

# The Impact of Exchange Rate on GDP: In Case of Tajikistan

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**Keywords:** Exchange Rate, GDP, Economic Growth, OLS, Real Exchange Rate, Real Effective Exchange Rate, Investment.

**Abstract:** The purpose of the study is to identify and build a model of the impact of the exchange rate on GDP of the Republic of Tajikistan. According to the goal, the model was developed based on the current situation in Tajikistan by selecting the main influencing factors. To build the model, GDP was used as an endogenous variable, and the real effective exchange rate and investment were used as exogenous variables. According to estimates, the result of the model shows that the economic growth of the Republic of Tajikistan reaches 7% on average, of which about 0.17% is due to the increase of the real effective exchange rate.

## 1 INTRODUCTION

In a market economy, the stability of monetary policy is the most important indicator of the welfare of the state and the population. In order to increase the effectiveness of monetary policy and socio-economic development of the Republic of Tajikistan, the National Strategy and Development of the Republic of Tajikistan (NDS) for the period up to 2030 defines the main tasks related to monetary policy and presents an analysis of the current state, as well as directions, stages and terms of implementation of future reforms: strengthening the role and capacity of the National Bank of Tajikistan in the area of monetary policy management; the implementation of a comprehensive monetary operation and the creation of a stable state of foreign exchange policy (NDS, 2016).

Regulation and supply of money supply in the economy and maintenance of price stability are the main objectives of the monetary policy of the Government of the country. In theory, the national regulator should implement acceptable policies to activate sectors of the economy for sustainable growth (Paun et al., 2019). Thus, exchange rate policy is one of the main elements of monetary policy, which regulates inflation, the interest rate, the exchange rate of the national currency, the money supply, the level

of international reserves and the competitiveness of domestic goods.

Currently, in the Republic of Tajikistan, the issues of the impact of the exchange rate on the gross domestic product (GDP) play an important role in the real and monetary sectors. Economic issues related to the dynamics of the exchange rate have become one of the main problems that dominate in macroeconomic studies of the last period. Some scientists argue that the economic crisis in developing countries is caused directly or indirectly by the incorrect choice of exchange rate policy, which is one of the key tasks for ensuring the stability of production (Reinhart, 2002; Camba-Crespo, 2021; Krugman, 2014).

Thus, it is relevant to study the impact of the exchange rate and its volatility on the economic growth rate of Tajikistan, depending on the country's monetary policy.

## 2 REVIEWS OF LITERATURE

The impact of the exchange rate on GDP should be studied based on the economic system of the country, since the relationship of these indicators varies depending on the economies of countries. Therefore,

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several theoretical analyzes of the impact of the exchange rate on GDP have been considered.

According to the study Fofanah (2020), the impact of exchange rate volatility on economic growth is insignificant. It should be noted that the study was based on data from WAMZ countries. But studies have shown that there is a positive and significant relationship between exports and economic growth. According to this study, the relationship between imports and GDP growth rates is also positive and significant.

An increase in the real exchange rate reduces the efficiency of exports, causes an increase in imports and prices for imported goods, or negatively affects the competitiveness of national goods in foreign and domestic markets, and increases the production of non-tradable goods (Davlyatov, 2011). This study analyzes the purchasing power of the national currency in a small open economy of the Republic of Tajikistan. Based on this, the author has determined the relationship between the internal and external markets on the basis of the real effective exchange rate (REER).

The relationship between exchange rates and FDI in Vietnam for the period 2005–2019 based on the vector autoregression (VAR) model, have been studied by Huong et al. (2020) and three main results have been obtained. First, there is a positive causal relationship between FDI and Real Effective Exchange Rate (REER). Second, trade openness has a positive impact on FDI and REER. Third, economic growth has an impact on REER but did not impact on FDI.

The economic literature notes that the depreciation of the real exchange rate plays an important role in increasing the competitiveness of international prices, but this indicator will not be able to determine the volume of production. The function of the real exchange rate is the measurement of domestic prices in relation to foreign ones. It also shows a decrease or increase in the competitiveness of tradable goods, for example, a decrease in the real exchange rate in the short term contributes to an increase in the export of domestic goods. Indeed, improving competitiveness is an important part of the money transmission mechanism.

In the long term, changes in real exchange rates are driven by fundamental factors such as shifts in productivity and the terms of trade: they are endogenous and independent of monetary policy. This does not mean that government policy cannot indirectly influence the real exchange rate. However, only government policies aimed at changing the real economy will sustainability affect the real exchange

rate. Therefore, efficiency gains that increase the tradable sector's ability to attract resources from competing sectors (domestic and foreign) will drive an appreciation of the real exchange rate, however defined.

