Empirical analysis of dependencies between the current account of the balance of payments in Azerbaijan and some macroeconomic indicators

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Abstract.
The article is devoted to the empirical analysis and modeling of the dynamics of the development of the balance of payments in Azerbaijan. For this purpose, the theoretical foundations of the balance of payments were investigated and explanatory factors were selected, the most suitable composition was formed, the functional dependence between the independent factors and the explanatory factor was determined, and the dependencies between the current account of the balance of payments and macroeconomic indicators were quantitatively evaluated based on the econometric methodology, and the relevant factor determining the overall quality of the time series was determined. Econometric tests were conducted.

Keywords:
time series
descriptive statistics
regression
heteroscedasticity
correlation matrix
**Actuality.** At the beginning of the 21st century, the researches related to the adjustment of the balance of payments were part of the general analysis of the transitional economy. However, in recent years, it can be seen that more studies of the influence of national exchange rates on the balance of payments have been conducted in the conditions of already formed market relations[4,5]. In the conducted studies, a model was established by evaluating the effect of changes in exchange rates on the components of the balance of payments, analyzing the theoretical-methodological bases of exchange rates, taking into account the dynamics of the currency structure of investment assets, developing methodologies for assessing devaluation expectations of financial market subjects and establishing economic mathematical models that determine the dependence of exchange rates on inflationary processes[ 1,10,11,12].

The processes determine the dedication of the conducted research to the current topic in the sphere of foreign economic activity, which is characterized by a significant and increasing influence on the development of the national economy, and the importance of taking them into account in the assessment of the economic development trends of the country in the prospective period.

The balance of payments is the primary "mechanism" that shows the relations between economic units in a country and foreign countries. The leading constituent indicators of the balance of payments are the balance of current operations, the balance of capital movements, and the trade balance.

The balance of payments is a statistical report that systematically reflects the final results of foreign economic transactions conducted by the state with other countries. Information about the balance of payments and the position of the state regarding international investments inevitably play an important role in the formation of domestic and foreign economies. When analyzing and forecasting the main indicators of the balance of payments of the Republic of Azerbaijan, the impact of imports, exports, budget revenues, the price of oil in the world market, foreign currency reserves, and investments in fixed capital should be taken into account. We created six mathematical-statistical models and used one
model comparison analysis.

In the research process, the tools of the EViews 8 application package were used and all necessary statistical procedures were used. These procedures are required to identify, estimate, and verify the adequacy of the model's parameters. Based on the quarterly data of economic variables using primary statistical indicators without substitution, trade and economic processes in the country, import, export, budget revenues, the price of oil on the world market, foreign currency reserves, and indicators of investments in fixed capital, the working principle of the balance of payments of the Republic of Azerbaijan is reviewed and empirically analysis is carried out. The research work was carried out quarterly in the Republic of Azerbaijan for 15 years according to statistical indicators. Appropriate econometric methods are used for model verification identification, the Dickey-Fuller test for the determination of time series stationarity, and the Granger test for the determination of cause-and-effect dependencies. Increasing internationalization and globalization of economic life, deepening of integration processes, increasingly close interaction, and dependence on national economies are among the most important factors in the development of the world economy today.

In several conducted studies, the formulation of the regression model of analysis and forecasting operations of the main indicators of the balance of payments of the Republic of Azerbaijan every quarter for 2007-2021 was noted.

Research purpose. The study is dedicated to the econometric analysis and modeling of the dynamics of the development of the balance of payments in Azerbaijan, to the issue of the formation of a statistical model that can provide perspective values for the development of the balance of payments. Using the capabilities of correlation and regression analysis, and econometric tests, the task of selecting the best composition of explanatory factors for the model based on determining the nature and closeness of the relationship between explanatory factors was set.

Materials and methods. The official statistical data of the State Statistics Committee and the Central Bank of Azerbaijan, scientific works, and research of both
Azerbaijani and foreign scientists and specialists in the fields of economics and mathematical-economic modeling was used. Eviews 8 software package was used for calculations.

