Customs Payments Received to The State Budget and Econometric Analysis of Factors Affecting It

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Abstract. **This scientific article describes an econometric analysis of customs duties collected into the state budget by customs authorities and the factors influencing it. Based on the research results, scientific proposals and practical recommendations are given.**

***Keywords*:** Customs payments, benefits and preferences, import volume, trend model, econometric models, outcome factor, variable factors.

1. INTODUCTION

The use of customs payments plays an important role in ensuring the stable economic development of New Uzbekistan and regulating its foreign economic activities. Customs payments perform the necessary regulation of foreign trade turnover, economic security, and fiscal tasks in the regulation of foreign economic activity.

According to the 46th objective of the President's Decree "On the Strategy of Uzbekistan: 2030," dated September 11, 2023, "Ensuring the well-being of the population through sustainable economic growth," entitled "Ensuring fiscal stability and effective management of state obligations," the "consolidated budget deficit of 4 percent of GDP in 2024 and in the coming years "to ensure that it is less than 3 percent" [1].

The fact that customs payments currently make up 21 percent of the revenue of the state budget and that this indicator has been growing continuously for the past 5 years is an indication of the increasing importance of this direction [2].

Based on the above, the econometric analysis of the customs payments charged to the state budget and the factors influencing their collection is considered important.

2. LITERATURE REVIEW

It should be noted that B.Yu. Khodiev, T.Sh. Shodiev, and B.B. Berkinov, among the scientists of our country, conducted research on econometric modeling of economic development [3–4] and Yu. Mukhamedov's factors and econometric models of sustainable socio-economic growth [5].

I.A. According to Maybrova, there is a positive relationship between taxes, the state, society and the national economy. At this point, the scientist emphasizes that a positive relationship can be achieved only when the tax burden of the state is reduced to the minimum level [6].

Economist J.M. Keynes believes that taxes, in addition to their fiscal function, have the functions of economic regulation, stimulation, and income management. These functions of the tax arise from the need to use it as a means of regulating the economy and ensuring sustainable economic growth [7].

3. RESEARCH METHODOLOGY

This scientific article describes an econometric analysis of customs duties collected into the state budget by customs authorities and the factors influencing it. Research methods such as grouping, correlational analysis, econometric analysis, and comparison are widely used in it.

4. ANALYSIS AND RESULTS

In this article, we have studied the issues of econometric modeling of customs payments charged to the state budget and factors influencing it. During this study, a multifactor econometric model is constructed. The resulting factor participating in the multifactor econometric model is the customs payments charged to the state budget, bln. soum (Y). The factors affecting this indicator are the volume of imports, in mln. US dollars (X1), concessions on customs payments, in bln. soums (X2), the number of TIF participants who imported, in units (X3), the average arithmetic rate of import customs duty, in percent (X4), and the rate of value-added tax, in percent (X5). Since the measurement units

of the factors participating in the multifactor econometric model are different, we bring their values to a single measurement unit by logarithming.

First, we conduct descriptive statistics on the endogenous and exogenous factors involved in the multifactor econometric model. The following Table 1 presents the results of the descriptive statistics of the factors included in the multifactor econometric model.

Table 1: Descriptive statistics results for factors

	LNY	LNX1	LNX2	LNX3	LNX4	LNX5
Mean	9.030676	9.596486	10.02481	9.572921	11.08385	18.75000
Median	8.690343	9.462201	9.736867	9.401209	14.84000	20.00000
Maximum	10.73693	10.24574	10.99516	10.25083	14.84000	20.00000
Minimum	7.642284	9.069400	8.866567	9.086816	4.060000	15.00000
Std. Dev.	0.974687	0.357687	0.704690	0.429035	4.353645	2.165064
Skewness	0.376232	0.470468	-0.003500	0.372460	-0.340522	-1.201850
Kurtosis	2.009204	1.995584	1.688833	1.467890	1.368025	2.527778
Jarque-Bera	7.838434	2.026032	1.931238	1.572061	1.893881	3.250418
Probability	0.007562	0.008687	0.027746	0.055650	0.028725	0.006871
Sum	117.3988	124.7543	130.3225	124.4480	144.0900	243.7500
SumSq. Dev.	11.40019	1.535283	5.959062	2.208851	227.4507	56.25000
Observations	13	13	13	13	13	13

The average value (mean), median (median), and maximum and minimum values (maximum and minimum) of each factor can be seen from the table data. In addition, the values of the standard deviation of each factor (std. deviation) (the coefficient of standard deviation shows how much each variable deviates from the average value) are presented.

