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## **WAYS TO IMPROVE FORECASTING OF PROPERTY TAX COLLECTED FROM INDIVIDUALS**

**Аннотация.** *Мазкур мақолада маҳаллий бюджетлар даромадлар базасининг манбаи бўлган жисмоний шахслардан олинадиган мол-мулк солиқ турлари бўйича солиқ тушумларини прогнозлаштириши борасидаги муаммолар ва ушбу жараёни янада такомиллаштириши бўйича методологик ёндошув акс эттирилган.*

**Калит сўзлар:** *Солиқлар, солиқ тўловчилар, кўчмас мулк солиғи, метод, моделлар, ялпи ички маҳсулот, солиқларни прогноз қилиши, кадастр қиймати, солиқ ставкаси.*

**Аннотация.** *В данной статье отражены проблемы прогнозирования налоговых поступлений по видам имущественных налогов с физических лиц, являющихся источником доходной базы местных бюджетов, и методический подход к дальнейшему совершенствованию этого процесса.*

**Ключевые слова:** *Налоги, налогоплательщики, налог на недвижимость, метод, модели, валовой внутренний продукт, налоговое прогнозирование, кадастровая стоимость, налоговая ставка.*

**Annotation.** *This article reflects the problems of forecasting tax revenue on types of property taxes from individuals, which are the source of the revenue base of local budgets, and a methodological approach to further improvement of this process.*

**Keywords:** *Taxes, taxpayers, real estate tax, method, models, gross domestic product, tax forecasting, cadastral value, tax rate.*

### **INTRODUCTION**

Proper identification of state budget revenues, which are the main source of social services in the fiscal policy of the state, and ensuring consistency in

expenditure policy in accordance with it, remains relevant as a key function of all countries in the world. The persistence of instability in the world market, the growth of total external and internal debt worldwide is having an impact on the state budget. "At the beginning of 2020, the damage to the world economy caused by the coronavirus pandemic will lead to a reduction in tax revenues to the state budget, and ultimately to 3.3 trillion. The budget deficit is projected at US \$ 1 billion"<sup>1</sup>.

Currently, the personal income tax forecast is carried out using indicative methods based on macroeconomic indicators. At the same time, the basis for forecasting tax revenues to the budget is macro prudential indicators that affect the tax base, and this methodology is effective in stable economic conditions. Accordingly, in the context of medium - term fiscal policy and the introduction of a representative tax system, the use of combined methods of medium-term forecasting of taxes to the state budget, simulation, deterministic, adaptive modeling methods based on the trend of dynamic growth in the short-and medium-term forecasting of tax revenues is one of the important areas of scientific research.

The transition to medium-term planning of the state budget in Uzbekistan also requires new approaches to forecasting state budget revenues. This situation requires a new level of research in the development of forecast indicators of tax revenues from individuals in the medium term.

The factors that affect the budget revenues from the property tax of individuals are the gross domestic product, the number of individuals paying property tax, the amount of debt owed by individuals on property tax, the amount of property tax benefits for individuals, the average tax regression and correlation analysis the influence of the rate and the level of inflation is carried out and the budget revenues from the property tax are predicted.

When constructing a multivariate econometric regression and correlation model, property tax receipts (prt) from randomly changing individuals and gross domestic product (GDP), the number of property tax payers from individuals ( nptr), the amount of property tax arrears (lprt), the amount of property tax benefits for individuals (pptr), the average tax rate (ar) and the rate of inflation (ir), and research hypotheses are identified:

H1-GDP depends on the growth of personal property tax receipts and has a large impact;

H2-the number of individual property tax payers depends on the growth of personal property tax receipts and has a large impact;

H3 - the amount of personal property tax arrears depends on the growth of personal property tax receipts and has a high degree of influence;

H4-the amount of personal property tax relief depends on the amount of property tax levied on individuals and has a high level of impact;

H5 is associated with changes in the average tax rate and has a strong impact on personal income from property tax;

H6-the change in the inflation rate is associated with an increase in personal income tax receipts and has a high level of impact.

