



NATIONAL BANK OF KAZAKHSTAN

THE IMPACT OF THE GOVERNMENT EXPENDITURES ON THE CURRENT ACCOUNT OF THE BALANCE OF PAYMENTS OF KAZAKHSTAN THROUGH THE CHANNEL OF IMPORT OF GOODS

Balance of Payments Department

Economic Study No.2023-05

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Content

1. Preamble	5
2. Literature review	7
3. An overview of the structure of the republican budget expenditure side	9
4. An overview of the current account of the balance of payments	12
5. Basic empirical model	14
6. Conclusions	18
7. List of used literature	19

The impact of the government expenditures on the current account of the balance of payments of Kazakhstan through the channel of import of goods

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Abstract

The NBK continues the series of studies devoted to the analysis of the country's foreign economic activity. The purpose of this study is an empirical assessment of the extent to which public spending finances imports.

The study describes the structural problems of Kazakhstan's balance of payments, provides an overview of the expenditure side of the republican budget, and conducts an empirical assessment of the relationship between imports of goods and government spending to test the "twin deficits hypothesis".

Key words: current account, real current account, government spending, double deficit, non-oil current account, impulse responses.

JEL classification: E21, E63, F14, F32.

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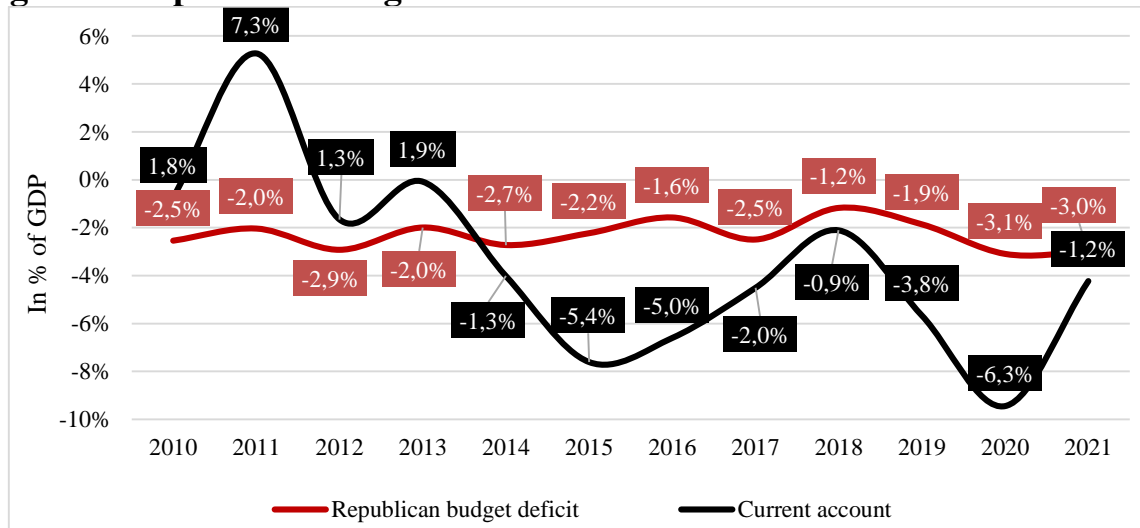
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1. Preamble

This research paper examines the presence of **twin deficit phenomenon in Kazakhstan**. The twin deficit was first seen in an analysis of the US economy in 1980-2000. In macroeconomics, the twin deficit hypothesis is the proposition that there is a strong causal link between a nation's government budget balance and its current account balance. That is, according to researchers who support this hypothesis, a higher budget deficit leads to a higher current account deficit.

Conventional analysis, albeit somewhat correct, fails to recognize an important distinction to be made between the ways in which the public sector deficits are created – by cutting taxes and increasing spending. It thus provides an inaccurate picture of the relationship between the fiscal policy and the balance of payments. To cut the trade deficit, reducing the government spending can be much more effective than increasing the tax burden.

Figure 1. Republican budget deficit and the current account⁶ in Kazakhstan



Source: MF RK, NBK.

*Note: There is a specificity of accounting in official trade statistics on the export of oil and gas condensate compiled by the SRC of the MF RK and the BNS of the ASPR RK. It is outlined as follows: the oil actually shipped in month t is reported in official statistics based on the date of submission of the final declaration, that is, with an approximate lag of up to 3 months. **Within the scope of this study, the current account of the balance of payments is looked at with the adjustment of the lag in the statistics of oil exports. It represents an estimated current account that recognizes oil exports on a timely basis.***

The main reasons for the deficit of the current account of the balance of payments adjusted for a time lag in oil export statistics in Kazakhstan (“the current account”) in 2014-2021 include relatively low prices for raw materials and a persistently high demand for foreign goods (Figure 1). The pressure on the current account from imports is constant because the local production is not sufficient to cover the domestic demand for various goods. As a result, the elasticity of demand for imports remains low. Thus,

⁶ Estimated current account where oil exports are reported on a timely basis. A more detailed description of the estimated current account is provided in the note to Figure 1.

in the reviewed period, despite the deteriorating economic situation (depreciation of the national currency, economic slowdown, falling total factor productivity, and low prices for raw materials), imports of goods did not show a significant decline.

Sources for financing of imports include not only personal and borrowed funds of the population and businesses, but also the government spending whose growth has been quite significant recently. The purpose of this paper is an empirical assessment of the scale of financing of imports with the government spending.

2. Literature review

At present, the global scientific community agrees that the fiscal policy pursued by the government has an impact on the nation's economic growth. That is, the government spending contributes to the economic growth in the long run. However, when it comes to the impact of fiscal impulses on the current account, the scientific community cannot come to unambiguous conclusions. Some researchers are trying to prove empirically that a higher budget deficit leads to a higher current account deficit (twin deficit hypothesis⁷), others prove otherwise and do not see any relationship between them.

Using the combined average group estimate of annual panel data from G7 countries, the European Central Bank researchers Katja Funke and Christiane Nickel (2006) examine the empirical relationship between the fiscal policy and international trade by analyzing the interrelation between the government spending and imports. The results of the authors' studies on developed countries show that a 1% growth in the government spending leads to a 0.4% increase in imports of goods and a nearly 0.5% increase in imports of services.

