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Article

The Impact of The Interest Channel of The Transmission Mechanism on The Economy – in the Case of Uzbekistan

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Abstract: In this scientific work, is studied the influence of the interest rate channel of the transmission mechanism on economy. The analysis was carried out in case of Uzbekistan. The indicators were converted to real values relative to 2017q1, covering the period 2003q1-2024q2. We conduct our empirical analysis through the Least Squares with Breaks model. Based on the results of the Least Squares with Breaks model, the main interest rate of the central bank, along with long-term loan rates, significantly impacted inflation control during the 2017Q2 – 2024Q2 period. Despite the numerous measures implemented to improve the central bank's activities during the 2017Q2 – 2024Q2 period, no significant changes were observed in the impact of the interest rate channel on gross production. The analysis indicates that even in this period, the primary factor influencing gross production remains changes in the money supply.

Keywords: interest rate channel, monetary policy, GDP, Least Squares with Breaks model inflation rate, short-term loan rates.

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1. Introduction

The monetary policy transmission mechanism describes how changes in a central bank's policies, particularly interest rate adjustments, affect the broader economy. Through various channels, these policies influence factors like spending, investment, and inflation. Central banks utilize this mechanism to help stabilize the economy, control inflation, and support growth.

One key channel is the interest rate channel, where changes in policy rates directly impact borrowing costs for consumers and businesses. Lower interest rates reduce the cost of loans, encouraging spending and investment, while higher rates tend to reduce economic activity. Similarly, the exchange rate channel affects the value of the national currency; higher rates attract foreign investment, which can appreciate the currency, potentially reducing export demand.

The asset price channel and credit channel further illustrate the transmission mechanism. By impacting the value of assets like stocks and real estate, monetary policy can increase household wealth, promoting spending. The availability of credit also plays a role; looser monetary policy generally increases access to credit, encouraging borrowing for both consumers and businesses.

Finally, the expectations channel captures the psychological aspect of monetary policy. When central banks communicate their policy goals clearly, they shape expectations about future economic conditions. This influences behavior across the economy as consumers and businesses make decisions based on their expectations for inflation, interest rates, and growth.

Literature review

In the last 50 years, many scientific studies have been conducted on the importance of the

monetary policy transmission mechanism and on determining the effectiveness of the transmission in different countries. In this, scientists are using various empirical models. Over the years, these scientific studies reveal new channels of monetary policy transmission and methods of determining their effectiveness.

According to M.L. Brandao-Marques et al. (2020) central banks in emerging markets and developing economies (EMDEs) are modernizing their monetary policy frameworks, frequently adopting inflation-targeting policies. However, concerns about the strength of monetary policy transmission from interest rates to inflation and output have often interrupted this transition. To investigate this hypothesis, they conducted a new econometric analysis using Jordà's approach across 40 emerging economies, providing further clarity on the monetary policy transmission mechanism in these countries. The analysis results indicate that increases in interest rates, particularly when accounting for exchange rate movements, have led to reductions in both economic growth and inflation. They conclude that in modern monetary policy, adopting an inflation-targeting policy, as well as having independent and transparent central banks, is more significant for monetary policy transmission than financial development.

In their research, Y. Wang et al. (2022) quantitatively assessed the impact of the monetary policy transmission mechanism on borrowers through banks. They evaluated dynamic banking models showing how monetary policy affects the costs of large, non-competitive banks. In response to adverse changes in monetary policy, these banks, facing capital and reserve requirements, aim to optimize by passing on some of this burden to borrowers and deposit holders. Their analysis reveals that market power in the banking sector plays a crucial role in transmitting monetary policy to borrowers, a role comparable to that of bank capital regulation. It was found that when the federal funds rate (the interbank interest rate in the U.S.) drops below 0.9%, market power interacts with bank capital regulation, reversing the intended effects of monetary policy.

In our view, the interaction between banks' market power and capital regulation may influence the effectiveness of monetary policy. If the federal funds rate falls below a certain level, it may alter banks' ability to pass funds to borrowers, complicating the transmission and impact of monetary policy within the economy. The findings of this study are significant for understanding the interplay between banks and the economic environment, as they demonstrate how economic policy and banking operations influence each other.