For the development of the economy of Tajikistan, export is the main source of foreign exchange (Tursunov, 2017). This suggests that in the socio-economic policy of the Republic of Tajikistan, much attention is paid to the development of the export sector by creating a favorable environment for the development of industrial production, considering the choice of monetary policy.

It should be noted that Evans and Saibu (2017) in their studies in case of Nigeria assess the impact of monetary and exchange rate policies on the diversification of the economy using the ARDL (Autoregressive Distributed Lag) approach. His results show that the relationship between the exchange rate and economic diversification is statistically significant. In addition, monetary policy instruments, in terms of money supply and credit, have a significant impact on the diversification of the economy. Thus, they recommend that it is possible to maintain the value of the national currency, to ensure the internal and external balance without prejudice to the overall goal of diversifying the economy.

Enu and Opoku (2013), having studied the relationship between GDP growth and the exchange rate in the case of Ghana for the period from 1980 to 2012, estimated linear regression using OLS (Ordinary least squares method). They used statistical methods of autocorrelation, heteroscedasticity, and multicollinearity, and, as a result, they obtained a positive linear relationship between the GDP growth rate and the exchange rate. This confirms the theory that high exchange rate depreciation stimulates economic growth in the short term. Their results are also consistent with the conclusions of Tarawalie (2010) and Chen (2012). They propose that politicians should ensure long-term stability of monetary and fiscal policy, and should also continue to engage in productive activities in order to increase a country's exports more than its imports.

Rizokulov and Azizbayev (2018) in their works propose that “after legislative amendments and measures taken to stabilize the foreign exchange market, the volume of dollarization decreased only due to the fact that it moved from official sources, such as credit institutions, to the unofficial sphere, namely, to the shadow economy. They note that in order to achieve import substitution, it is necessary to take into account the factor as a result of which, due to the outflow of capital, domestic production will

develop". Based on this, it can be argued that today the exchange rate is one of the important factors in the development of the real sector of the economy.

The results obtained by Huong (2019) showed that the real exchange rate can lead to a positive effect on real GDP. Empirical studies (Conrad, et al., 2018) for the Trinidad and Tobago economy over the period 1960 to 2016 have shown that undervalued exchange rates have a positive impact on economic growth and overvaluations have a long-term negative impact. According to the Krekó and Oblath (2020) research, the relationship between economic growth and RER misalignments within the EU during the period of 1995–2016 has been identified.

Thus, there are many studies that suggest a correlation between the real exchange rate and GDP growth (Alidzhanov, 2016; Ashurov and Safarov, 2019). As long as productivity in the tradable sector is higher, countries have an incentive to keep the relative price of tradable goods high enough to make it attractive to move resources into their production. Consequently, a low real exchange rate is required to support the production of tradable goods.

It should be noted that the impact of the real exchange rate on economic growth per capita in the medium term is still unresolved.

### 3 DATA AND METHODOLOGY

Currently, in conditions of economic instability, the exchange rate is a key indicator of economic development, especially in the external sector of the economy, and managing it is one of the main goals of the country's monetary and foreign exchange policy. In this context, the effective management of the national currency is timely, which affects the growth of inflation, trade balance, capital, financial stability and the country's economy as a whole. Despite being unstable due to external economic and financial shocks, the structure of the economy of the Republic of Tajikistan is mainly focused on import substitution, since the traded goods of domestic producers are closely related to the purchasing power of the national currency.

To achieve the NDS goals until 2030, it is necessary to determine the impact of exchange rate dynamics on economic growth, which is one of the main tasks of the state and creates favorable conditions for the development of domestic production, which can help create sustainable employment and the development of the country's economic sector.

Therefore, given the use of the real effective exchange rate indicator, the NBT can ensure efficient and optimal allocation of foreign exchange to the private sector.

Maintaining the growth of production, the choice of the exchange rate regime, is an important issue of monetary policy. Consequently, according to the IMF methodology for managing the foreign exchange market of the Republic of Tajikistan, the exchange rate classification system was implemented in order to regulate the exchange rate.

The choice of the exchange rate regime and foreign exchange transactions in the country also has implications for the economic growth of the Republic of Tajikistan (Khikmatov and Sayfullozoda, 2019).

As noted, the impact of monetary policy in the real sector of the economy occurs through the money supply. To assess the velocity of money circulation, the theory of the amount of money was used (Keynes, 2018).