Researchers from the Netherlands (Beetsma, Giuliodori, Klaassen, 2007) elaborate this point in their study and expand it in various directions. They test this hypothesis for the European Union countries, and in the VAR models they use, break down the trade balance into components (exports, imports, ratio of GDP) as separate elements of the VAR. Thus, the authors are trying to determine the source of movement of the trade balance. According to the empirical analysis, a 1% growth in the government spending results in a 1.2% increase in the impact on GDP and a peak increase of up to 1.6%. According to their computations, the trade balance is deteriorating by 0.5% of GDP due to the growth in imports against reduction in the exports of goods.

In many economies in transition, the budget deficit and external deficit (current account deficit) arises simultaneously. Lasky (2009) argued that a direct and causal relationship appears only when private savings equal private investments (formula 4).

$$Y = C + S + T \quad (1)$$

$$Y = C + G + I + (X - M) \quad (2)$$

where Y – GDP, G – government spending, C – consumption, I – investments, S – savings, X – exports, M – imports, T – taxes.

$$S + T + M = G + I + X \quad (3)$$

$$I + (G - T) = S + (M - X) \quad (4)$$

⁷ In macroeconomics, the twin deficits hypothesis is the proposition that there is a strong causal link between a nation's government budget balance and its current account balance.

A. Abel, B. Bernanke in their book noted the importance of relationship between the budget deficit and savings. The authors write that if an increase in the government deficit ($G-T$) is not accompanied by an equal increase in national savings (S), then this should result in the reduced domestic investments (I) or the increased current account deficit, or both. In addition, the authors pay attention to the sources of budget deficit. They agree that if the budget deficit is caused by an increase in government procurements, then it will affect the reduction in the current account balance. At the same time, the issue of the budget deficit arising due to tax cuts remains open.

According to the Ricardo equivalence theorem, the budget deficit resulting from tax cuts does not lead to a worsening of the current account, since households will send all the benefits from tax cuts to savings (the US experience in 2001). Tax cuts today are forcing the government to borrow more in order to cover its running costs. When the government begins to repay these debts, future taxes will have to increase along with interest. However, conflicting results were obtained in the mid-1980s in Canada and Italy. Despite the fact that the budget deficits in these countries are larger than in the United States, their current accounts remained in surplus zone.

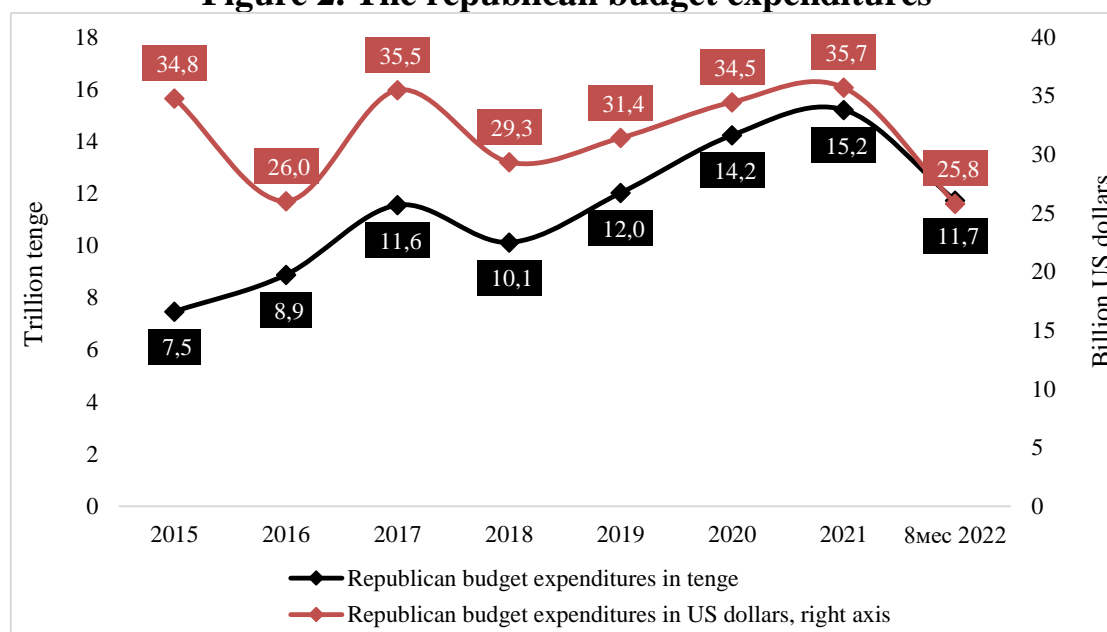
Hubert Gabrisch (2011) in his paper examines the long-term causal relationship between the budget and external deficits in three post-transition countries of Central and Eastern Europe (Poland, Czech Republic, Hungary). It is assumed that there is a long-term (intertemporal) equilibrium between private savings and investments. All results reject the twin deficit hypothesis. On the contrary, according to the author's observations, the trade balance is influenced by such specific transitional factors as high import intensity of exports and a net capital inflow.

3. An overview of the structure of the republican budget expenditure side

The volumes of imports are determined by many **factors**: the level of real income of the population and businesses (phases of economic activity), lending (consumer loans, leasing, and mortgages), fixed capital investments, the exchange rate, etc. However, **the impact of government spending can be reflected through all of these factors** due to the fact that the Kazakhstan economy is characterized by a high level of government participation.

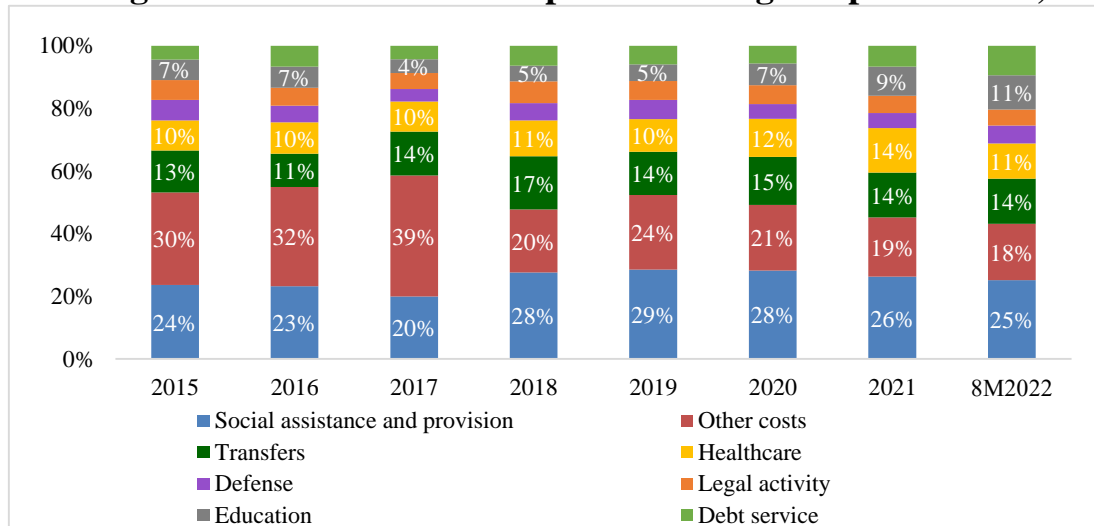
The national budget of Kazakhstan makes up 83% of the state budget on average during the last seven years. Government financing of investment projects is accomplished from the national budget. The national budget expenditures in 2021 amounted to 35.7 billion US dollars exceeding the levels of 2015 despite the 92.1% depreciation of the tenge (Figure 2).

