bank of Russia, 2021).

In the period from September 17, 2013, to June 29, 2022, 73 meetings of the Board of Directors (including unscheduled) were held. All decisions (cut/keep/raise) on the key rate and the values of the key-rate changes observed during the considered period of time are presented in Table 1.

The data from Table 2 can be used to conduct a preliminary analysis of the relationship between the decisions on the key-rate change and the behavioral options of the HP trend (downward means that the trend crosses the key rate from top to bottom, no crossing occurs when the trend does not cross the rate, upward corresponds to the case when the trend crosses the rate from bottom to top). All the cases are presented in Table 2.

Table 2 is a two-way frequency table of values of key-rate changes and key-rate crossings by HP trends. Pearson's χ^2 equaled to 41.0 rejects (with p-value of 0.031) the hypothesis that the rows and columns in the two-way Table 2 are independent. It is even more evident that a similar hypothesis should also be rejected by considering the relationship of the decision of the Board of Directors with the nature of the HP crossing the key-rate trend presented in Table A1. Pearson's χ^2 for the hypothesis that the rows and columns in a two-way Table A1 are independent equals to 14.6 (p-value is 0.006).

Table 1. The Bank of Russia key0rate decisions and values of the key-rate changes for the period 17.09.2013–29.06.2022

Key-rate change	Key-rate decision
–3	3
–2	1
–1.5	2
–1	3
–0.5	8
–0.25	11
0	28
0.25	4
0.5	4
0.75	1
1	4
1.5	2
6.5	1
10.5	1
Total	73

Source: Authors' analysis based on the data from the Bank of Russia, 2018.

Table 2. Changes in the key rate and the crossings of the key-rate lines by HP trends

Key rate change	Key-rate crossing indicator			Total
	Downward	No crossing	Upward	
–3	2	1	0	3
–2	1	0	0	1
–1.5	1	1	0	2
–1	1	2	0	3
–0.5	2	4	2	8
–0.25	5	6	0	11
0	6	20	2	28
0.25	0	4	0	4
0.5	0	4	0	4
0.75	0	0	1	1
1	0	2	2	4
1.5	0	1	1	2
6.5	0	1	0	1
10.5	0	0	1	1
Total	18	46	9	73

Source: Authors' analysis based on the data from the Bank of Russia, 2018.

Table A2 shows the average values, $\overline{\Delta er_t}$, and their equality test in cases of different decisions of the Board of Directors of the Bank of Russia. Table A2 shows that the average values of the first-order differences of the HP trend, $\overline{\Delta er_t}$, are statistically significantly different for various decisions of the Board of Directors. Before the key rate is cut, there is an average (between two meetings of the Board of Directors) decrease in IBL rates, before it is raised, there is an increase.

Results

Parameter estimates, $\hat{\beta}$, and average marginal effects, $\partial P_i / \partial x$, of the two specifications of model (1) are given in Tables 3 and 4. Table 3 presents the results for binary explanatory variables which identify crossings of the HP trend with the key rate in the period between two meetings of the Board of Directors (from the previous to the next): from the top to the bottom (Downward) and from the bottom to the top (Upward). "No crossing" is the base category. Table 4 presents results for a continuous explanatory variable – the average value of the first-order differences of the HP trend between two meetings of the Board of Directors (Mean of first-order difference of HP trend) was used as an explanatory variable.

It can be seen from Table 3 that the crossings of the key rate with the HP downward trend lead to a statistically significant increase in the probability, P_1, of making a decision to cut the key rate and reduce the probability of making a decision to raise the key rate, P_3. The average marginal effect of the key-rate crossing with the upward HP trend for the probability of making a decision to raise the key rate, P_3, is statistically significant at the 10 % significance level.

Table 4 shows a statistically significant relationship (at 1 % significance level) of the average value of the first-order difference of the HP trend with the decision on the key rate: with an increase in the slope of the trend, the probability, P_1, of making the decision to cut the key rate decreases, and the probability, P_3, of making the decision to raise the key rate increases. The probability, P_2, of making the decision to keep the key rate for the considered period (17.09.2013–29.06.2022) also increased on av-

Table 3. Average marginal effects and parameter estimates for model (1) with binary explanatory variables.