M.P. Deb et al. (2023) studies the impact of the monetary policy transmission mechanism on the economy, with the statistical data of 33 developed and developing market economy countries during 1991-2023. According to the results of the analysis, it was determined that there are significant differences in how the monetary policy affects the economy, depending on the economic conditions in the countries, the level of development of financial institutions and other factors. In their scientific research, using VAR models and Local Projections Method, monetary restrictive policy has a quick and negative effect on economic activity, but it takes time to fully affect inflation and inflation expectations. It is worth noting that there is considerable variation in the conduct of monetary policy across countries and over time, depending on structural features and cyclical conditions. The channels of the transmission mechanism work effectively in countries with a managed exchange rate regime, a developed financial system and a strong monetary policy framework. They also found that monetary policy is stronger when there is low uncertainty in the economy, when financial conditions are tight, and when monetary policy is coordinated with fiscal policy, that is, when positions move in the same direction.

D.Vayanos and J.L.Vila (2021) modeled the interest rate channel in their scientific work and determined that it occurs as a result of the interaction between investors' preferences for certain periods and prudent actions (arbitrageurs) in relation to risk. According to the results of the analysis, shocks in short-term interest rates are transmitted to long-term interest rates through arbitrageurs' trading on the stock exchange. Arbitrageurs benefit from passing these short-term interest rate shocks through bond risk premiums, which have been found to be directly proportional to movements in the interest rate structure. If short-term interest is the only risk factor, changes in investor demand will have the same effect on interest rates for all maturities, regardless of where they originate. The analysis showed that long-term interest rates are less affected by short-term interest rate forecasts. Buying large amounts of assets can be more effective

in moving long-term interest rates, especially when focused on longer durations.

In our opinion, the econometric models used in this study show how long-term interest rate movements and their market reaction take place, taking into account the interaction of investor demand and short-term interest rates. This modeling helps to understand the relationship between investor demand and interest rates. The results show that large asset purchases and forecasts play an important role in moving long-term rates, providing important implications for economic policy and monetary policy planning.

B.S.Bernanke (2020) said that in order to overcome various monetary restrictions caused by the low setting of short-term interest rates in the money market, the Federal Reserve System and central banks of other developed economies have used new monetary policy instruments in recent years. In the scientific research conducted by this economist, it was noted that new monetary instruments, in particular, quantitative easing (QE) and forward guidance, are considered as the main new instruments used by the FedBank. He notes that the new instruments have been effective in easing financial conditions when central banks' key interest rates are low, and they may be even more effective in the future. He noted that new monetary instruments should be included in the set of standard central bank instruments. Simulations from the model used in FedBank show that if the nominal interest rate is in the range of 2-3 percent, which is consistent with many estimates for the US, then a combination of quantitative easing (QE) and forward-looking policy is around 3 percent. gap, and this compensates to a large extent the effects of the low threshold. The econometric models used in his research are designed to simulate the effects of monetary policy. The results show that new monetary instruments, in particular quantitative easing (QE) and forward guidance, are effective in easing economic conditions further. It also suggests that if the real interest rate is low, there is a need to strengthen countermeasures to constraints on money market rates.

According to E. Falck, M. Hoffmann, and P. Hürtgen (2021) time-varying uncertainty about future inflation is a well-observed phenomenon in survey data, but there is limited information on how such uncertainties interact with the effectiveness of the monetary policy transmission mechanism. Their research indicates that in the U.S., a 100-basis-point reduction in the Federal Reserve's key interest rate during periods of high uncertainty leads to a statistically significant increase in inflation and inflation expectations of up to 0.7%. Conversely, under conditions of low uncertainty, similar policy shocks can reduce inflation and inflation expectations by as much as 0.8%. Their analysis, using a regime-switching model to adapt data on inflation expectations to account for these uncertainty-dependent effects, incorporates the New Keynesian model, which effectively captures information transmission adjustments in U.S. data.

The econometric models used in their study, particularly the regime-switching model, highlight how varying levels of uncertainty influence inflation expectations. This model analyzes inflation expectations with respect to distributed information, showing that the responsiveness of monetary policy can change significantly in periods of high uncertainty. Thus, the relationship between inflation expectations and monetary policy depends on the specific conditions, an insight crucial for economic policy formulation.