Figure 2. The republican budget expenditures



Source: MF RK.

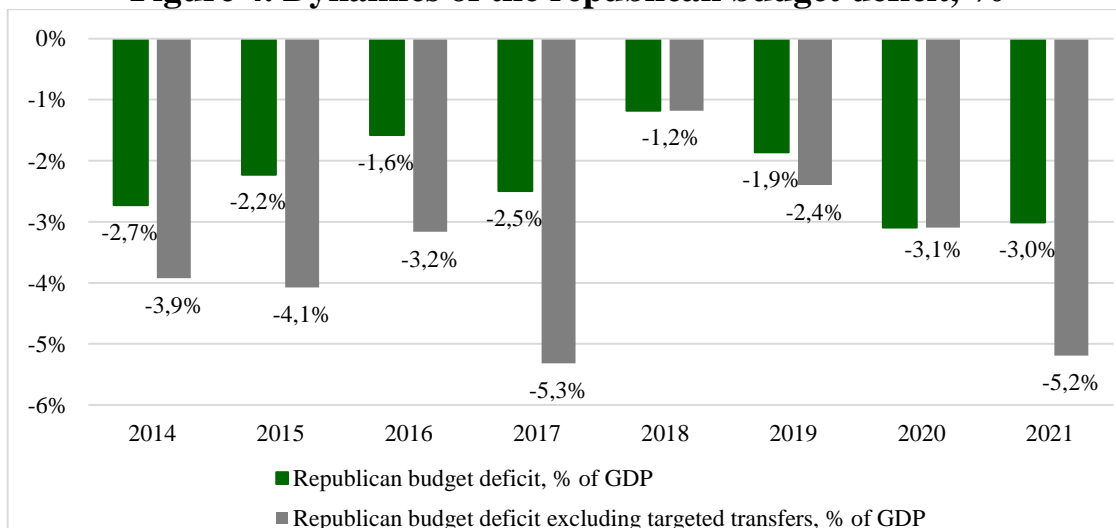
The share of spending allocated to the social welfare and social security within the structure of the national budget (Figure 3) has been persistently high. It increased from 24% in 2015 to 29% in 2019. In 2021, a fourth part of the national budget was spent for this sphere. In 2017, the portion of resources allocated to education went down to 4%. Based on the results of 2021, more focus had been made by the government on this sphere, therefore the share of allocated resources reached 9%. In general, other items in the budget structure have not undergone significant changes over the reviewed period.

Figure 3. Structure of the republican budget expenditures*, %

Source: MF RK.

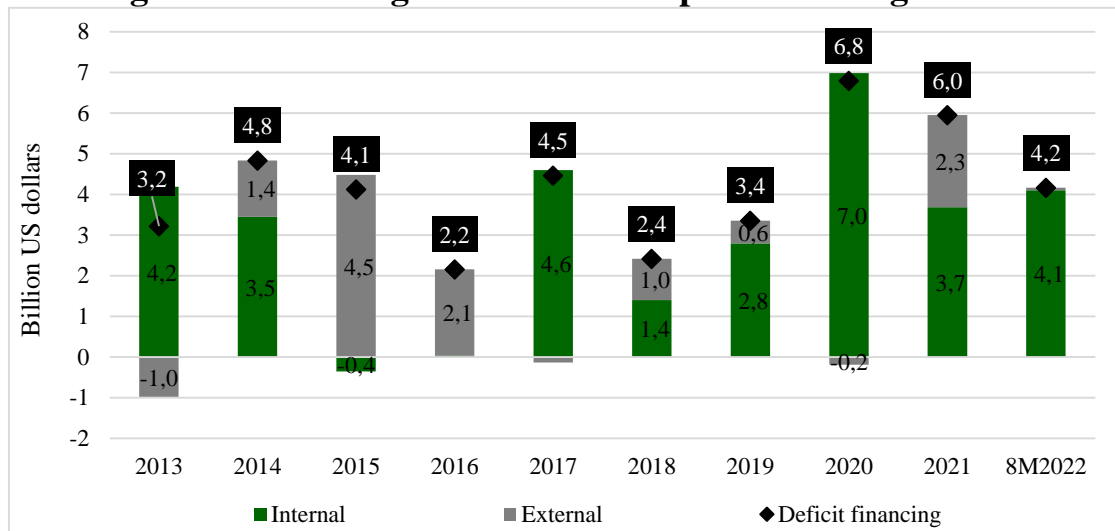
Note: expenditures are shown excluding budget loans and financial asset acquisitions.

During the period from 2014 through 2021, the republican budget remained in the deficit zone. The highest level of deficit as percentage of GDP was observed in 2020 and equaled -3.1%. If it were not for the earmarked transfers from the National Fund, the republican budget deficit would have been higher. This is related to the fact that earmarked transfers are the least regulated channel of allocations from the National Fund and are characterized by the immediate decision-making regarding their allocation. **Excluding earmarked transfers, the national budget deficit would exceed 5% of GDP in 2017 and 2021** (Figure 4).

Figure 4. Dynamics of the republican budget deficit, %

Source: MF RK.

The national budget deficit is financed from domestic and external sources by way of issuing bonds and capital raising. Since 2017, priority in financing of the national budget deficit has been given to domestic sources, whereas before 2017, the deficit was mainly financed by borrowing from abroad (Figure 5).

Figure 5. Financing sources of the republican budget deficit

Source: MF RK.

Note: financing volumes are presented on a net basis (receipt less repayment).