Monetary policy cannot directly control prices, and its impact is associated with increased volatility in interest rates, which lead to increased demand for money, and a lack of money supply. The mechanism of influence of monetary policy is associated with the growth rate of the money supply and the activation of the interest rate. As a result, it affects the equilibrium of the real effective exchange rate. The money that is not in the banking system can cause inflation to rise.

Therefore, the real effective exchange rate is a key relative price in the economy, which gives economic agents signals on how to optimally use factors of production between goods and the provision of services. In addition, the real effective exchange rate shows how the structure of the economy should adapt to the external environment in the medium term. Unlike bilateral nominal exchange rates, the real effective exchange rate is not directly observable, highlighting the need for valuation techniques to calculate it.

In this analysis, the estimated REER was used as an exogenous variable. It should be noted that the methodology for calculating this indicator is given in more detail in the work of Turakhonzoda et al. (2017).

According to theoretical analysis, the impact of the exchange rate on GDP should be significant, but in the case of Tajikistan, the impact of the exchange rate on GDP is insignificant. Therefore, the real effective exchange rate was used as an influencing factor due to its high impact on GDP.

Consequently, in addition to the REER, the economy of Tajikistan is highly dependent on investment, which has a significant impact on GDP growth.

Table 1: Statistics of Macroeconomic Indicators.

Indicators	2001	2005	2010	2015	2016	2017	2018	2019
GDP (mln. TJS)	12601.8	17938.7	24704.7	34650	37057.9	39670.8	42447.7	45900.5
Investment (mln. TJS)	155.2	623.4	5891.6	13973.9	16944.1	20398.4	24200	25783.9

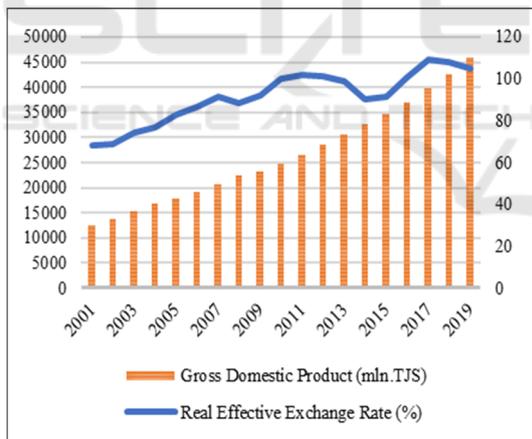
Therefore, an equation was created to show the functional relationship of real GDP (base year 2010) with REER and investment (base year 2010) based on historical data (Table 1).

Real GDP was used as an endogenous variable, and REER and investment were used as exogenous variables (equation 1).

$$Y = \alpha + \beta_1 REER + \beta_2 I + e, \quad (1)$$

where, Y- real GDP, REER- real effective exchange rate, I-investment.

For the period 2008, 2013-2014 and 2016 weighted relative prices declined relative to foreign prices, stimulating domestic producers. Therefore, between 2009 and 2012 there is an increase in REER at the level of 101.64%. After this period, since 2013, the volatility of this indicator of  $\pm 10\%$  has been observed (Figure 1). It should be noted that the main influencing factors that lead to the volatility of the REER are the global financial crises.



\*Source: author's calculation according to the official data of the Statistical of the Republic of Tajikistan

Figure 1: GDP in constant prices and REER for the period 2001-2019.

The REER trend shows that for the periods 2002-2007, 2008-2009, and 2015-2017 weighted relative prices were strengthened against foreign currencies, so it can be argued that domestic producers were uncompetitive in the domestic and foreign markets (Figure 1).

Since 2015, the structure of exports has changed significantly and has led to an increase in exports. The

reason for the increase in exports is the positive change in tradable commodities such as minerals, electricity and cement (Table 2).

Table 2: Structure of Exports by commodity (2001 to 2019).

Export structure	2010	2015	2016	2017	2018	2019
Aluminum primary, %	62	24	23	17	18.6	15
Ore concentrates, %	-	17	27	33	37.3	25
Cotton fiber, %	17	16	14	10	15.4	12
Electricity, %	-	6	6	5	7.2	8
Cement, %	-	0.01	2	4	6.1	5.8
Other goods, %	21	37	28	31	15.5	34
Total, %	100	100	100	100	100	100

Table 2 shows that aluminum production decreased from 398.4 million USD in 2001 to 173.2 million USD in 2019, and in recent years there has been an increase in ore concentrates, reaching up to 296.9 million USD in 2019, and cement production increased to 68.1 million USD in 2019.