In our view, these findings also indicate that uncertainty can amplify or weaken the impact of monetary policy, providing guidance on which strategies may be most effective for managing the economy. Additionally, numerous studies examine the effectiveness of monetary policy transmission channels, and our research will explore scientific work on the impact of these channels on the economy. Initially, we will analyze studies on the interest rate channel within the monetary policy transmission mechanism.

Methodology

In this research, we analyze the impact of the interest rate channel within the monetary policy transmission mechanism on macroeconomic indicators, specifically on gross domestic product (GDP) and inflation rates. Our analysis incorporates the following dependent variables: GDP growth (〖LnGDP〗_t), changes in the inflation rate (〖LnCPI〗_t), short-term lending rate changes (〖LnSTLR〗_t), and long-term lending rate changes (〖LnLTLR〗_t). Independent variables include changes in the central bank's primary interest rate (〖LnINR〗_t) and changes

in the money supply (〖LnM2〗_t).

To assess the interrelationships among these variables and to scale the statistical data comparably, we employed natural logarithmic transformations and analyzed the growth of these variables. Additionally, the indicators were converted to real values relative to 2017q1, covering the period from 2003q1 to 2024q2. We conduct our empirical analysis through the Least Squares with Breaks model.

Results and Discussion

The choice to consider lending rates as dependent variables is driven by the bidirectional influence of lending rates on macroeconomic indicators such as GDP and inflation, which, in turn, impact lending rates reciprocally. Therefore, only the central bank's interest rate and money supply changes were selected as independent variables.

A series of statistical analyses were conducted to study the selected variables, including descriptive statistics to examine their means, maximum and minimum values, and standard deviations. We also assessed the normal distribution of the selected variables in this study. Furthermore, to eliminate seasonal components, we applied the Hodrick-Prescott filter to the data.

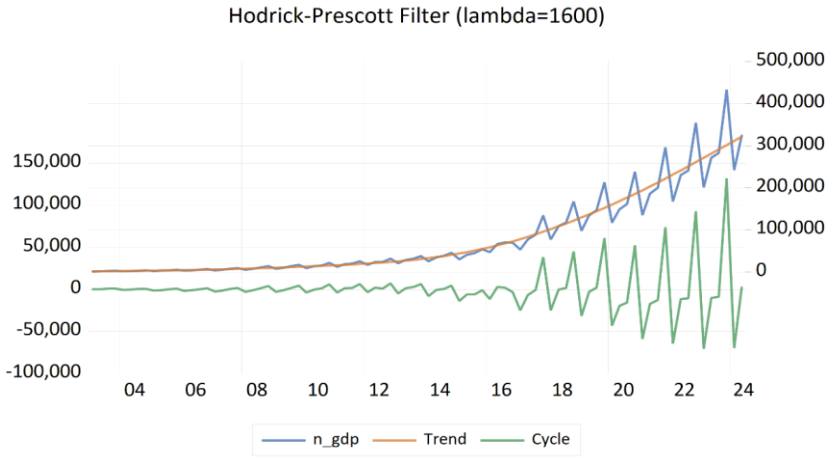

Diagram 1. The case of HP filtering of changes in the volume of GDP

The analysis shows that there is seasonality in the quarterly changes in the volume of GDP. That is, due to the large role of agriculture in the economy of our country, the products created are not distributed uniformly throughout the year.