In analyzing the republican budget spending, it becomes obvious that the budgetary system of Kazakhstan is more of a social nature. That is, the budget spending is not only focused on large investment projects in the country but also has a high share of welfare payments, in addition to the salaries of employees of state-owned organizations as well as employees of organizations funded from the state budget.

When viewed from the perspective of the demand for import of goods, this situation is an impulse for the demand for consumer goods created by the government spending. Thus, the continuous increase in government spending supports the demand for consumer goods in addition to the demand for interim and investment goods. If we take into account the stability of public spending, regardless of the economic situation in the country, the abovementioned **welfare payments from the budget restrain the cyclical change in imports.**

4. An overview of the current account of the balance of payments

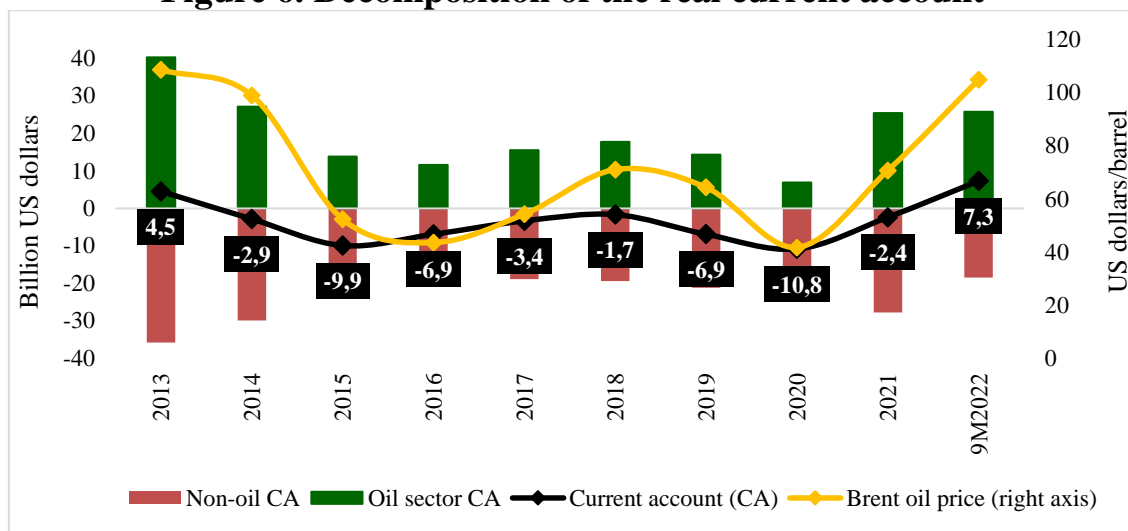
The current account of the balance of payments has been traditionally characterized by a number of structural problems: a high percentage of raw materials in exports, the economy's dependence on imports, and concentration of attracted foreign direct investments in the mining industry.

A large share of raw commodities in exports increase the balance of payment exposure to changes in world prices for raw materials. The current account path mainly **repeats the dynamics of oil prices** (Figure 6). Consequently, the following picture had been observed throughout the period in question: from 2014 to 2021, the current account had been in the deficit zone, in 2013, and at the end of 9 months of 2022 – in the surplus zone.

The **non-oil** current account had been in the negative zone throughout the reviewed period whereas the **oil** current account had stayed in the surplus zone.

The government spending on implementation of investment projects is mainly allocated to the **non-oil** sector of the economy. However, **until now such spending had not contributed to the improvement of the current account and its migration to the surplus zone.**

Figure 6. Decomposition of the real current account



Source: MF RK, NBK.

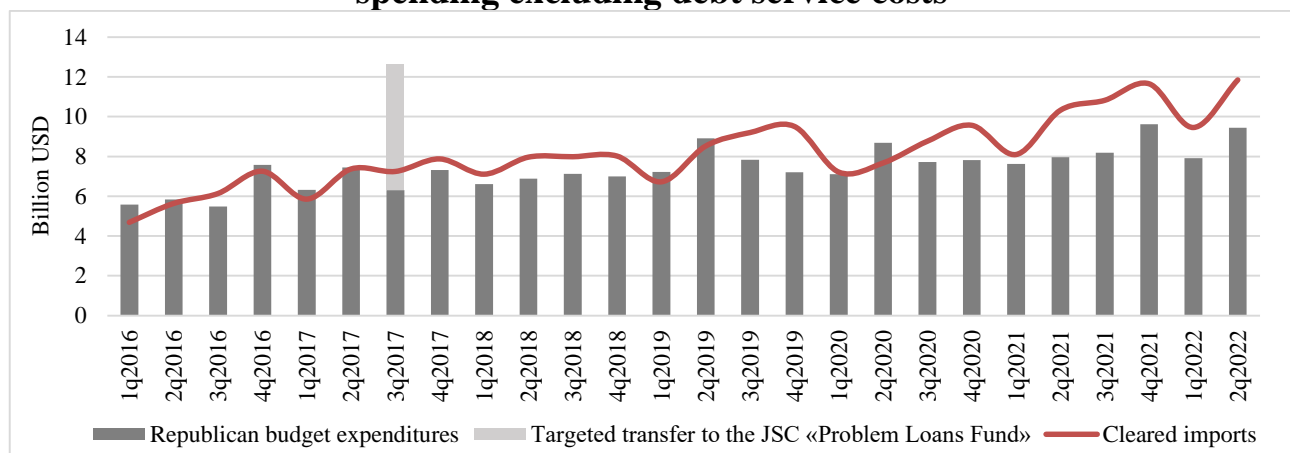
The main reason for the deficit of the current account of the balance of payments in Kazakhstan in 2014-2021, in addition to relatively low prices for raw materials, was also a persistently high demand for foreign goods. Pressure on the current account from imports is constant due to the fact that the local production is not sufficient to cover the domestic demand for various goods. As a result, the elasticity of demand for imports remains low. Thus, in the reviewed period, despite deterioration of the economic situation (depreciation of the national currency, economic slowdown, the falling total factor productivity, low prices for raw materials), imports of goods did not show a significant reduction.

Yet another structural problem of Kazakhstan's balance of payments is a high concentration of attracted foreign investments in the mining industry. The ratio between the return payable to foreign investors and exports of goods remains high and over the recent 8 years (2014-2021) had averaged 37%. Therefore, **when the trade balance improves owing to the rising world prices for raw materials, the current account does not improve proportionally.**

5. Basic empirical model

In order to determine the scale to which the imports of goods are financed by the government spending, an empirical relationship was considered between the republican budget spending, excluding debt service costs, and imports of goods, cleared of procurements by oil companies (Figure 7). The need to clear imports is driven by the fact that investment projects in the oil sector are mainly financed by foreign investors, and not from the nation's budget.