**The main part of Research.** All the statistical data used for the analysis of the main indicators of the balance of payments of the Republic of Azerbaijan were taken from official sources such as the State Statistics Committee of Azerbaijan (SSCA) [7] and the Central Bank of Azerbaijan (CBA) [8]. The time series consists of 60 levels covering the period 2007–2021 on a quarterly basis. The time series studied in the analysis were examined according to baseline without replacement. According to the dynamic description and descriptive statistics of the analyzed time series, the results are presented in table 1 and figure 1. The obtained results demonstrate the high stationarity of the time series.

### Table 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>BALANCE_OF_PMTS</th>
<th>BUDGET_REVENUES</th>
<th>CAPITAL_INVESTMENT</th>
<th>EXPORT</th>
<th>FOREING_EXCH_RESERVES</th>
<th>OIL_PRICES</th>
<th>IMPORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average indicator</td>
<td>2043.169</td>
<td>3485.182</td>
<td>3213.435</td>
<td>5722.232</td>
<td>7087.157</td>
<td>92.14927</td>
<td>2284.437</td>
</tr>
<tr>
<td>Median</td>
<td>1967.000</td>
<td>3252.054</td>
<td>2662.183</td>
<td>5310.991</td>
<td>6000.400</td>
<td>83.97000</td>
<td>2292.622</td>
</tr>
<tr>
<td>Maximum</td>
<td>6031.000</td>
<td>6432.705</td>
<td>7707.292</td>
<td>9996.039</td>
<td>15142.23</td>
<td>181.8900</td>
<td>3212.064</td>
</tr>
<tr>
<td>Minimum</td>
<td>-856.0000</td>
<td>894.0410</td>
<td>1339.625</td>
<td>2551.987</td>
<td>1972.133</td>
<td>35.9600</td>
<td>1186.941</td>
</tr>
<tr>
<td>Mean squared deviation</td>
<td>3715.609</td>
<td>1270.522</td>
<td>1583.893</td>
<td>1994.689</td>
<td>3374.781</td>
<td>32.86145</td>
<td>503.5379</td>
</tr>
<tr>
<td>Asymmetry</td>
<td>0.235124</td>
<td>0.565208</td>
<td>1.155567</td>
<td>0.296472</td>
<td>1.069724</td>
<td>0.409372</td>
<td>0.233953</td>
</tr>
<tr>
<td>Excess</td>
<td>2.133357</td>
<td>2.846845</td>
<td>3.580977</td>
<td>1.987099</td>
<td>3.113123</td>
<td>2.375915</td>
<td>2.388219</td>
</tr>
<tr>
<td>Probability</td>
<td>0.302704</td>
<td>0.201896</td>
<td>0.009921</td>
<td>0.183922</td>
<td>0.000346</td>
<td>0.272850</td>
<td>0.348848</td>
</tr>
<tr>
<td>Sum</td>
<td>120547.0</td>
<td>2056257.7</td>
<td>103652.6</td>
<td>337611.7</td>
<td>410142.2</td>
<td>5436.807</td>
<td>134791.8</td>
</tr>
<tr>
<td>Square sum of deviations</td>
<td>1.71E+08</td>
<td>9362.9554</td>
<td>1.46E+08</td>
<td>2.31E+08</td>
<td>6.61E+08</td>
<td>62632.74</td>
<td>1470592.7</td>
</tr>
<tr>
<td>Observations</td>
<td>59</td>
<td>59</td>
<td>59</td>
<td>59</td>
<td>59</td>
<td>59</td>
<td>59</td>
</tr>
</tbody>
</table>

Regressiya The main purpose of regression analysis is to build a multivariate model, to study the effect of each factor separately or all factors together on the modeled outcome factor. Since the multivariable regression analysis is a continuation of the double regression analysis with multifactor dependencies, the issue here is the study of the effect of specific factors on the dependent variable, the determination of the boundary of this effect, and the
quantitative assessment of its effect on other factors. At the same time, it is a question of model specification, in which case the issues of which factors to include in the model and which factors to exclude from the model are considered. Since the main purpose of regression analysis is to reflect the general state of relations between factors, a multidimensional regression model was created for the current account of the balance of payments to be studied.