When choosing the factors included in the multi-factor econometric model for the customs sector of the Republic of Uzbekistan, it is important to determine the density of connections between the factors. For this, we will conduct a correlational analysis between the resulting and influencing factors. In this process, individual and pair correlation coefficients are calculated between factors. The matrix of individual and pairwise correlation coefficients between the factors is presented in Table 2 below.

Table 2: Correlation matrix calculated between factors

Correlation
t-Statistic

Probability	**LNY**	**LNX1**	**LNX2**	**LNX3**	**LNX4**	**LNX5**
LNY	1.000000					
LNX1	0.958957	1.000000				
	11.21665	-----				
	0.0000	-----				
LNX2	0.814231	0.604605	1.000000			
	7.483242	1.038682	-----			
	0.0000	0.0654	-----			

LNX3	0.823476	0.535754	0.654177	1.000000		
	7.983235	0.800576	1.57558	-----		
	0.0000	0.1128	0.05211	-----		
LNX4	-0.740707	-0.621149	-0.699822	-0.563942	1.000000	
	-3.656659	-1.452438	-1.840845	-1.689883	-----	
	0.0038	0.0548	0.09121	0.0991	-----	
LNX5	-0.859089	-0.602810	-0.621548	-0.637285	0.467019	1.000000
	-5.566876	-1.201814	-1.631485	-1.609542	1.751690	-----
	0.0002	0.05841	0.0833	0.1024	0.1076	-----

It can be seen from Table 2, where the correlation coefficients calculated between the factors are located, that the private correlation coefficients indicate the density of connections between the resulting factor (lnY) and the factors affecting it (lnXi). Therefore, private correlation coefficients show that there is a close connection between the resulting factor (customs payments charged to the state budget, lnY) and influencing factors, that is, the value of private correlation coefficients is greater than 0.7. For example, the private correlation coefficient calculated between the customs payments charged to the state budget (lnY) and the volume of imports (lnX1) is equal to 0.9589. This shows that there is a strong connection between these factors.

In Table 2 above, there are also pairwise correlation coefficients, which show the correlation densities between the influencing factors (lnXi, lnXj). The most important thing here is that the influencing factors should not be closely related to each other. That is, there should be no multicollinearity between influencing factors. Multicollinearity is said to exist if the value of the pairwise correlation coefficient between two influencing factors is greater than 0.7. From the data of Table 2, it can be seen that the connection densities between the influencing factors are not greater than 0.7. Judging by the pairwise correlation coefficients in the correlation matrix, there is no multicollinearity between the influencing factors.

In addition, in Table 2, coefficients for determining the reliability and probability of correlation coefficients were calculated (values in the rows below the calculated correlation coefficients). At the bottom of each correlation coefficient is its t-Student's calculated value and probability. It is assumed that the calculated probability between the factors is not greater than 0.05. For example, the coefficient of private correlation between customs duties charged to the state budget (lnY) and the volume of imports (lnX1) is equal to , and This indicates that there is a strong relationship between these two factors, the private correlation coefficient is reliable, and there is a positive relationship between the two factors at 95 percent certainty.

Thus, the correlation coefficients between the factors included in the multifactor econometric model meet the requirements for the calculated value and probability of Student's t-criterion.

After determining the factors, we create a linear multifactor econometric model. In general, a linear multifactor econometric model has the following form: $\ln y = \ln a_0 + a_1 \ln x_1 + a_2 \ln x_2 + ... + a_n \ln x_n + \varepsilon$,

(1)

where y is the resulting factor, influencing factors, random error.

We use the "method of least squares" to determine the unknown parameters of the multifactor econometric model (1).

To determine the parameters of the multifactor econometric model, we use the econometric modeling program - Eviews. The results of the multifactor econometric model calculated on the basis of the customs payments charged to the state budget (lnY) are presented in Table 3 below.