Figure 7. Dynamics of cleared import of goods and the republican budget spending excluding debt service costs



Source: MF RK, NBK.

Note: the import of goods are cleared of procurements of oil companies under the CCEA “06100 – Crude oil and natural gas production”.

Model parameters

In order to determine the impact of government spending on the balance of payments via the import of goods channel, various econometric models (VAR, VECM, OLS, and ARDL) with the use of monthly data for 2016-8 months of 2022 were constructed and studied.

Among all constructed models, the **vector autoregression model** (VAR, Appendix 1) produced the best results on a number of statistical tests.

Table 1. Information about the chosen VAR model

Model Type	VAR
Factors included in the model	1) Import of goods (consumer, intermediate, investment) without oil projects. Imports were cleared of oil projects (87 companies in total, the share in imports – 7.3% in the period of 2016-8 months of 2022) given that almost all their procurements are financed not by the government spending but by foreign direct investments. 2) The republican budget spending excluding debt service costs.
Length of the time series used	January, 2015 – August, 2022
Time series frequency	Monthly data

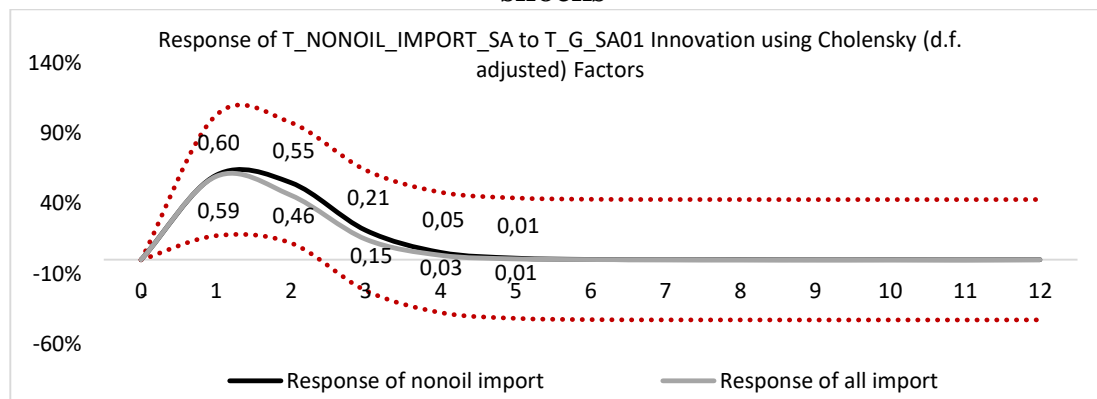
Results of empirical assessment

The literature review presented the results of a study by the European Central Bank (Katja Funke and Christiane Nickel, 2006), whereby, in the G7 countries, a 1% increase in the government spending leads to an increase in imports of goods by about 0.4%.

The results of this study show that the impact of government spending on import growth in Kazakhstan is more significant than in the G7 countries: a **1%** growth in the budget spending in the current month leads to a **0.6%** increase in **cleared imports** next month, followed by a full impulse attenuation after 5 months (Figure 8)⁸.

The impact of budget spending on total (uncleared of oil sector procurements) imports is not significantly different from the impact on net imports: a **1%** growth in the budget spending in the current month leads to a **0.59%** increase in **total (uncleared) imports** in the next month, followed by a full impulse attenuation after 5 months. Such insignificant difference in impulses can be explained by the fact that when imports are cleared of the oil sector procurements, purchases of oil companies **through contracting enterprises** were not taken into account. Imports of oil companies through contractors can be significant.

Figure 8. Impulse response of cleared imports to the government spending shocks



Source: the authors' computations.

Note. *X axis* shows months. The month $t=0$ is a period of shocks to the government spending. *Y axis* shows the response from imports to a surge in the government spending. Dotted lines denote a 95% confidence interval.

Impulse responses from cleared imports to the government spending shocks presented in Figure 8 demonstrate the following: other things being equal⁹, the growth in budget spending by **1%** on average in the current month will lead to a **1.42%** increase in the average monthly cleared imports after 5 months. A growth in imports

⁸ According to the IMF, most studies conclude that a budget improvement of 1 percent of GDP improves the current account by 0.1-0.4 percent of GDP. Source: World Economic Outlook, IMF, September 2011.

⁹ The volume of imports, in addition to the government spending, is also affected by a number of other factors – real income of the population and businesses (phases of the economic activity), lending (consumer loans, leasing, and mortgages), fixed capital investments, the exchange rate, and others. In making computations, we assume that the above factors remain unchanged.

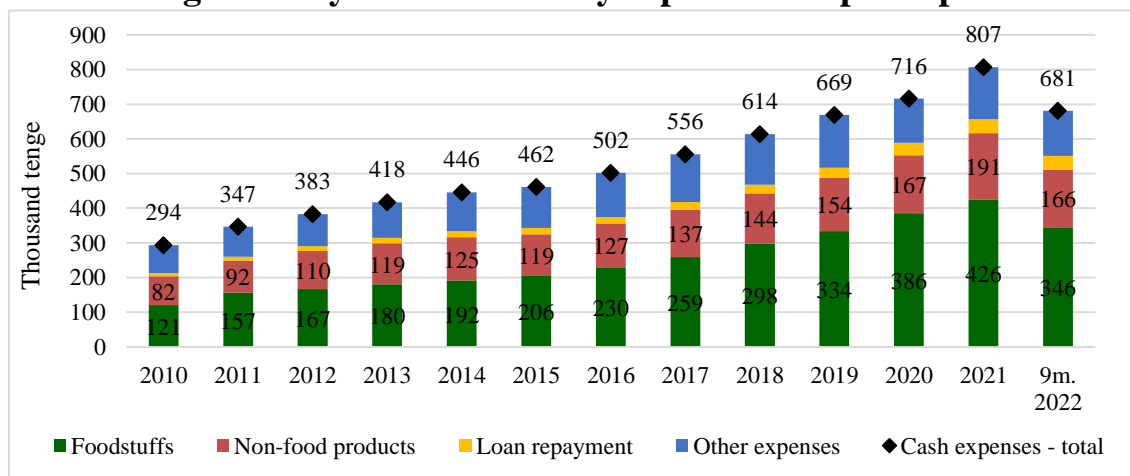
larger than the impulse itself ($1.42\% > 1\%$) may be associated with a possible **multiplier effect** of the government spending.