	$\partial P_1/\partial x$	$\partial P_2/\partial x$	$\partial P_3/\partial x$	$\hat{\beta}$	
				Cut	Raise
Downward	0.362***	–0.101	–0.261***	1.050*	–14.75
	(0.130)	(0.133)	(0.065)	(0.609)	(840.586)
No crossing is a base category					
Upward	–0.0821	–0.213	0.295*	0.357	1.427+
	(0.154)	(0.157)	(0.178)	(1.059)	(0.913)
Constant				–0.357	–0.511
				(0.348)	(0.365)
Observations	73	73	73	73	
Pseudo R^2				0.109	
χ^2				17.2***	

Note: Standard errors are given in parentheses. + p < 0.15, * p < 0.1, ** p < 0.05, *** p < 0.01

Source: Authors' analysis based on the data from the Bank of Russia, 2018.

Table 4. Average marginal effects and parameter estimates for model (1) with a continuous explanatory variable.

	$\partial P_1/\partial x$	$\partial P_2/\partial x$	$\partial P_3/\partial x$	$\hat{\beta}$	
				Cut	Raise
$\overline{\Delta er_t}$	–19.95 ***	8.354 **	11.59 ***	–143.9 ***	78.73 **
	(2.649)	(3.288)	(2.521)	(42.733)	(32.177)
Constant				–0.850 **	–1.297 ***
				0.392	0.437
Observations	72	72	72	72	
Pseudo R^2				0.356	
χ^2				55.2 ***	

Note: Standard errors in parentheses. * p <0 .1, ** p < 0.05, *** p < 0.01

Source: Authors' analysis based on the data from the Bank of Russia, 2022.

erage with an increase in the slope of the HP trend (the marginal effect is statistically significant at the 5 % level of significance). Perhaps it was a "wait-and-see" policy in an environment where the trend had a small positive slope without the intersection with the key-rate level. The Bank of Russia waited for further developments and did not make a decision to change the key rate.

In addition to the results presented above, we estimated the key-rate change as a function of the gap between the value of the one-day rate on the IBL market and the current value of the key rate on the day before the meeting of the Board of Directors.

Estimates of model (4) parameters are given in Table 5 ("Model I" column). Formally, the small number of observations available limits the possibility to state with complete certainty that the slope coefficients in Model (4) are different in cases of positive and negative HP trends: β_4 is statistically insignificant. There-

Table 5. Model (4), OLS estimates.

	Model I	Model II
β_1	-0.437^{*}	-0.373^{+}
	(0.254)	(0.244)
β_2	1.079^{+}	1.581^{***}
	(0.682)	(0.413)
β_3	0.924^{**}	0.897^{**}
	(0.355)	(0.353)
β_4	0.793	
	(0.857)	
Observations	72	72
R^2 adj.	0.279	0.281
F-st.	10.2^{***}	14.9^{***}

Note: Standard errors are given in parentheses.
+ p < 0.15, * p < 0.1, ** p < 0.05, *** p < 0.01

Source: Authors' analysis based on the data from the Bank of Russia, 2018.

fore, a "constrained" model (4) was estimated without the fourth term (see column "Model II" in Table 5).

Thus, the main conclusions of the second part of our research can be stated as follows. Both models (Model I and Model II, Table 5) unambiguously show that the relationship between the change in the key rate, Δcr_t, and the gap in the interbank rate and the key rate, $r_{t-1} - cr_{t-1}$, is different in cases of positive and negative HP trends. The slope coefficient is approximately 1.58 (see Model II in Table 5), the 95 % confidence interval for this coefficient is [0.76; 2.40]. At the same time, in the case of a positive HP trend, almost one more percentage point is added to the above proportion, 0.897 (95 % confidence interval is equal to [0.193; 1.601] according to Model II in Table 5).

Conclusions

Understanding the rules for making decisions to adjust the key rate is crucial for effective financial decision-making by governments, corporate sector, and individuals. While numerous rules (models) have been developed to forecast the dynamics of the key rate in the medium and long term, there is a notable scarcity of rules (models) proposed for short-term predictions. This study aims to bridge this gap by focusing on identifying the rules for central banks to make short-term adjustments to the key rate.

As a result of the study, a polynomial logit model was developed that makes it possible to predict the probability of a change in the key rate depending on the behavior of the equilibrium level of the one-day rates of the interbank lending market in the period between the previous and the next meeting of the Board of Directors of the Bank of Russia. Additionally, we have created a linear model that predicts the magnitude of the change in the key rate. The models were calibrated for the Russian money market.