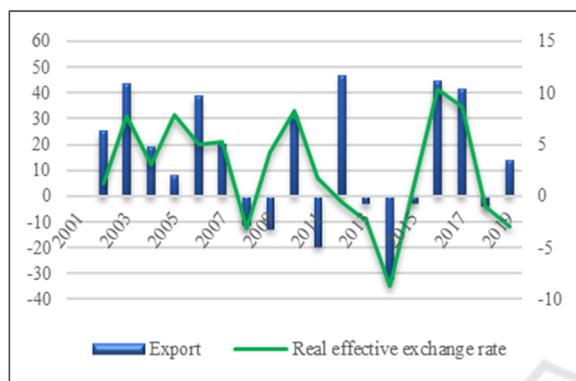
In order to assess the reason for the change in the structure of exports and the impact of the exchange rate on economic growth, the real effective exchange rate can be used as an influencing factor.

The change in the volume of exports over the past 5 years has reached an average of 7.3%. It should be emphasized that in 2018, compared to 2017, it decreased by 10%, and compared to 2015, it increased by 21%, and the change in the volume of imports increased from 2,564.9 million somoni in 2002 to 14,004.9 million somoni in 2008 and 26676.2 million somoni in 2014.

According to the REER and export trends for the period 2016-2019, it can be argued that the real effective exchange rate stimulated the turnover of

domestic producers and led to an increase in exports (Figure 2).

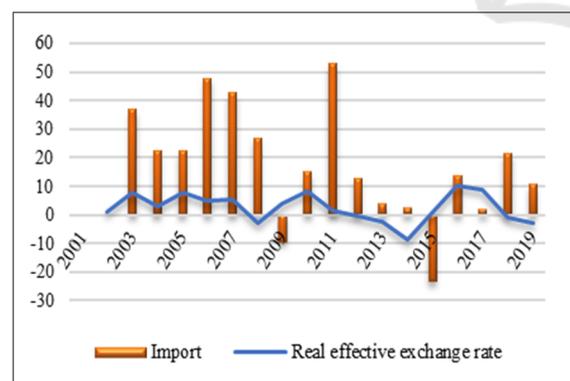
The appreciation of the real exchange rate in cases of high inflation has a negative impact on the current account, as real effective exchange rate indices are weighted averages of exchange rates that show fluctuations in the bilateral nominal or real exchange rate.



\*Source: author's calculation according to the official data of the Statistical of the Republic of Tajikistan

Figure 2: Export growth rate (million TJS) and REER growth rate (2002-2019).

Figure 2 shows that changes in exports and REER in 2008, 2013, 2014 and 2018 are negative, while in other years these indicators are positive. This means that changes in export growth rates are closely related to REER growth rates. Thus, it was revealed that the rate of change of the real effective exchange rate reaches  $\pm 10\%$ .



\*Source: author's calculation according to the official data of the Statistical of the Republic of Tajikistan

Figure 3: Import growth rate (million TJS) and REER growth rate (2002-2019).

And also, the change in the REER has a significant impact on the rate of change in imports.

Figure 3 shows that the dynamics of changes in imports is gradually declining. It should be noted that the trend of changes in exports and imports in 2009 and 2015 is opposite to the change in REER. It follows that there are two main factors influencing the growth of imports, these are the growth of domestic demand and changes in relative prices. In this case, the part of imports that depends on changes in relative prices is considered through the REER. However, the other part of the change in imports depends on aggregate demand. Depending on the trend in imports and REER, it can be argued that these indicators are closely related.

Descriptive statistics were calculated for the selected indicators, which have the following properties (Table 3).

Table 3: Descriptive Statistics.

	RGDP_2010	REER	I
Mean	27695.44	92.11610	7117.791
Median	25618.75	91.86352	6264.306
Maximum	49113.52	109.4057	16371.93
Minimum	12601.80	68.21631	762.9205
Std. Dev.	11005.29	12.66114	4944.509
Skewness	0.434314	-0.507209	0.435215
Kurtosis	2.070750	2.189427	2.023606
Jarque-Bera	1.348351	1.405062	1.425829
Probability	0.509577	0.495330	0.490213
Sum	553908.8	1842.322	142355.8

\*Source: author's calculation according to the official data of the Statistical of the Republic of Tajikistan

Based on the descriptive statistics obtained, it can be argued that Skewness (skewness coefficients) give a measure of how symmetrical the observations are around the mean. For a normal distribution, the skewness is zero. In our case, the distribution of RGDP\_2010 and I has a positive skewness, i.e. the distorted one is on the left, while the REER distribution has negative skewness and the distorted one is on the right.