The multiplier effect can be expressed as follows. A part of the republican budget spending is directed to implementation of investment projects, subsidizing agriculture, supporting SMEs, thereby stimulating the growth of imports of interim and investment goods in the period of utilization of resources allocated by the government. The resulting profit of economic entities is spent by such entities on real estate, cars and other tangible assets, which are either satisfied by imports or stimulate it (for example, the purchase of real estate stimulates the import of construction materials, household appliances and furniture).

The budget spending includes not only expenditures related to implementation of investment projects, agricultural subsidies, SME support but also expenditures on wages to public sectors and social benefits. Such expenditures are distinguished by their stability and support the demand for consumer goods, including imported ones.

According to the BNS of the ASPR RK, based on the results of 2021, every resident of the country on average uses 76.5% of his/her expenditures for consumer goods (Figure 9).

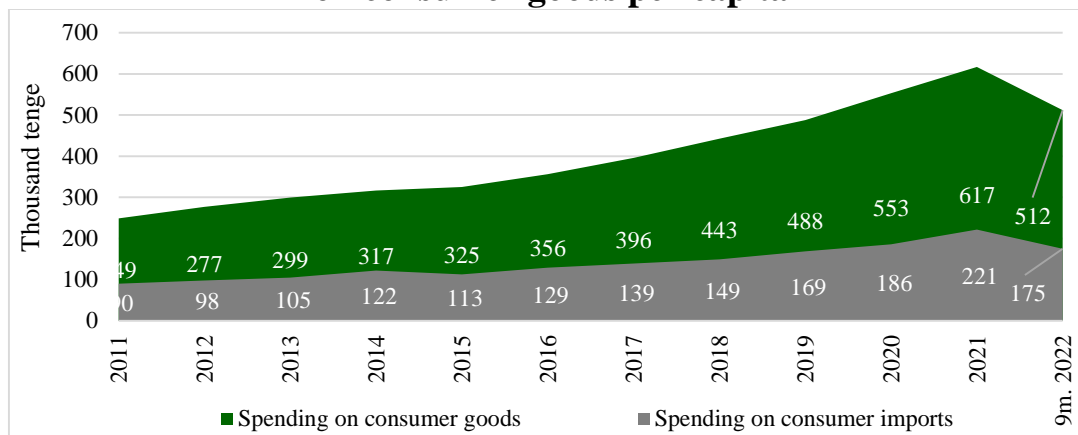
Figure 9. Dynamics of money expenditures per capita



Source: BNS of the ASPR RK.

Based on the data from the BNS of the ASPR RK, an attempt was made to estimate the share of imports in spending on consumer goods. The analysis results show that for the year of 2021, every resident of Kazakhstan on average uses **36%** of his/her expenditures for imported goods (Figure 10).

Figure 10. The share of imports in spending on consumer goods per capita

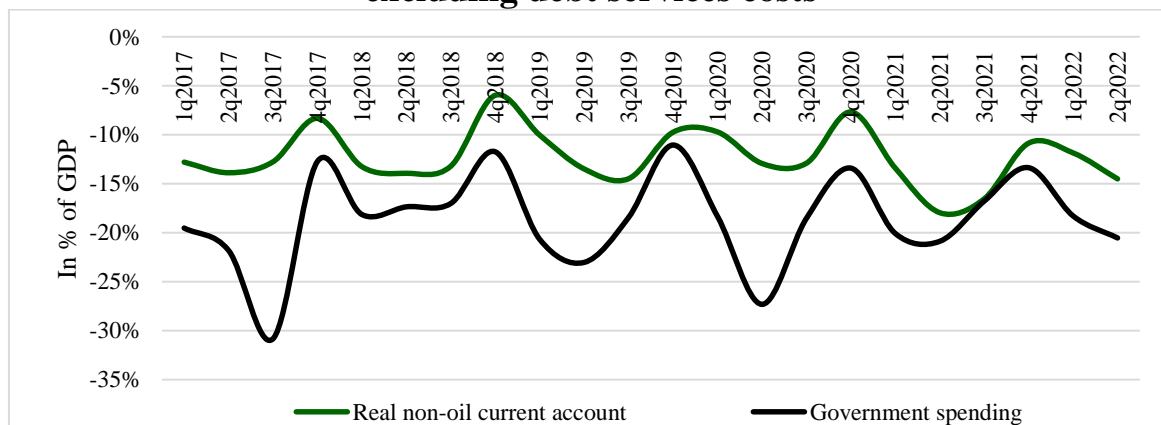


Source: BNS of the ASPR RK.

Given that the government spending is mainly directed to the sectors of economy not related to the oil and gas industry, a more precise reflection of the impact on the pursued fiscal policy is shown by the non-oil current account¹⁰ (Figure 11).

A visual analysis indicates that the change in the non-oil current account deficit (Appendix 2) repeats the dynamics of the volumes of government spending. That is, an increase in budget expenditures leads to worsening of the current account.

Figure 11. The non-oil current account and the republican budget spending excluding debt services costs



Source: MF RK, NBK.

Note: government spending is shown with a minus sign.

¹⁰ The oil sector is mainly developing owing to investments made by foreign direct investors.

6. Conclusions

The empirical analysis showed the following results.

1. According to estimates, in Kazakhstan, a **1%** growth in the budget spending excluding debt service costs in the current month leads to a **0.6%** increase in **imports less imports by oil companies** in the next month, followed by a full impulse attenuation in **5 months**.

In aggregate, the growth in the budget spending by 1% on average in the current month will lead to a 1.42% increase in cleared imports after 5 months in total. Other things being equal, a growth in imports larger than the impulse itself ($1.42\% > 1\%$) may result from a **multiplier effect** of the government spending on overall expenditures in the economy.

2. The government spending stimulates the demand not only for **production means and interim goods** for implementation of investment projects, but also for **consumer goods**. This stems from the fact that welfare payments and salaries to the public sector employees account for a significant portion in the budget structure. Insufficient volumes of the local production to cover the domestic demand result in that a considerable part of public resources as well as private sector funds goes to finance the imports.

3. The government spending is characterized by **stability**, irrespective of the economic situation in the country. Such non-cyclical financial impulses on the part of the government explain the non-cyclical path of imports of goods.