Table 3: Estimated parameters of the multifactor econometric model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNX1	0,066256	0,020140	3,2897716	0,0008***

LNX2	1,331326	0,330478	4,028486	0,0050***
LNX3	0,522014	0,257204	-2,0295719	0,0676**
LNX4	-0,038943	0,017456	2,2309235	0,0596**
LNX5	-0,221254	0,046047	-4,8049601	0,0020***
C	3,762627	4,444052	0,8466658	0,4252
R-squared	0.984473	Mean dependent var		9.030676
Adjusted R-squared	0.973383	S.D. dependent var		0.974687
S.E. of regression	0.159019	Akaike info criterion		-0.535549
Sum squared resid	0.177009	Schwarz criterion		-0.274803
Log likelihood	9.481067	Hannan-Quinn criter.		-0.589144
F-statistic	88.76628	Durbin-Watson stat		2.084946
Prob(F-statistic)	0.000004			

Note: *** - 0.05 percent accuracy, ** - 0.10 percent accuracy

Using the data of the 3rd table above, we present the analytical form of the multi-factor econometric model on the customs payments charged to the state budget in the republic and the factors affecting it:

$$\ln \hat{Y} = 3{,}763 + 0{,}066 \ln X_1 + 1{,}331 \ln X_2 + 0{,}522 \ln X_3 - 0{,}039 \ln X_4 - 0{,}221 \ln X_5, \qquad (2)$$

The multifactor econometric model (2) calculated on the basis of the data on customs duties charged to the state budget shows that if the import volume (lnX1) in our republic increases by an average of one percent, the customs duties charged to the state budget (lnY) increases by an average of 0.066 percent. In our republic, the concessions on customs payments (lnX2) increased by an average of one percent, while the customs payments charged to the state budget (lnY) increased by an average of 1.331 percent. The number of TIF participants importing in our republic (lnX3) increases by an average of one percent, while the customs payments charged to the state budget (lnY) increase by an average of 0.522 percent. Also, if the average arithmetic rate of import customs duty (lnX4) increases by one percent on average, the customs payments charged to the state budget (lnY) decrease by 0.039 percent on average. Finally, if the value-added tax rate (lnX5) in the republic increases by one percent on average, the customs payments charged to the state budget (lnY) decrease by 0.221 percent on average.

We consider the value of the coefficient of determination calculated to check the quality of the multifactor econometric model (2) calculated on customs payments charged to the state budget. The calculated coefficient of determination shows how much the resulting factor (lnY) consists of the factors included in the model. In our case, the calculated coefficient of determination (R2 - R-squared) is equal to 0.9845. This shows that 98.45 percent (2) of the customs payments charged to the state budget are made up of the factors included in the multifactor econometric model. The remaining 1.55 percent (1.0-0.9845) is the influence of unaccounted factors.

The fact that the standard errors of the factors in the multifactor econometric model (2) also took small values indicates that the statistical significance of the calculated model is high.

In order to be able to compare models with different number of factors and this number of factors does not affect the R2 statistic, a smoothed coefficient of determination is usually used, i.e.:

$$R^2_{\text{adj.}} = 1 - \frac{s^2}{s_y^2} \qquad (3)$$

Adjusted coefficient of determination (Adjusted R-squared) equal to 0.9734 and its proximity to R2 means that the model can accept values around the change in the number of influencing factors.

Fisher's F-criterion is used to check the statistical significance of the calculated multifactor econometric model (2) or its adequacy (suitability) to the studied process. Fisher's calcd

The value of the F-criterion is compared with its value in the table. If Fhisob>Fzhadval, then the multifactor econometric model (2) is said to be statistically significant, and it can be used to forecast the resulting indicator -

customs duties charged to the state budget (lnY) for future periods.

Hence, (2) to test the statistical significance of the model

We find the tabular value of the F-criterion. For this, we calculate the values of the degrees of freedom and the level of significance. Given the level of significance and the degrees of freedom and , the table value of the F-criterion is equal to . The calculated value of the F-criterion is Fhisob=88,766 and the table value is equal to Fjadval=3.97, and since the condition of Fhisob>Fzadval is fulfilled, the multifactor econometric model (2) can be called statistically significant and it can be used in forecasting the customs payments charged to the state budget (lnY) for future periods possible.

When checking the reliability of the calculated parameters (regression coefficients) of the multifactor econometric model (2) Student's

t-test is used. By comparing the calculated (calculation) and table (table) values of Student's t-test, we accept or reject the N0 hypothesis. To do this, we find the tabular value of the t-criterion based on the conditions of the selected reliability probability ( ) and degree of freedom ( ). Here - the number of observations, - the number of factors.

The table value of t-criterion is equal to confidence probability and degree of freedom.

Prob of Table 2.10 above. Looking at the probability column, the probability of the factor parameters lnX1, lnX2, and lnX5 is less than 0.05 percent, which means that they are reliable at 5.0 percent accuracy. The probability of factor parameters lnX3 and lnX4 is greater than 0.05 percent, so they are reliable with 10.0 percent accuracy (Table 2.10). This allows these factors to participate in the multifactor econometric model.

Therefore, in the multifactor econometric model (2), all influencing factors (lnXi) are left in the model and used in forecasting.