Another indicator Kurtosis (coefficient of kurtosis) shows that all the selected indicators in the Table 3 have a flat-topped distribution.

To validate the tests of the normal distribution of the time series, we need to take into account the Jarque-Bera test and its Probability. These statistical tests in our case indicate the possibility of a normal distribution.

As a result, after checking the descriptive statistics, we can use this data for analysis.

#### 4 EMPIRICAL RESULTS AND DISCUSSIONS

It should be noted that before performing the regression analysis, we will check the relationship between the selected variables (Table 4).

Therefore, the correlation between REER and I is 0.86, which indicates the absence of multicollinearity.

Table 4: Correlation of the Selected Indicators.

	RGDP 2010	REER	I
RGDP <sub>2010</sub>	1.000000		
REER	0.858732	1.000000	
I	0.988896	0.860068	1.000000

\*Source: author's calculation

Thus, we can use the selected indicators in the equation. As a result of the regression analysis, we got the following result (equation 3).

$$RGDP_{2010} = 172.5503 * REER + 1.60226 * I + [AR(1) = 0.63486] \quad (3)$$

where, RGDP<sub>2010</sub>-GDP (in constant price, 2010) and I-Investment (in constant price, 2010).

The coefficients of equation (3) shows that if the REER increases by 1%, then real GDP in national currency will increase by 172.55 million TJS, and if investments increase by 1 million somoni, respectively, GDP will increase by 1.6 million TJS. It can be expected that, other things being equal, in a country with a positive rate of change in the real effective exchange rate, the depreciation of the national currency will lead to an increase in the rate of economic growth. And the depreciation of the exchange rates of a country with a negative rate of change in the real effective exchange rate can negatively affect the foreign trade balance, which impedes GDP growth. In fact, exchange rate fluctuations have an impact on growth effects, especially when the national currency depreciates. Although this is indeed what we found in this regression, i.e. the real exchange rate ratio has a much greater impact on economic growth than other factors.

Table 5 indicates that based on exogenous variables (real effective exchange rate, investment), GDP is predicted in real terms. The coefficient of determination R<sup>2</sup> is 0.97, which describes the quality (accuracy) of the constructed regression model, and the higher this indicator, the better the model describes the initial data.

Table 5: Model Results.

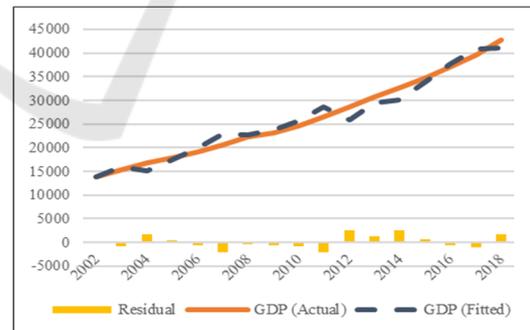
Dependent variable: RGDP 2010

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REER	172.5503	26.14827	6.598917	0.0000
I	1.602256	0.281287	5.696171	0.0001
AR (1)	0.634863	0.236063	2.689378	0.0176
R-squared	0.972526	Mean dependent var		26252.53
Adjusted R-squared	0.968601	S.D. dependent var		8831.200
S.E. of regression	1564.873	Akaike info criterion		17.70778
Sum squared resid	34283593	Schwarz criterion		17.85482
Log likelihood	-147.5161	Hannan-Quinn criter.		17.72240
Durbin-Watson stat	1.631790			
Inverted AR Roots	.63			

\*Source: author's calculation

Other statistics, such as the t-statistic, state that the coefficients of the equation are significant and reject the null hypothesis. In general, based on the result of equation (3), it is possible to predict the GDP of the Republic of Tajikistan in the medium term.

The result of the evaluation test for equation (3) for real GDP, real effective exchange rate, and investment using the adjustment process is shown in Figure 4.