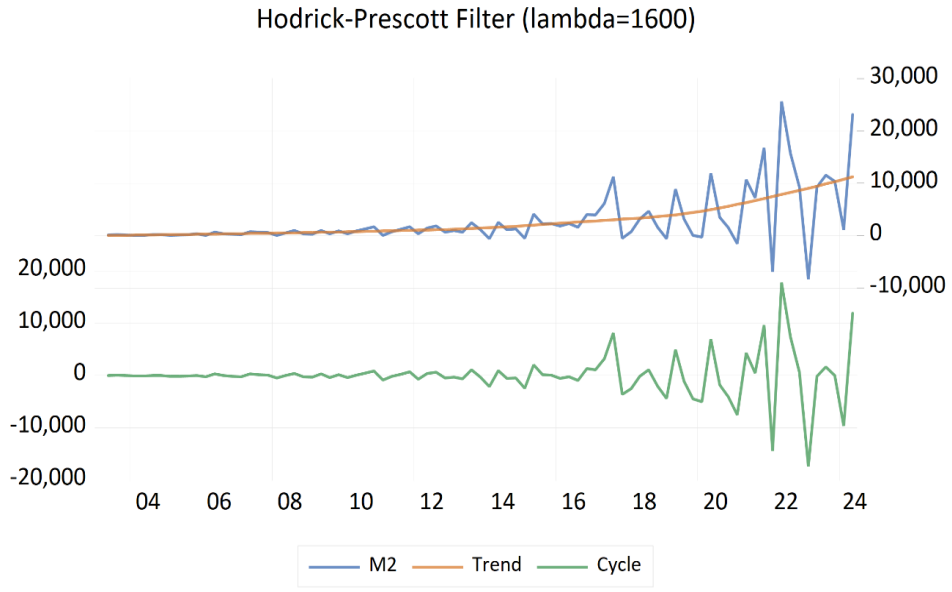

Diagram 2. The case of HP filtering of changes in the volume of Money supply.

From the analysis, we also found out that there are signs of seasonality in the money supply. That is, the Central Bank regulates the size of the money supply in relation to GDP. Therefore, the presence of seasonality in GDP, in turn, means that it is also present in the money supply.