For the estimation of regression coefficients, as in the case of pairwise linear regression, the EPC is applied, according to this method, the values of the parameters are selected so that the sum of the squares of the differences between the actual values of the dependent variables and their values at these values is minimal. If the regression coefficient is positive, as the independent variable increases, the dependent variable increases and decreases as it decreases, if the regression coefficient is negative, then the independent variable and the dependent variable are inversely proportional. Table 2 shows the parameters of the multivariate linear regression model estimated with ECM using the Eviews 8 software package.

Image 1
Dynamic data description
**Table 2**

Results of multivariate linear regression analysis on variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficient of parameters</th>
<th>Standard error</th>
<th>t-statistics</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUDGET_REVENUES</td>
<td>0.065716</td>
<td>0.088973</td>
<td>0.738612</td>
<td>0.4635</td>
</tr>
<tr>
<td>CAPITAL_INVESTMENT</td>
<td>-0.061152</td>
<td>0.062126</td>
<td>-0.984331</td>
<td>0.3295</td>
</tr>
<tr>
<td>EXPORT</td>
<td>1.003831</td>
<td>0.098182</td>
<td>10.22415</td>
<td>0.0000</td>
</tr>
<tr>
<td>FOREX EXCHANGE_RESERVES</td>
<td>-0.056226</td>
<td>0.028808</td>
<td>-1.951726</td>
<td>0.0564</td>
</tr>
<tr>
<td>OIL_PRICES</td>
<td>-0.968234</td>
<td>0.163095</td>
<td>-5.936622</td>
<td>0.0000</td>
</tr>
<tr>
<td>IMPORT</td>
<td>-9.542175</td>
<td>6.087902</td>
<td>-1.567400</td>
<td>0.1231</td>
</tr>
<tr>
<td>C</td>
<td>-245.8561</td>
<td>360.8095</td>
<td>-0.675858</td>
<td>0.5021</td>
</tr>
</tbody>
</table>

Coefficient of determination: 0.957189
The arithmetic mean of the dependent variable: 2043.169

Adjusted coefficient of determination: 0.952249
The squared standard deviation of the dependent variable: 1715.605

Standard error of the regression: 374.8944
Akaike Criterion: 14.80216

The sum of the squares of the residuals: 7308380.
Schwarz Criterion: 15.04865

The value of the maximum likelihood function: -429.6637
Hannan-Quinn Criterion: 14.89838

The F-statistic: 193.7719
Durbin-Watson statistics: 1.086042

Probability (F-statistic): 0.000000

According to the results of the regression analysis (see table 2), the number of observations: n=59; R2- coefficient of determination of observations 0.96; Fisher Criterion F=193.772; F-statistics probability prob.=0.00; Durbin Watson statistic DW=1.09. The results are quite satisfactory. According to the coefficient of determination, the independent variables included in the model explain 96% of the outcome variable. Criterion F received a fairly reliable assessment with a high probability. However, the result obtained for the DW criterion cannot be considered satisfactory. The critical limits for the DW criterion with n = 59 and k = 5 (the number of explanatory factors included in the model) are D_L = 1.41 and D_U = 1.77. The calculated DW criterion value for the model is DW= 1.09. Since 1.09 <D_L, DU, there is positive autocorrelation of the residuals.
The measurement units of independent variables BALANCE_OF_PAYMENTS, BUDGET REVENUES, CAPITAL INVESTMENT, EXPORT, FOREIGN EXCH RESERVES, OIL PRICES and IMPORT included in the model for regression analysis are expressed in US dollars. As it is known, the pandemic situation in 2020 affected BALANCE_OF_PAYMENTS, CAPITAL_INVESTMENT, EXPORT, OIL_PRICES, and IMPORT variables and caused certain changes in their dynamics. It is possible to determine which of the function budget revenues, exports, imports, foreign exchange reserves, the price of oil in the world market, and investment in fixed assets has a stronger influence on the dependent variable, the balance of payments. Using these possibilities in the conducted research, the formal form of the multivariate regression model expressing the relationships between the variables in the study can be shown as follows:

\[
\text{BALANCE\_OF\_PAYMENTS} = 0.065716\text{BUDGET\_REVENUES} - 0.061152\text{CAPITAL\_INVESTMENT} + 1.003831\text{EXPORT} - 0.056226\text{FOREING\_EXCH\_RESERVES} - 0.968234\text{IMPORT} - 9.542175\text{OIL\_PRICES} - 243.8561
\]

Now let's look at the parameters of the model and quality assessment of the overall model. Depending on the type of econometric model, initial conditions (properties of the residual limit), and criteria, the applied estimation methods differ. Depending on the type of model, basic and modified methods of evaluation are applied. Base methods are distinguished by the criteria on which they are based. The main base methods are LSM and MLM. Their modifications are used with those criteria, but the specific properties of the residual limit (heteroscedasticity, understood as its elements having different dispersion for different observations, etc.) are taken into account in the estimation
of parameters. According to the linear regression model, the random component \( u_i \) should have constant variance across all observations. When the assumption of constant variance is not followed, the residuals of the model face the problem of variable variance. Let us clarify the problem of unstable dispersion. If there are unaccounted variables that should be included in the model but are not included in the model, non-constant variances arise in the levels of the residual limit of the model, and the Gauss-Markov conditions for the residual limit are not satisfied. In regression models, assuming constant coefficients can also lead to variable variances. Errors may have been made during the collection of data used in building the model. Measurement errors may have been made regarding the variables. And all of these lead to variable dispersion. These time-varying variances, in turn, cause other problems. The obtained results lose the significance of the t and F tests based on the standard assumptions of the regression model. Estimated regression leads to erroneous results related to statistical significance and estimation errors related to variables can occur. Thus, the results obtained with the variable variance problem will not be correct.

The Gauss-Markov theorem for the multivariate linear regression model is derived from the properties of regression parameter estimates. As a result of a violation of one of the conditions determined by the Gauss-Markov theorem, the case of heteroscedasticity appears. This happens when the variances of the random deviations for any observations are not constant. To prevent this from happening, homoscedasticity research is considered important for econometric modeling. There are different tests in the literature to clarify this. The most commonly used tests are the Breusch-Pagan-Godfrey test, the Glejser test, and the White test. In the first case, let's consider the theoretical basis of the Breusch-Pagan-Godfrey test.

The general form of the constructed model

\[
Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \beta_k X_{ki} + U_i,
\]

Residual limit
\[ \sigma_i^2 = f(\alpha_1 + \alpha_2 z_i + \cdots + \alpha_p z_p) \]

The hypotheses in the Breusch-Pagan test are as follows:

- \( H_0: \alpha_2 = \alpha_3 = \cdots = \alpha_p = 0 \) the hypothesis for constant variance is valid;
- \( H_1: \alpha_2 \neq \alpha_3 \neq \cdots \neq \alpha_p \neq 0 \) the hypothesis for constant variance is not valid.

To estimate the auxiliary regression model, \( \sigma^2 \) must first be determined:

\[ \hat{\sigma}^2 = \frac{\sum e_i^2}{n}; \quad e_i^2 = \alpha_1 + \alpha_2 z_i + \cdots + \alpha_p z_p. \]

The sum of squares explained by the regression of the model has a value of \( SSR_0 \). The Breusch-Pagan test statistic is calculated as:

\[ \lambda = \frac{SSR_0}{2\hat{\sigma}^4} \]

The \( \lambda \) (p-1) distribution is a chi-square distribution with degrees of freedom. The calculated test statistic \( \lambda \) compared to the table value that would be found from the chi-square table with a margin of error and (p-1) degrees of freedom. If the test statistic \( H \) is greater than the table value, the hypothesis is rejected, if it is less, the hypothesis cannot be rejected.