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<sup>1</sup> <https://www.imf.org/ru/Publications/FM/Issues/2020/04/06/fiscal-monitor-april-2020>

Based on this hypothesis, the following mathematical functions were formed:

$$I_{prt} = \alpha + \beta_1 G_{gdp} + \beta_2 N_{nptr} + \beta_3 L_{lppt} + \beta_4 P_{pptr} + \beta_5 A_{ar} + \beta_5 I_{ir} + \varepsilon_i$$

Here:

$I_{prt}$ - revenues from property tax from individuals;

$G_{GDP}$ - Gross Domestic Product;

$N_{nptr}$ - number of taxpayers of the property tax from individuals;

$L_{lppt}$ - the amount of property tax arrears from individuals;

$P_{pptr}$ - the amount of incentives on property tax from individuals;

$A_{ar}$ - average tax rate;

$I_{ir}$ - the level of inflation.

The problem of multicollinearity must be solved before constructing a multivariate regression and correlation economic model. With this in mind, to solve the multicollinearity problem, we constructed a correlation matrix of the selected variables, which is reflected in the following table (Table 1).

**Table 1**

**Correlation matrix between variables that affect the property tax levied on individuals<sup>2</sup>**

Indicators	<i>lnprt</i>	<i>lngdp</i>	<i>lnnptr</i>	<i>lnlppt</i>	<i>lnpptr</i>	<i>lnar</i>	<i>lnir</i>
<i>lnprt</i>	1.000000						
<i>lngdp</i>	0.981790	1.000000					
<i>t-statistics</i>	14.61757						
<i>probability</i>	0.0000						
<i>lnnptr</i>	0.964471	<b>0.984072</b>	1.000000				
<i>t-statistics</i>	10.32575	15.65723					
<i>probability</i>	0.0000	0.0000					
<i>lnlppt</i>	0.779394	<b>0.875691</b>	0.894069	1.000000			
<i>t-statistics</i>	3.518499	5.129363	5.645558				
<i>probability</i>	0.0079	0.0009	0.0005				
<i>lnpptr</i>	0.953010	0.934236	0.894305	0.714223	1.000000		
<i>t-statistics</i>	8.897855	7.408903	5.653000	2.886236			
<i>probability</i>	0.0000	0.0001	0.0005	0.0203			
<i>lnar</i>	-0.176656	-0.347270	-0.361295	-0.713556	-0.068295	1.000000	
<i>t-statistics</i>	-0.507644	-1.047413	-1.095926	-2.880736	-0.193621		
<i>probability</i>	0.6254	0.3255	0.3050	0.0205	0.8513		
<i>lnir</i>	0.620057	0.688556	<b>0.647700</b>	0.650883	0.478237	-0.575071	1.000000
<i>t-statistics</i>	2.235385	2.685573	2.404492	2.424961	1.540208	-1.988194	
<i>probability</i>	0.0558	0.0277	0.0429	0.0415	0.1621	0.0820	

<sup>2</sup> Author's development using Eviews-9.0 program based on the data of the Tax Committee of the Republic of Uzbekistan

As can be seen from the analysis of the data in Table 1, we formulate a multivariate regression model by subtracting free variables that are not affected by property tax income (LNPRТ) from individuals that are considered arbitrary variables to prevent close correlation of variables from reducing the influence of other variables (2-Table).

**Table 2**

**Results of multivariate regression and correlation analysis based on the Eviews program<sup>3</sup>**

Dependent Variable: *lnprt*

Independent variables	Coefficient	Standard error	t-statistics	Probability (P-value)
<i>lngdp</i>	1.352765	0.102292	13.22461	0.0000
<i>lnar</i>	0.230198	0.031507	7.306310	0.0003
<i>lnpptr</i>	-0.292573	0.116420	-2.513077	0.0457
<i>C</i>	0.344367	0.298592	1.153303	0.2927
Determination coefficient	0.997371	The average value of the dependent variables		12.64503
Calculated determination coefficient	0.996056	Standard deviation of dependent variables		0.717854
Standard error of regression	0.045081	Akayke's criterion		-3.071532
The square sum of the remains	0.012194	Schwartz criterion		-2.950498
The value of the maximum similarity function	19.35766	Hannan-Quinn criterion		-3.204306
F-statistics	758.6835	Darbin-Watson statistics		2.754424
Probability (F-statistics)	0.000000			

Based on the above calculations, the following multivariate regression model was formed.

$$\widehat{lnprt} = 0.344367 + 1.352765 \ln gdp + 0.230198 \ln ar - 0.292573 \ln pptr + \varepsilon$$