4. An increase in the government spending fuels the **worsening of the non-oil sector current account**. Therefore, investment projects in the non-oil sector implemented with government resources until now haven't contributed to improvement in the current account.

5. The preformed empirical analysis demonstrates that the **twin deficit hypothesis** in Kazakhstan **is confirmed**: a worsening republican budget balance leads to the worsening of the current account via the import of goods channel.

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To determine the impact of government spending on import of goods, a **vector autoregression model (VAR model)** was built using data for the period from 2015 to 8 months of 2022 on a monthly basis:

$$\text{Import} = a_1 * \text{Import}(-1) + a_2 * G(-1) + \text{Dummy} + \varepsilon_t$$

где:

Import – growth rates of imports of goods excluding imports of oil companies (month to the corresponding month of the previous year);

G – government spending growth rate excluding debt service costs (month on the corresponding month of the previous year);

Dummy – a dummy variable that takes into account the effects of events on the variable being explained.

At the same time, the variables under study (Import, G) are introduced into the model as endogenous variables, while the dummy variable is introduced as exogenous.

When constructing the VAR model, a short-term relationship between government spending and import of goods minus imports of oil companies was obtained, presented in the table.

	T_NONOIL_IMPORT_SA(-1)	T_G2_SA(-1)
Short-run relationship coefficient	0.670845	0.174274

The resulting model shows a **positive dependence of imports on government spending**. The corrected coefficient of determination was 0.71 and shows a high value, which means that the variables under study are informative for the analysis.

VAR model

Vector Autoregression Estimates

Date: 02/27/23 Time: 15:12

Sample: 2016M03 2022M08

Included observations: 78

Standard errors in () & t-statistics in []

	T_NONOIL_IMPORT_SA	T_G2_SA
T_NONOIL_IMPORT_SA(-1)	0.670845 (0.06479) [10.3545]	0.353350 (0.13854) [2.55050]
T_G2_SA(-1)	0.174274 (0.05046) [3.45366]	0.290842 (0.10790) [2.69537]
C	0.190745 (0.06972) [2.73569]	0.358106 (0.14910) [2.40181]

DUMMY_IMPORT	-0.251640 (0.06499) [-3.87194]	0.083548 (0.13898) [0.60117]
R-squared	0.723573	0.242093
Adj. R-squared	0.712366	0.211367
Sum sq. resids	0.594064	2.716480
S.E. equation	0.089599	0.191596
F-statistic	64.56718	7.879108
Log likelihood	79.54440	20.26030
Akaike AIC	-1.937036	-0.416931
Schwarz SC	-1.816179	-0.296074
Mean dependent	1.096304	1.047852
S.D. dependent	0.167063	0.215750
Determinant resid covariance (dof adj.)		0.000295
Determinant resid covariance		0.000265
Log likelihood		99.80534
Akaike information criterion		-2.353983
Schwarz criterion		-2.112269
Number of coefficients		8

The necessary tests were carried out to confirm the statistical significance of the model and the absence of false regression.

For this, a **correlation** table was constructed, which shows the presence of a positive statistical relationship between imports and government spending, which is also confirmed by the coefficients in the model.

Correlation

	T_G_SA	T_NONOIL_IMPORT_SA
T_G_SA	1	0.42479
T_NONOIL_IMPORT_SA	0.42479	1

The Granger causality test shows that changes in government spending cause changes in imports, and not vice versa.

VAR Granger Causality/Block Exogeneity Wald Tests

Date: 02/28/23 Time: 12:48

Sample: 2016M03 2022M08

Included observations: 78

Dependent variable: T_NONOIL_IMPORT_SA

Excluded	Chi-sq	df	Prob.
T_G2_SA	11.92778	1	0.0006
All	11.92778	1	0.0006

Dependent variable: T_G2_SA

Excluded	Chi-sq	df	Prob.
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T_NONOIL_IMPORT_SA	6.505031	1	0.0108
All	6.505031	1	0.0108

Through the **Lag Criteria Structure** function, the optimal number of lags for the $p=1$ model is determined. This is confirmed by 5 out of 5 criteria, including the information criteria of Schwartz and Hanna-Queen.

VAR Lag Order Selection Criteria

Endogenous variables: T_NONOIL_IMPORT_SA T_G2_SA

Exogenous variables: C DUMMY_IMPORT

Date: 02/28/23 Time: 14:20

Sample: 2016M03 2022M08

Included observations: 73

Lag	LogL	LR	FPE	AIC	SC	HQ
0	66.16355	NA	0.000624	-1.703111	-1.577606	-1.653095
1	96.97340	58.24327*	0.000300*	-2.437627*	-2.186618*	-2.337596*
2	100.9360	7.273737	0.000300	-2.436601	-2.060088	-2.286554
3	101.5497	1.092889	0.000330	-2.343826	-1.841808	-2.143763
4	101.9806	0.743783	0.000364	-2.246043	-1.618520	-1.995964
5	104.0097	3.391101	0.000385	-2.192046	-1.439018	-1.891951
6	105.9964	3.211404	0.000408	-2.136887	-1.258355	-1.786777
7	110.2177	6.592174	0.000408	-2.142951	-1.138914	-1.742825

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

The calculation model is **stationary**, because all reciprocal roots are less than unity in absolute value and are located inside the unit circle.

Roots of Characteristic Polynomial

Endogenous variables: T_NONOIL_IMPORT

_SA T_G2_SA

Exogenous variables: C DUMMY_IMPORT

Lag specification: 1 1

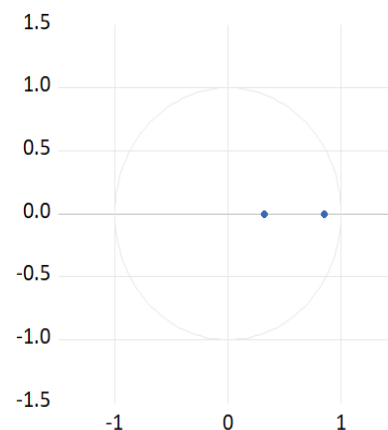
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Root	Modulus
0.793381	0.793381
0.168305	0.168305

No root lies outside the unit circle.

VAR satisfies the stability condition.

Inverse Roots of AR Characteristic Polynomial



The **Autocorrelation LM Test** checks for residual serial correlation up to a specified order. Prob > 5% for all lags, which confirms the absence of serial correlation.