**Table 4**

<table>
<thead>
<tr>
<th>Heteroskedastiklik Test: Breusch-Pagan-Goldfrey Test for testing heteroscedasticity</th>
</tr>
</thead>
<tbody>
<tr>
<td>The F-statistic</td>
</tr>
<tr>
<td>Coefficient of determination</td>
</tr>
</tbody>
</table>

Heteroscedasticity of the residuals in the model was checked by the Breusch-Pagan-Godfrey test, and the results are shown in Table 4. nR²= coefficient of determination of...
observation, where the number of observations is \( n=59 \), \( R^2 \)-determination coefficient of observations received the value of 12.13983. These values were calculated using the EViews application software. In Table 4, the corresponding probability value is greater than 0.05, so hypothesis \( H_1 \) is rejected. Thus, the assumption of constant variance holds. There is no variable variance problem here.

Consider the Glejser test in the second case. This test is based on the hypothesis that the state of variable variance arises from the relationship between the independent variable and the variance of the residual threshold. In this test, unlike \( \sigma^2 \), the absolute values of the residuals are used [3]. For the independent variable thought to be related to \( \sigma_i^2 \) by estimating the residuals:

\[
|e_i| = \beta_0 + \beta_1 x_i + v_i; \\
|e_i| = \beta_0 + \beta_1 \sqrt{\xi_i} + v_i; \\
|e_i| = \beta_0 + \beta_1 x_i^{-1} + v_i; \\
|e_i| = \beta_0 + \beta_1 \sqrt{\xi_i}^{-1} + v_i; \\
|e_i| = \sqrt{\beta_0 + \beta_1 x_i} + v_i; \\
|e_i| = \sqrt{\beta_0 + \beta_1 x_i^2} + v_i.
\]

One or more or all of the given regression models can be tested. The significance of the coefficients of the tested models is determined by \( t \) and \( F \) tests. Whether the coefficients \( \beta_0 \) and \( \beta_1 \) are significant is checked by the test:

\[
\beta_0 = 0, \beta_1 = 0 \quad \text{constant dispersion;}
\]

\[
\beta_0 = 0, \beta_1 \neq 0 \quad \text{or} \quad \beta_0 \neq 0, \beta_1 = 0 \quad \text{variable variance.}
\]

It is not so important whether the constant coefficient is significant or not. For this reason, in multiple regression models, whether the coefficients of all independent variables are significant or not is checked with the \( F \) test.

In the second case, the heteroscedasticity of the residuals in the model was checked by Glejser’s test, and the results are shown in Table 5. \( nR^2= \) The coefficient of determination of observations, where the number of observations is \( n=59 \), the coefficient of determination of
R²-observations was 12.14421. These values were checked using EViews application software. As the corresponding probability value in Table 5 is greater than 0.05, the H₁ hypothesis is rejected, and thus the constant variance hypothesis is valid. As can be seen from the result of this test, there is no variable dispersion problem.

<table>
<thead>
<tr>
<th>Results of the Glejser Test for testing heteroscedasticity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient of determination of observations</td>
</tr>
</tbody>
</table>

In the third case, consider the White Test. White's test requires the estimation of an auxiliary regression model, and for its implementation, the residuals are analyzed by estimating the model. Hypotheses in this case:

- \( H_0: \beta_2 = \beta_3 = \cdots = \beta_k = 0 \) the hypothesis for constant variance is valid;
- \( H_0: \beta_2 \neq \beta_3 \neq \cdots \neq \beta_k = 0 \) the hypothesis for constant variance is invalid.