The coefficient of determination formed in the generated model shows that the factors formed in the 99% model of property tax income (prt) from individuals are gross domestic product (GDP), the amount of exemption from personal property tax (pptr) and the average tax rate (ar). The remaining 1 percent is calculated due to other factors not taken into account. Factors affecting property tax revenue (prt) from individuals include gross domestic product (GDP), the amount of property tax relief for individuals (pptr), and the average tax rate (ar) of 5%. The probability of the P-value of the gross domestic product (GDP) of the regression model, the amount of the personal property tax exemption (pptr), and the average tax rate (ar) is less than 0.05, and these coefficients are property tax receipts from individuals (prt). The probability that the P-value of the Fisher F-statistic of the constructed regression model is less than 0.05 is a sudden change in gross domestic product (GDP), the amount of the personal property tax exemption (pptr), and the average tax. the rate

<sup>3</sup> Author's development using Eviews-9.0 program based on the data of the Tax Committee of the Republic of Uzbekistan

(ar). shows that it affects the property tax income (prt) levied on individuals, which is considered a related variable. We perform a diagnostic analysis to determine the forecast of the constructed model. First of all, we check for the presence of the problem of autocorrelation of residuals in the constructed model. Residual autocorrelation is determined using the Breusch-Godfrey test (Table 3).

**Table 3**

**Breusch-Godfrey autocorrelation test result<sup>4</sup>**

F-statistics	1.201302	Probability F(2,4)	0.3903
Tracking * R-square	3.752542	Probability. Chi-square(2)	0.1532

There is no autocorrelation between the residues based on the Breush-Godfrey test result. Because the Chi-square probability level is greater than 0.10, the zero hypothesis indicates that the autocorrelation of the residuals assumes the non-existent hypothesis. After the Breush-Godfrey autocorrelation test, we perform a heteroskedastic test of the remains. The heteroskedastic test is determined using the Breush-Pagan-Godfrey test (Table 4).

**Table 4**

**Breush-Pagan-Godfrey heteroskedastic test result<sup>5</sup>**

F-statistics	0.644733	Probability F(1,7)	0.6140
Tracking * R-square	2.437800	Probability. Chi-square (1)	0.4866
Explanation of the sum of the total squares	0.457802	Probability. Chi-square (2)	0.9281

There is no heteroskedastic among the remains as a result of the Breush-Pagan-Godfrey heteroskedastic result. Because the Chi-square probability level is greater than 0.9281 i.e. 0.10, the zero hypothesis suggests that the heteroskedastic non-existent hypothesis of the residues is accepted. That is, the remnants of the structured model have a homoscedastic vibration. Diagnostic tests mean that if there is no autocorrelation in the residues in the constructed model, the homoscedastic oscillations in the residues allow the model to be predicted.

In summary, the increase in property tax revenues from individuals by 1% of GDP to increase by 1.35%, the increase in the amount of property tax benefits for individuals by 1%, the increase in property tax revenues from individuals by 0.29% and an increase in the average tax rate by 1 percent will lead to an increase in property tax revenues from individuals by 0.23 percent. Excluding other factors, an increase of 1% in GDP, the amount of property tax exemptions for individuals and the average tax rate by 1% will lead to an increase in property tax revenues from individuals by 1.29%. Through the above multifactorial regression, we forecast the growth of property tax revenues from individuals over the years depending on the gross domestic product, the amount of property tax exemptions for individuals and the average tax rate (Table 5).

**Table 5**

<sup>4</sup> Author's development using Eviews software.