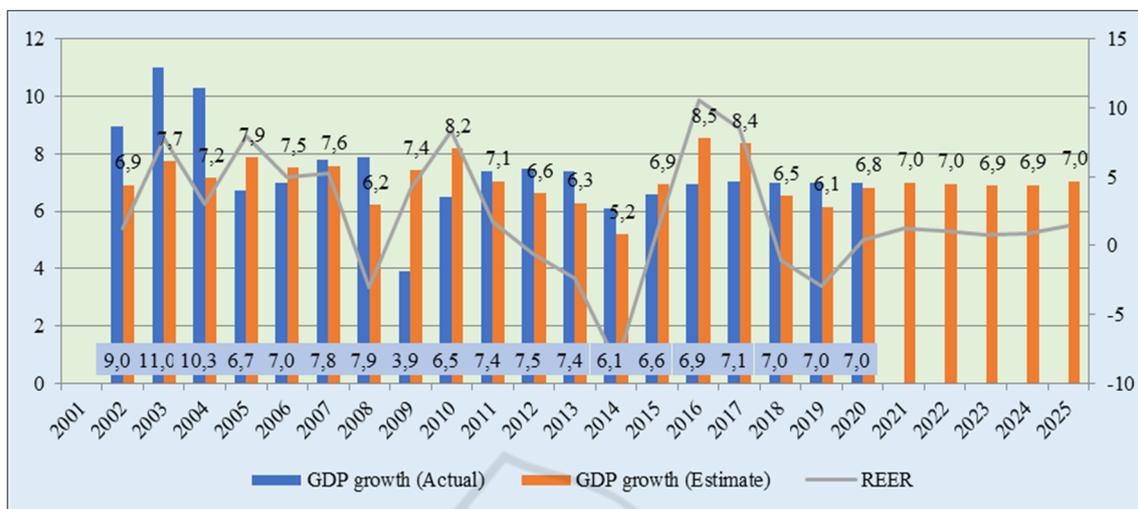
\*Source: author's calculation according to the official data of the Statistical of the Republic of Tajikistan

Figure 4: Result of the Model of the Impact of the Exchange Rate on GDP growth in the Republic of Tajikistan (for the period 2001-2018).

A consequence of the analysis result for policy formulation is that the government can provide access to foreign exchange, especially for goods and services that cannot be produced in the country. With the establishment of an exchange rate, which is

exogenous, the inflation rate, the level of exports and imports will be decided by the model as a target for monetary policy. In addition, our economy is also dependent on investment, and this factor was also included in the model.

Accordingly, the forecast for real GDP growth was obtained depending on the real effective exchange rate and investment (Figure 5)



\*Source: author's calculations using annual statistics from the Agency for Statistics under the President of the Republic of Tajikistan and the National Bank of Tajikistan.

Figure 5: GDP growth rates and Model Results (forecast for 2025).

## 5 CONCLUSIONS

Based on the analysis, it was revealed that there is a positive relationship between the real exchange rate and the growth of gross domestic product. In recent years, due to the global financial crisis, managing daily fluctuations in the exchange rate of the national currency has made it difficult to apply the objective of monetary policy. In this regard, the impact of the monetary policy of the Republic of Tajikistan on the real sector of the economy was determined by choosing the exchange rate regime. Since the role of monetary policy in sustainable growth is price stability, monetary policy cannot directly control prices and its influence occurs through increased volatility of interest rates, which, as a result, lead to an increase in the demand for money and a shortage of money supply. It is known that in a developing economy, the growth rate of money demand is faster than the growth of gross domestic product and this leads to an increase in the growth rate of money supply and activates the growth of the interest rate. Therefore, the Central Bank can achieve its goal in the process of determining inflation through the effect of the mechanisms of influence of monetary policy

The result of the analysis, using the real effective exchange rate, which is periodically assessed by the

NBT, can ensure efficient and optimal allocation of foreign exchange to the private sector. In addition, this strategy can help create sustainable employment and the development of a country's economic sector, which can often serve as an engine of growth and development.

Based on the obtained model results, it can be argued that the proposed methods and approaches for econometric modeling of the impact of the national currency exchange rate on the dynamics of the gross domestic product of the Republic of Tajikistan as a whole ensure an increase in the efficiency of monetary and foreign exchange policy, production, trade, government revenues and ensuring economic development. The result of the model shows that the economic growth of the Republic of Tajikistan reaches 7% on average, of which about 0.17% is due to the increase of the real effective exchange rate.

## 6 POLICY IMPLICATIONS

In order to ensure the effectiveness of monetary and exchange rate policies, it is recommended that:

- Introduction into practice of the model of gross domestic product, depending on the real effective

exchange rate and investment for the choice of monetary policy.

- implementation of the proposed model of the influence of the exchange rate on the dynamics of the gross domestic product in order to choose a monetary policy, which makes it possible to substantiate the influence of monetary policy on the exchange rate, the external sector and the growth of gross domestic product.

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