The novelty of the study lies in the fact that it clarifies the relationship between the key rate and money market interest rates. It has been established that the changes in the key rate occur after adjustments in the one-day rates of the interbank lending market, abiding by two distinct rules.

The first rule is that the decision to change the key rate is made by the central bank depending on the behavior of the long-term trend of overnight rates in the inter-bank lending market in the period between the last and the next meeting of the Board of Directors. At the same time, the study considered cases when the trend line crosses or reaches the level of the current key rate, and when this intersection does not occur.

The second rule determines the amount by which the key rate is changed. According to this rule, the change in the key rate is determined by the value of the gap between the actual (as of the last date before the date of the meeting of the Board of Directors) value of the one-day rate in the interbank lending market and the value of the current key rate.

The empirical results of the study demonstrate the reliability and robustness of the developed models in understanding the dynamics of key interest rates. In addition, the developed models prove to be user-friendly and easily interpreted, relying solely on official data openly available in the public domain.

Appendix

Table A1. Decisions of the Board of Directors and the nature of the intersection of the HP key rate with the trend

Key-rate decision	Key-rate crossing indicator			Total
	Downward	No crossing	Upward	
Cut	12	14	2	28
Keep	6	20	2	28
Raise	0	12	5	17
Total	18	46	9	73

Source: Authors' analysis based on the data from the Bank of Russia, 2018.

Table A2. $\overline{\Delta er_t}$ and test of equality of $\overline{\Delta er_t}$.

	Key-rate decision			χ^2
	Cut	Keep	Raise	
$\overline{\Delta er_t}$	-0.0313	0.0019	0.0635	12.47
	(0.0108)	(0.0019)	(0.0358)	

Note: standard errors are given in parentheses; χ^2 statistic of three-sample equality test is provided in the last column; p-value in the test is 0.0059.

Source: Authors' analysis based on the data from the Bank of Russia, 2018.

References

Adam K., Woodford, M. Robustly optimal monetary policy in a new Keynesian model with housing. In: *Journal of Economic Theory*, 2021, 198(C). DOI: 10.1016/j.jet.2021.105352

Alekhina V., Yoshino N. Exogeneity of world oil prices to the Russian Federation's economy and monetary policy. In: *Eurasian Economic Review*, 2019, 9, 531–555. DOI:10.1007/s40822–018–0115–3

Arestis P., Karoglou M., & Mouratidis K. The price puzzle: fact or artefact? Working Paper, Department of Economics, University of Sheffield. 2013. Available at: https://eprints.whiterose.ac.uk/75665/1/serps_2013008.pdf (accessed on 30 June 2023).

Bank of Russia. Monetary Policy Report. 2015. Available at: https://cbr.ru/Collection/Collection/File/8359/2015_01_ddcp_e.pdf (accessed on 30 June 2023).

Bank of Russia. Key rate decision: preparation process and communication, 6. 2018. Available online: http://www.cbr.ru/content/document/file/44308/keyratedic_20180625_e.pdf (accessed on 30 June 2023).

Bank of Russia. Monetary Policy Guidelines for 2022–2024. 2021. Available at: http://www.cbr.ru/Content/Document/File/126065/on_project_2022(2023–2024)_eng.pdf (accessed on 30 June 2023).

Bank of Russia. Databases, Key Rate. 2023. Available at: https://cbr.ru/eng/hd_base/KeyRate/ (accessed on 30 June 2023).

Bank of Russia. Databases, Weighted Average Actual Rates on Moscow banks' credits in rubles. 2023. Available at: https://cbr.ru/eng/hd_base/mkr/mkr_base/ (accessed on 30 June 2023).

Boehm C.E., House C.L. Optimal Taylor rules when targets are uncertain. In: *European Economic Review*, 2019, 119(C), 274–286. DOI: 10.1016/j.euroecorev.2019.07.013

Dellas H., Gibson H.D., Hall S.G., & Tavlas G.S. The macroeconomic and fiscal implications of inflation forecast errors. In: *Journal of Economic Dynamics and Control,* 2018, 93, 203–217. DOI: 10.1016/j.jedc.2018.01.030

Dobrynskaya V. The monetary and exchange rate policy of the Central Bank of Russia under asymmetrical price rigidity. In: *Journal of Innovation Economics Management,* 2008, 1(1), 29–62. DOI:10.3917/jie.001.0029

European Central Bank. An overview of the ECB's monetary policy strategy. 2021. Available at: https://www.ecb.europa.eu/pub/economic-bulletin/articles/2021/html/ecb.ebart202105_01~d813529721.en.html (accessed on 30 June 2023).