We use the Darbin-Watson (DW) test to check the autocorrelation in the residuals of the resulting factor according to the multifactor econometric model (2).

The calculated DW value is compared with the DWL and DWU in the table. If DWcount<DWL, the residuals are said to have autocorrelation. If DWcount is greater than DWU, the residuals are said to have no autocorrelation. The lower limit value of the Darbin-Watson criterion is DWL=0.69 and the upper limit value is DWU=1.97. DW = 2.0849. Therefore, since DWHisob>DWU, there is no autocorrelation in the residuals of the resulting factor (customs payments charged to the state budget (lnY)).

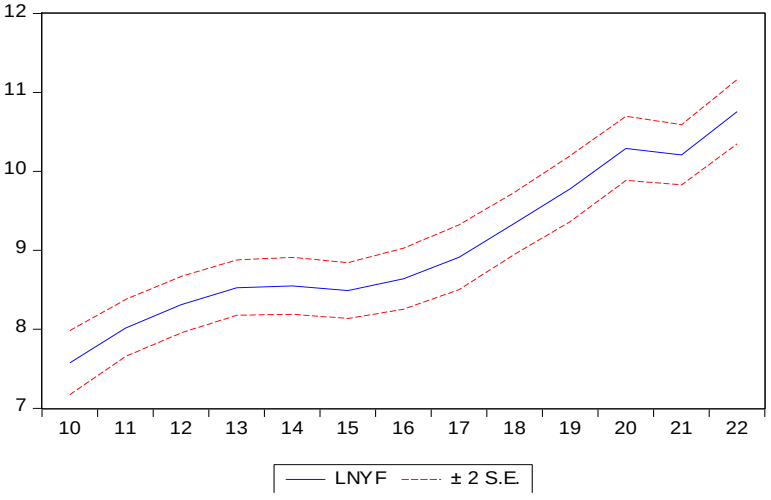
The absence of autocorrelation in residuals of the resulting factor also indicates that the multifactor econometric model given above (2) can be used in forecasting.

The coefficient of MARE (Mean absolute percent error) is calculated from the calculated (2) multifactor econometric model in forecasting the result indicator for future periods, and it is found using the following formula:

$$MAPE = \frac{1}{n}\sum_{i=1}^{n}\frac{|y_i - \hat{y}_i|}{y_i}\cdot 100\%, \qquad (4)$$

where - the actual values of the resulting factor, - the calculated values of the resulting factor.

If the calculated MARE coefficient value is less than 15.0 percent, the model can be used to predict the resulting factor, otherwise it cannot be used. The value of the MARE coefficient for customs payments charged to the state budget is 1.0322 percent (Figure 2.8).



Forecast: LNYF	
Actual: LNY	
Forecast sample: 2010 2022	
Included observations: 13	
Root Mean Squared Error	0.116688
Mean Absolute Error	0.092022
Mean Abs. Percent Error	1.032242
Theil Inequality Coefficient	0.006426
Bias Proportion	0.000000
Variance Proportion	0.003912
Covariance Proportion	0.996088

Figure 1. Indicators of using the estimated multifactor econometric model in forecasting

This is less than 15.0 percent (MAPE=1.0322). Therefore, (2) the multifactor econometric model can be used in the forecasting of customs duties charged to the state budget.

Thus, the multi-factor econometric model (2) compiled on the customs payments charged to the state budget and the factors affecting it was checked using a number of criteria and it was found that it can be used in forecasting the factors in future periods. That's why (2) we make forecast calculations of customs payments charged to the state budget for future periods using a multifactor econometric model.

The analysis of the trend models created between the influencing factors and the time factor shows that the statistical significance of all calculated coefficients in the trend models (6) - (10) and the reliability of their parameters were determined.

5. CONCLUSION AND RECOMMENDATIONS

As a result of the above research, it was found that a number of factors have an impact on the collection of customs payments.

The multifactor econometric model developed as a result of our research shows that:

- if the import volume (lnX1) in our republic increases by an average of one percent, the customs payments charged to the state budget (lnY) by an average of 0.066 percent;

benefits granted on customs payments (lnX2) increased by an average of one percent, and customs payments charged to the state budget (lnY) increased by an average of 1.331 percent;

It was determined that if the number of imported TIF participants (lnX3) increases by an average of one percent, the customs payments charged to the state budget (lnY) increase by an average of 0.522 percent.

In conclusion, the effective use of factors affecting customs payments contributes to ensuring the economic security and fiscal stability of our country.

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