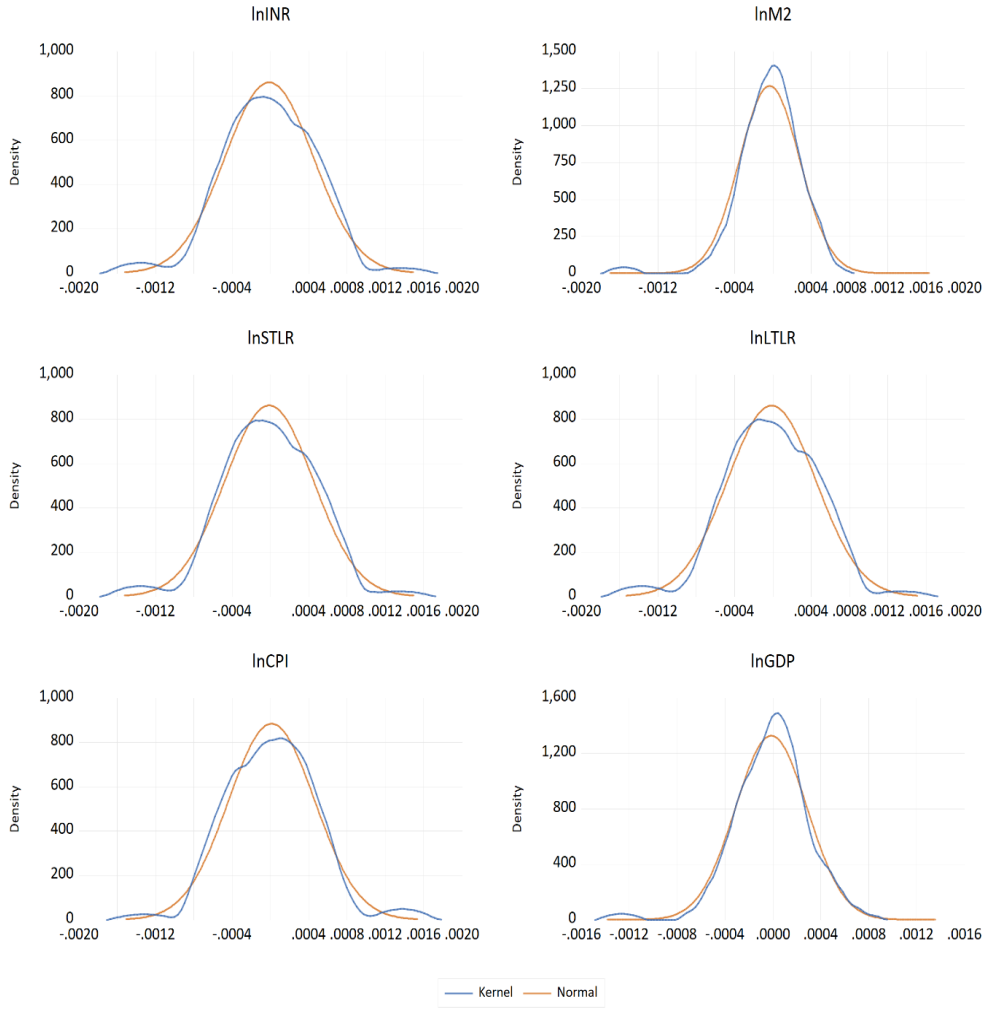

Diagram 3. Normal distribution of the selected indicator

The Jacques Bera coefficient was used to test the normal distribution of the data. The analysis showed that all the selected indicators have a normal distribution. Because it was found that the Jacques-Bera coefficient calculated for all the selected indicators is reliable and their probability is less than 0.05.

In this research, we utilized the Least Squares with Breaks model to examine the impact of the interest rate channel on the economy.

The advantage of the Least Squares with Breaks model lies in its suitability for regression analysis when time series data exhibit sudden or structural changes at certain points. This model enhances analytical accuracy by incorporating break points identified within the time series data, thus improving the model's predictive capability.

We can see from the descriptive statistics of the indicators that the average real value of the selected percentage indicators is negative in the considered period. In particular, the quarterly average real value of the main interest rate of the Central Bank is -0.82 percent, its fluctuation is from -5.63 percent to 6.43 percent, and the frequency of deviation from the average is 2.17 percent units. Also, the average quarterly real indicator of the short-term loan rates is -0.70 percent, with a maximum of 6.54 percent and a minimum of -5.75 percent in the studied period, with a standard deviation of 2.19 percent. This situation is typical of the quarterly average real value of long-term loan rates.

Table 1

Descriptive statistics of the selected indicators

	$LnINR_t$	$LnM2_t$	$LnSTLR_t$	$LnLTLR_t$	$LnCPI_t$	$LnGDP_t$
Mean	-0.819	2215.99	-0.704	-0.782	2.747	57920.09
Median	-1.033	1608.13	-0.944	-1.017	2.924	40328.02
Maximum	6.432	13168.05	6.598	6.537	7.561	139445.1
Minimum	-5.627	-3950.48	-5.754	-5.584	-4.218	5615.65
Std. Dev.	2.175	2787.94	2.188	2.185	2.174	42632.33
Observations	84	84	84	84	84	84

Analyzing the quantitative indicators, the change in the quarterly average real amount of money in circulation was 2215.99 billion soums, and its fluctuation was from -3950.48 billion soums to 13168.05 billion soums, and the degree of deviation from the average was 2787.94 billion soums. Also, the average quarterly real value of the GDP was 57920.09 billion soums. During the period under review, the GDP trend fluctuated from 139445.1 billion soums to 5615.65 billion soums, and the standard deviation of GDP was 42632.33 billion soums.

At the next stage of our analysis, we determine the correlation matrix of indicators.

Table 2.

Correlation matrix of indicators.

	$LnINR_t$	$LnM2_t$	$LnSTLR_t$	$LnLTLR_t$	$LnCPI_t$	$LnGDP_t$
$LnINR_t$	1					
$LnM2_t$	-0.4137	1				
$LnSTLR_t$	0.7967	-0.4089	1			
$LnLTLR_t$	0.6895	-0.4044	0.8993	1		
$LnCPI_t$	-0.5894	0.4153	-0.7392	-0.7083	1	
$LnGDP_t$	-0.4806	0.9686	-0.4759	-0.4718	0.4833	1

According to the results of the analysis, it was found that there is a strong correlation between the Central Bank key interest rate and inflation rate. Also, there is a strong correlation between the money supply and GDP growth.

The Least Squares with Breaks model is particularly useful for assessing factors impacting inflation, especially in economic time series where structural changes or sudden shifts occur. This approach allows for the identification of specific breakpoints within the data, enabling a more accurate estimation of inflation determinants by adjusting the model at each detected structural change.

By accounting for these shifts, the model provides clearer insights into how various factors—such as interest rates, exchange rates, and supply shocks—affect inflation over time, particularly during periods of significant economic transition. This methodology enhances the robustness of inflation forecasts and enables more precise policy analysis.