The test statistic for White's test is calculated using the coefficient of determination of observations in the regression model.

The test statistic is \( nR^2 \). The \( nR^2 \) distribution is a quadratic distribution with degrees of freedom equal to the number of independent variables of the auxiliary regression model. \( a \) is compared with the value of \( nR^2 \) in the table with the margin of error. If \( nR^2 \) is greater than the table value, the \( H_0 \) hypothesis is rejected, if it is smaller, the \( H_0 \) hypothesis cannot be rejected [13,14].
The results of White's test are shown in table 6. Here, \( nR^2 \) = Observation coefficient of determination, number of observations \( n=59 \), \( R^2 \) = observation coefficient of determination of observations was 23.73635. Since the value of the corresponding probabilities is greater than 0.7501 > 0.05, the null hypothesis about the homoscedasticity of the residuals in our model is accepted, or rather, it can be considered sufficiently qualitative since the heteroskedasticity of random deviations is not detected.

Currently, the availability of tests for instability is high. We can define their asymptotic power functions, and thus it is possible to determine which scores they are based on [2,6].

Instability can be determined using the Cusum or Sum of Squares test of instability. For this, first of all, a regression model should be established. In the presence of instability, the sum of squares of the residuals of the model increases. At this time, instability tests are applied. The history of instability in the Cusum test is known internally. We don't need to import from outside. The results of the Sum and Sum of Squares tests were obtained by means of the EViews application program and their graphs are depicted in Figure 2 and Figure 3 as follows. The boundaries shown in red lines in the graph, and the blue line is the description of our model. If the graph of the model goes beyond the red borders, the presence of instability is determined at those dates. If it is within the red limits, then there is no instability. We can say that there is instability because the graph of our model is not inside the red boundaries, but goes beyond the boundaries.

Looking at the Sum of Squares test, we can observe that our model is within the red limits and that there is no instability as it does not go beyond the limits. This is clearly illustrated in figure 3. The difference between the Sum of Squares test is that it is more sensitive than the Sum of Squares test and is based on the calculation of sequential residuals. The Cusum of Squares test is based on the same conditions as the Cusum test. As a result, unlike the Cusum test, there is no instability here.

In its broadest sense, correlation is a measure of association between variables. In correlated data, a change...
in the magnitude of 1 variable is associated with a change in the magnitude of the other variable in the same (positive correlation) or opposite (negative correlation) direction. Often the term correlation is used in the context of a linear relationship between 2 continuous variables and is expressed as the Pearson product-moment correlation.

Pearson's correlation coefficient is commonly used for jointly normally distributed data (data that follow a bivariate normal distribution). For non-normally distributed continuous data, ordinal data, or data with relevant outliers, Spearman's rank correlation can be used as a measure of
monotonic association. Both correlation coefficients are scaled so that they range from -1 to +1, where 0 indicates no linear or monotonic association and the relationship becomes stronger, eventually approaching a straight line (Pearson's correlation) or an ever-increasing or decreasing curve. When the correlation coefficient has a positive value close to one, it indicates that there is a close linear relationship between the variables. A negative value of the correlation coefficient close to one indicates the existence of a close linear relationship between the variables.

Based on the indicators of the correlation matrix, the assessment of the density of the relationship between the factors is determined by the Chaddock scale, according to which, when the value of the correlation coefficient is greater than 0.7, the relationship between the indicators is tight and strong, if it is between 0.7 and 0.3, then the relationship between the indicators is average and normal, 0.3 and when it gets a value smaller than, it is determined that the relationship between the indicators is weak and not tight [9].