VAR Residual Serial Correlation LM Tests

Date: 02/28/23 Time: 14:34

Sample: 2016M03 2022M08

Included observations: 78

Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	4.867511	4	0.3012	1.229169	(4, 142.0)	0.3012
Null hypothesis: No serial correlation at lags 1 to h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	4.867511	4	0.3012	1.229169	(4, 142.0)	0.3012

*Edgeworth expansion corrected likelihood ratio statistic.

The results of White's test for **heteroscedasticity** (variability of variances of deviations) show that the residuals of the model are homoscedastic (the probability is greater than 5% for both the general test and the residuals of individual variables), i.e. the variance of deviations is constant.

VAR Residual Heteroskedasticity Tests (Levels and Squares)

Date: 02/28/23 Time: 14:51

Sample: 2016M03 2022M08

Included observations: 78

Joint test:					
Chi-sq	df	Prob.			
8.159379	15	0.9172			
Individual components:					
Dependent	R-squared	F(5,72)	Prob.	Chi-sq(5)	Prob.
res1*res1	0.023799	0.351062	0.8800	1.856331	0.8686
res2*res2	0.008186	0.118848	0.9878	0.638492	0.9862
res2*res1	0.068594	1.060493	0.3895	5.350310	0.3746

Additionally, a **normal distribution** test was performed. As can be seen from the table, all variables have Prob > 5%, which allows us to speak about the normal distribution of the residuals of each variable individually and in general.

VAR Residual Normality Tests

Orthogonalization: Cholesky (Lutkepohl)

Null Hypothesis: Residuals are multivariate normal

Date: 02/28/23 Time: 14:55

Sample: 2016M03 2022M08

Included observations: 78

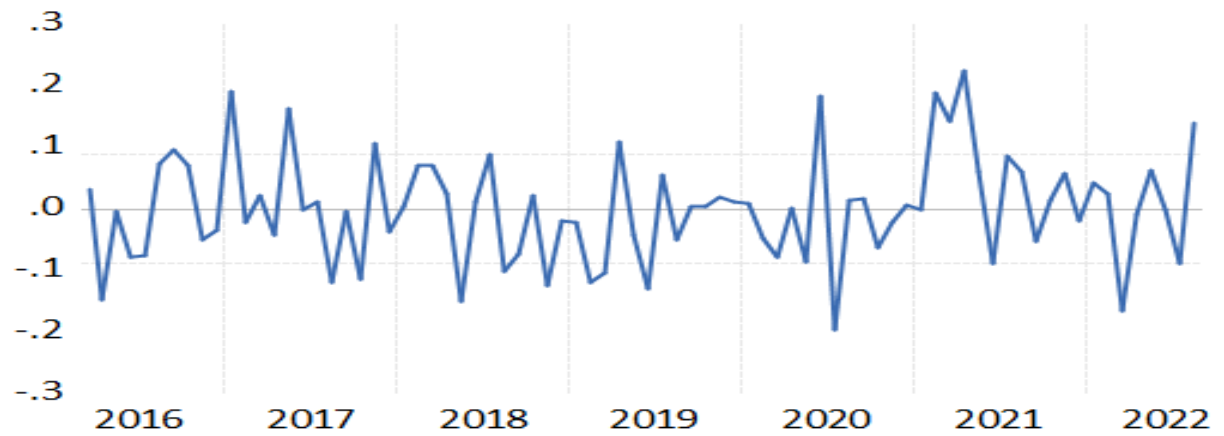
Component	Skewness	Chi-sq	df	Prob.*
1	0.285057	1.056349	1	0.3040
2	0.245075	0.780801	1	0.3769
Joint		1.837150	2	0.3991
Component	Kurtosis	Chi-sq	df	Prob.
1	3.062926	0.012869	1	0.9097
2	2.783130	0.152856	1	0.6958
Joint		0.165725	2	0.9205
Component	Jarque-Bera	df	Prob.	
1	1.069218	2	0.5859	
2	0.933657	2	0.6270	
Joint	2.002875	4	0.7352	

*Approximate p-values do not account for coefficient estimation

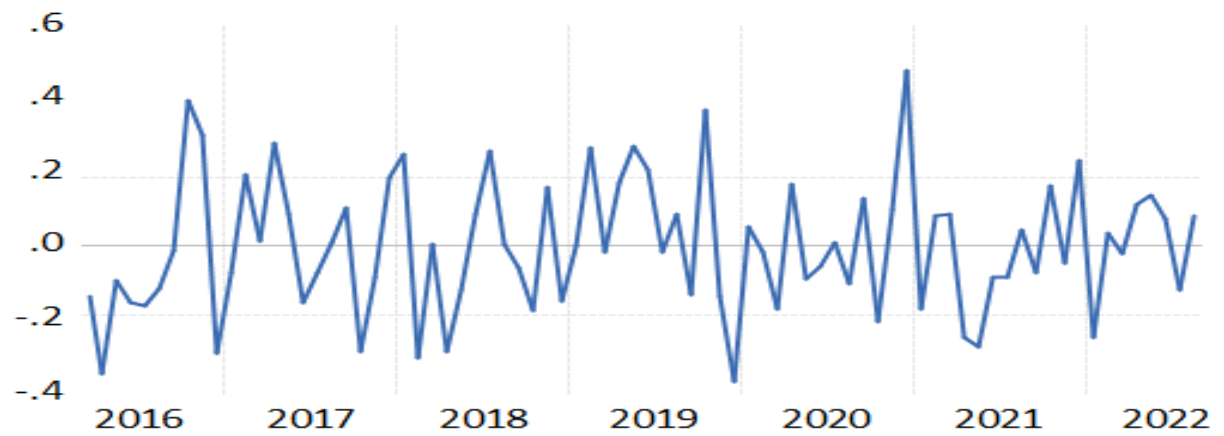
The residuals of the model are stable, indicating a good explanatory power of the model.

VAR Residuals

T_NONOIL_IMPORT_SA Residuals



T_G_SA Residuals



The non-oil current account was estimated by excluding the following parameters from the general current account:

- ✓ **Export** of oil in the group of goods "2709 – oil and gas condensate";
- ✓ **Import** of oil-producing enterprises according to CCEA "06100 – Extraction of crude oil and natural gas";
- ✓ **Balance of services** of enterprises according to CCEA "06100 - Extraction of crude oil and natural gas";
- ✓ **Income balance** of enterprises according to CCEA "06100".