Table 3.

Evaluating Factors Affecting Inflation Using the Least Squares with Breaks Model

Dependent Variable: $LnCPI_t$

Sample (adjusted): 2003Q3 2024Q2

Included observations: 84 after adjustments

Break type: Bai-Perron tests of L+1 vs. L sequentially determined breaks

Variable	Coefficient	Std. Error	t-Statistic	Prob.

2003q3 – 2006q2 -- 12 obs

$LnINR_t$	1.802033	0.246380	7.314047	0.0000
$LnM2_t$	0.650274	0.427794	1.520064	0.1333
$LnSTLR_t$	-1.495945	0.303007	-4.936993	0.0000
$LnLTLR_t$	-1.304493	0.156741	-8.322624	0.0000
$LnGDP_t$	0.002096	0.000790	2.652819	0.0100
C	-0.000408	0.000163	-2.506588	0.0147
2006q3 – 2017q1 -- 43 obs				
$LnINR_t$	-0.839943	0.128860	-6.518284	0.0000
$LnM2_t$	-0.134027	0.301505	-0.444528	0.6581
$LnSTLR_t$	-0.092238	0.116502	-0.791733	0.4314
$LnLTLR_t$	-0.036534	0.083322	-0.438461	0.6625
$LnGDP_t$	0.000805	0.000286	2.816615	0.0064
C	-7.19E-05	5.63E-05	-1.275596	0.2066
2017q2 – 2024q2 -- 29 obs				
$LnINR_t$	-0.713547	0.144553	-4.936234	0.0000
$LnM2_t$	-3.852263	3.263290	-1.180484	0.2420
$LnSTLR_t$	0.481830	0.110722	4.351723	0.0000
$LnLTLR_t$	-0.688544	0.115942	-5.938711	0.0000
$LnGDP_t$	-1.75E-05	0.000217	-0.080570	0.9360
C	8.94E-05	6.80E-05	1.313514	0.1936

When analyzing the factors affecting the inflation rate through the Least Squares with Breaks model, we recommend examining this influence in three phases: 2003Q3 – 2006Q2, 2006Q3 – 2017Q1, and 2017Q2 – 2024Q2. This division is suggested based on observed fluctuations in inflation over the 2003-2024 period. According to the results of our analysis, at a 5% level of significance, the impact of short- and long-term loan rates on inflation during the 2003Q3 – 2006Q2 period was found to be inverse, which is a logically consistent relationship. Specifically, a one-percent increase in short-term loan rates reduced the inflation rate by 1.49%, while a one-percent increase in long-term loan rates decreased inflation by 1.30%. Furthermore, although GDP growth was minimal, it slightly increased inflation. These correlations appear to be logically constructed. However, the effect of the central bank's interest rate channel on inflation was not present during this period.

Table 4.

Evaluating Factors Affecting GDP Using the Least Squares with Breaks Model

Dependent Variable: $LnGDP_t$

Sample (adjusted): 2003Q3 2024Q2

Included observations: 84 after adjustments

Break type: Fixed number of globally determined breaks

Variable	Coefficient	Std. Error	t-Statistic	Prob.
2003q3 – 2006q2 -- 12 obs				
$LnINR_t$	2.197212	3.953114	0.555818	0.5802
$LnM2_t$	0.816826	0.054214	15.06668	0.0000
$LnSTLR_t$	-2.719106	4.061364	-0.669506	0.5055
$LnLTLR_t$	-0.434219	1.131404	-0.383788	0.7024
$LnCPI_t$	-0.811986	0.886912	-0.915520	0.3633

C	0.000100	1.70E-05	5.899267	0.0000
2006q3 – 2017q3 -- 45 obs				
$LnINR_t$	-0.093289	1.614328	-0.057788	0.9541
$LnM2_t$	0.982001	0.061949	15.85176	0.0000
$LnSTLR_t$	0.081665	0.829184	0.098488	0.9218
$LnLTLR_t$	0.152211	0.711637	0.213888	0.8313
$LnCPI_t$	0.159140	1.428245	0.111423	0.9116
C	8.24E-06	7.05E-06	1.168693	0.2467
2017q4 – 2024q2 -- 27 obs				
$LnINR_t$	-0.143290	1.563786	-0.091630	0.9273
$LnM2_t$	0.953453	0.068661	13.88638	0.0000
$LnSTLR_t$	-0.063671	1.142899	-0.055710	0.9557
$LnLTLR_t$	0.179320	1.465587	0.122354	0.9030
$LnCPI_t$	-0.047936	1.487653	-0.032222	0.9744
C	-1.51E-05	9.06E-06	-1.671379	0.0994