Federal Reserve Board. Taylor Rules. Finance and Economics Discussion Series. 2007. Available at: https://www.federalreserve.gov/econres/feds/taylor-rules.htm (accessed on 30 June 2023).

Federal Reserve Board. Monetary Policy Strategies of Major Central Banks. 2023. Available at: https://www.federalreserve.gov/monetarypolicy/monetary-policy-strategies-of-major-central-banks.htm (accessed on 30 June 2023).

Gospodarchuk G., Suchkova E. Financial stability: problems of inter-level and cross-sectoral equilibrium. In: *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 2019, 14(1), 53–79. DOI:10.24136/eq.2019.003

Gross J., Zahner J. What is on the ECB's mind? Monetary policy before and after the global financial crisis. In: *Journal of Macroeconomics,* 2021, 68(103292). DOI:10.13140/RG.2.2.35250.56000

Higgins P., Zha T., & Zhong W. Forecasting China's economic growth and inflation. In: *China Economic Review*, 2016, 41(1), 46–61. DOI: 10.1016/j.chieco.2016.07.011

International Monetary Fund. Annual Report on Exchange Arrangements and Exchange Restrictions. 2021. Available at: https://www.imf.org/en/Publications/Annual-Report-on-Exchange-Arrangements-and-Exchange-Restrictions/Issues/2022/07/19/Annual-Report-on-Exchange-Arrangements-and-Exchange-Restrictions-2021–465689 (accessed on 30 June 2023).

Juurikkala T., Karas A., & Solanko L. The role of banks in monetary policy transmission: Empirical evidence from Russia. In: *Review of international economics,* 2011, 19(1), 109–121. DOI: 10.2139/ssrn.1430366

Korhonen I., Nuutilainen R. Breaking monetary policy rules in Russia. In: *Russian Journal of Economics,* 2017, 3, 366–378. DOI:10.1016/j.ruje.2017.12.004

Maddala G. S. *Limited-Dependent and Qualitative Variables in Econometrics*. Cambridge, Cambridge University Press, 1983. 401.

Mogilat A., Seleznev S., Zhabina S. On the preparation of a scenario macroeconomic forecast and the model apparatus of the Bank of Russia. 2021. Available at: http://www.cbr.ru/Content/Document/File/118793/inf_note_mar_0521.pdf (accessed on 10 May 2023).

Moiseev S. R. Rules for monetary policy. In: *Finance and credit,* 2021, 16, 37–46.

Nair A. R., Anand B. Monetary policy and financial stability: Should central bank lean against the wind? In: *Central Bank Review,* 2020, 20(3), 133–142. DOI: 10.1016/j.cbrev.2020.03.006

Ono S. The effects of monetary policy in Russia: A factor-augmented VAR approach. In: *Economic Systems*, 2021, 45(3), 100904. DOI: 10.1016/j.ecosys.2021.100904

Orlov A. Russia Quarterly Forecast Model. 2021. Available at: http://www.cbr.ru/Content/Document/File/118791/inf_note_feb_2521.pdf (accessed on 10 May 2023).

Shulgin A. G. How much monetary policy rules do we need to estimate DSGE model for Russia? In: *Applied Econometrics*, 2014, 36(4), 3–31.

Taylor J. B. Discretion versus policy rules in practice. In: *Carnegie-Rochester Conference Series on Public Policy,* 1993, 195–214.

Taylor J. B. Monetary Policy Rules. In: *National Beraeu of Economic Research*, 1999.

Teryoshin Y. Historical performance of rule-like monetary policy. In: *Journal of International Money and Finance*, 2023, 130 (102766). DOI: 10.1016/j.jimonfin.2022.102766

Tillmann P. Financial markets and dissent in the ECB's Governing Council. In: *European Economic Review*, 2021, 139. DOI: 10.1016/j.euroecorev.2021.103848

Vdovichenko A., Voronina V. Monetary Policy Rules and Their Application in Russia. In: *Research in International Business and Finance*, 2006, 20(2), 145–162. DOI: 10.1016/j.ribaf.2005.09.003

Yıldız B., Gokmenoglu K., & Wong W. Analysing Monetary Policy Shocks by Sign and Parametric Restrictions: The Evidence from Russia. In: *Economies,* 2022, 10(10), 239. DOI:10.3390/economies10100239