The results of the correlation analysis using the EViews application software package are described in table 4. According to Table 4, the balance of payments transactions, which are the main variables, are clearly described between the explanatory variables of imports, exports, investment in fixed capital, the price of oil in the world market, foreign exchange reserves, and budget revenues. According to Table 4, between the main variable, the balance of payments, and the explanatory variable, the export, between the main variable, the balance of payments, and the explanatory variable, the price of oil on the world market, between the explanatory variables, budget revenues and investment in fixed capital, and the explanatory variables, budget revenues and foreign we can say that there is a strong close relationship between foreign exchange reserves, exports, which are explanatory variables, and the price of oil in the world market. At the same time, we can see that there is an inverse (negative) density relationship between the main variable, the balance of payments, and the explanatory variable, the import, and between the explanatory variable, the import, and the explanatory variable, the price of oil in the world market.
The issues of forming a multidimensional regression model, which allows conducting an economic and statistical analysis of the dynamics of the current account of the balance of payments, were considered. In the modeling process, 6 embedded models such as investment in fixed assets, exports, imports, budget revenues, foreign currency reserves, and the price of oil in the world market were built for 2007-2021.

The dynamic description of the time series and the graphic of the descriptive statistics are described, and the results of the multivariate linear regression analysis on the variables are reflected. A formal description of the multivariate regression model was given, the form and directions of the functional relationship between the dependent and independent variables were determined, and the results of the multivariate regression analysis were analyzed using econometric methods; measured and interpreted the quantitative features of explanatory factors influencing the balance of payments.

2. The variable dispersion problem was investigated and Breusch-Pagan-Godfrey, Glejser, and White tests were used to clarify it. Based on the results of the regression model, CUSUM and CUSUM OF SQUARES tests were used to determine whether there is instability. In the model, the null hypothesis of homoscedasticity of the residuals is satisfied, and it was determined that heteroscedasticity of random deviations is not detected. According to the result of the

Table 4

<table>
<thead>
<tr>
<th></th>
<th>BALANCE_OF_PAYMENTS</th>
<th>BUDGET_REVENUES</th>
<th>CAPITAL_INVESTMENT</th>
<th>EXPORT</th>
<th>FOREIGN_EXCH_RESERVES</th>
<th>IMPORT</th>
<th>OIL_PRICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>BALANCE_OF_PAYMENTS</td>
<td>1.000000</td>
<td>0.140725</td>
<td>0.226122</td>
<td>0.930328</td>
<td>0.242006</td>
<td>0.255678</td>
<td>0.922439</td>
</tr>
<tr>
<td>BUDGET_REVENUES</td>
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<td>1.000000</td>
<td>0.613200</td>
<td>0.384090</td>
<td>0.606747</td>
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<td>CAPITAL_INVESTMENT</td>
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Results.

1. The issues of forming a multidimensional regression model, which allows conducting an economic and statistical analysis of the dynamics of the current account of the balance of payments, were considered. In the modeling process, 6 embedded models such as investment in fixed assets, exports, imports, budget revenues, foreign currency reserves, and the price of oil in the world market were built for 2007-2021. The dynamic description of the time series and the graphic of the descriptive statistics are described, and the results of the multivariate linear regression analysis on the variables are reflected. A formal description of the multivariate regression model was given, the form and directions of the functional relationship between the dependent and independent variables were determined, and the results of the multivariate regression analysis were analyzed using econometric methods; measured and interpreted the quantitative features of explanatory factors influencing the balance of payments;

2. The variable dispersion problem was investigated and Breusch-Pagan-Godfrey, Glejser, and White tests were used to clarify it. Based on the results of the regression model, CUSUM and CUSUM OF SQUARES tests were used to determine whether there is instability. In the model, the null hypothesis of homoscedasticity of the residuals is satisfied, and it was determined that heteroscedasticity of random deviations is not detected. According to the result of the
CUSUM test, instability was determined, but according to the results of the CUSUM OF SQUARES test, it was found that there was no instability.

3. Correlation matrix was analyzed for dependencies between dependent and independent variables in the model.

References:
[12] Айюбова Н.С., Исазаде А.Э. Вопросы моделирования и анализа взаимосвязей валютного курса маната и детерминантов национальной
FINANCE AND CREDIT