In the 2006Q3 – 2017Q1 period, when evaluating the impact of selected indicators on inflation, only the effect of long-term loan rates was observed. Specifically, a one-percent increase in long-term loan rates reduced the inflation rate by 1.04%. Similarly, GDP growth, although negligible, continued to slightly increase inflation. As in the previous period, the effect of the interest rate channel on inflation was not observed in this phase.

Based on the results of the Least Squares with Breaks model, tested at a 5% significance level, the main interest rate of the central bank, along with long-term loan rates, significantly impacted inflation control during the 2017Q2 – 2024Q2 period. Specifically, a one-percent increase in the central bank's main interest rate reduced inflation by 0.71%, while a one-percent increase in long-term loan rates decreased inflation by 0.69%, representing a logically consistent relationship.

We also analyzed factors affecting changes in GDP through the Least Squares with Breaks model, dividing the analysis into three phases: 2003Q3 – 2006Q2, 2006Q3 – 2017Q1, and 2017Q2 – 2024Q2. According to the results, at a 5% significance level, only the money supply influenced GDP growth during the 2003Q3 – 2006Q2 period. Specifically, a one-percent increase in the money supply volume increased GDP by 0.81%. However, the central bank's main interest rate did not significantly impact GDP changes.

In the 2006Q3 – 2017Q1 period, when analyzing the impact of selected indicators on GDP, again only the influence of the money supply was observed. Compared to the previous period, the impact of the money supply on GDP growth was stronger. Specifically, a one-percent increase in the money supply volume raised GDP by 0.98%.

Conclusion

Based on the above analysis, it can be concluded that the Central Bank’s main interest rate has been regarded as an indicative rate since 2019. Before this period, the Central Bank’s influence on the money market through its primary interest rate was limited. While the Central Bank’s ability to influence interbank lending and deposit rates in the money market has strengthened, its effect on bond yields remains weak.

In summary, prior to 2019, the transmission mechanism of the interest rate channel through the bond market had insufficient impact on the economy. However, since 2019, the establishment and expansion of the government securities market, and the increased issuance of Central Bank bonds in 2020, have enhanced the impact of the interest rate channel within the transmission mechanism on the economy.

It follows from the analysis that, before 2019, the Central Bank had two policy targets,

which diluted the impact of the interest rate channel on the economy. However, the Central Bank's transition to a single inflation-targeting mandate in 2020 has improved the efficiency of the interest rate channel in the transmission mechanism. Negative developments in the international economy since 2022 have hindered the Central Bank's achievement of its inflation-targeting objectives, weakening the effectiveness of the interest rate channel.

The 2017Q2 – 2024Q2 period corresponds to a time when significant economic reforms were initiated in our economy. This period saw numerous measures aimed at enhancing the activities of the central bank, including the introduction of a new law on the central bank, the liberalization of currency policy, promotion of financial inclusion, and measures to increase competition in the banking sector. Consequently, the impact of the interest rate channel on the economy was expected to strengthen. The new central bank law shifted its primary objective from ensuring the stability of the national currency to maintaining price stability. The main aim of this was to release exchange rate regulation from the central bank's mandate and instead direct monetary policy tools towards controlling inflation.

The main reason for the strong impact of money supply changes on macroeconomic indicators is due to the central bank's choice of targeting money supply growth as the primary instrument of monetary policy during this period.

Despite the numerous measures implemented to improve the central bank's activities during the 2017Q2 – 2024Q2 period, no significant changes were observed in the impact of the interest rate channel on gross production. The analysis indicates that even in this period, the primary factor influencing gross production remains changes in the money supply. Specifically, a one-percent increase in the money supply volume raised gross production by 0.95%. However, among the other selected indicators, no significant effect on GDP changes was identified through the Least Squares with Breaks model.

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