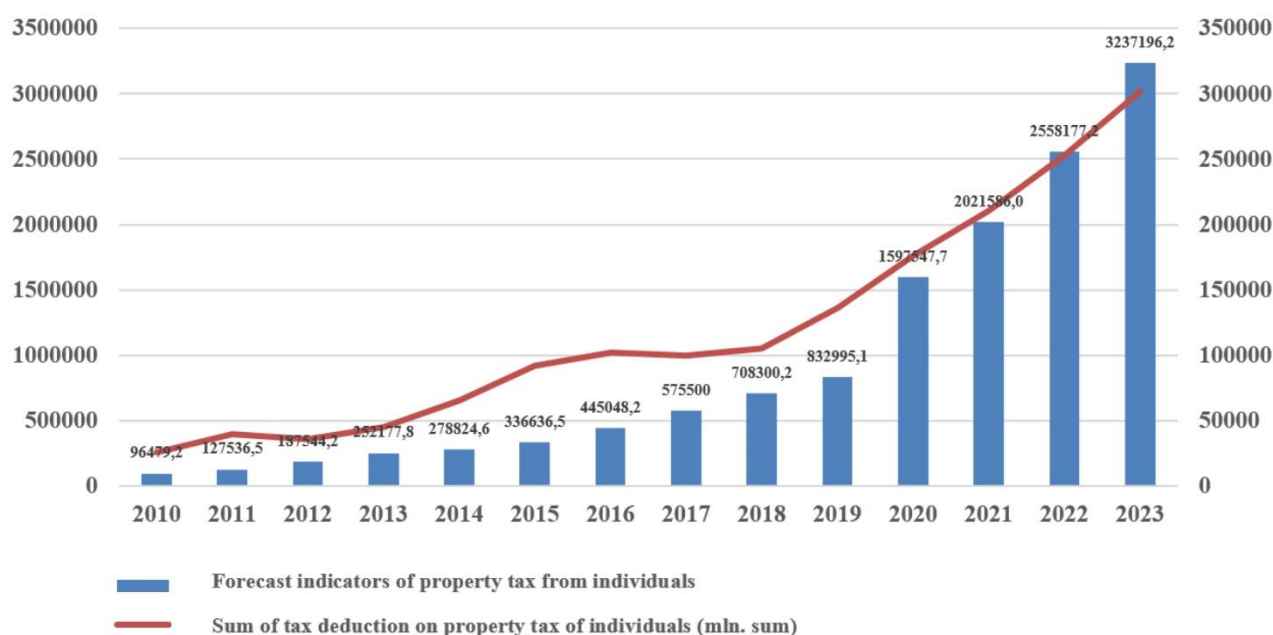
<sup>5</sup> Author's development using Eviews software.

## Forecast of personal property tax receipts (2020-2023)<sup>6</sup>

Years	Forecast indicators of property tax from individuals	GDP (in billion soums)	Sum of tax deduction on property tax of individuals (mln.soums)	Average Tax Rate (%)
2010	96479,2	62388,3	26200	0,5
2011	127536,5	78764,2	39500	0,9
2012	187544,2	97929,3	36100	1,1
2013	252177,8	120861,5	45000	1,28
2014	278824,6	145846,4	65236,8	1,46
2015	336636,5	171808,3	92202,2	1,7
2016	445048,2	199325,1	102489,3	1,93
2017	575500	249136,4	99987,1	2,23
2018	708300,2	406648,5	105416,4	0,26
2019	832995,1	511838	136278,9	0,26
2020	1597547,7	562192,7	176186,8	0,67
2021	2021586,0	702499,5	210828,4	0,63
2022	2558177,2	877822,8	252281,3	0,60
2023	3237196,2	1096901,6	301884,6	0,56

1-picture

### Forecast figures on property tax from individuals<sup>7</sup>



The general characteristics inherent in the tax forecasting process show how variable this process is. Certain changes in the tax policy of the state, for example, an increase or decrease in tax rates, an increase in tax benefits, provided that forecasting indicators are obtained with maximum accuracy, if the analytical stage and the methodologically correct approach are formed by forming the necessary databases. for forecasting over a certain period of time. or reduce, simplify or complicate the registration of a business, issue, revoke or revoke permits and licenses, or increase or cancel activities that require a license, etc., which leads to an

<sup>6</sup> Author's development.

<sup>7</sup> Author's development.



increase in the gap between the forecast indicators and future actual processes. This means that the process of forecasting tax revenues and its results should always be treated with "skepticism", given the likelihood of its change. If changes in the fiscal policy of the state are more related to tax elements, it is necessary to critically review the forecast indicators adopted in the process of rapid planning, otherwise changes in the implementation of forecast indicators for the republican and local budgets, where the tax is not taken into account when income increases, the financial risk (risk) is not taken into account, otherwise the financial risk of the budget increases and negatively affects the financing process, while in the pro-budget this leads to a slowdown in the activities of recipients of funds from the budget.

In this regard, the process of forecasting taxes from individuals should be considered as a complete system. Each of its details affects other elements and affects the overall effectiveness of the forecast. In this regard, when analyzing the version of the forecast adopted for forecasting and planning the revenues of the republican and local budgets, in our opinion, it is necessary to do the following. First, the factor that influences the increase in tax revenues is the tax rate. The tax rate affects the forecast through self-determination of the tax base. In this regard, it is necessary to analyze the risks of the impact of the tax rate through the tax base when conducting a risk analysis at each stage of the tax service (district, city, region, republic). In recent years, a lot of positive work has been done to improve the activities of the country's tax authorities to form new organizational structures and platforms related to the analysis and management of tax risks. Within the framework of the State Tax Committee, such departments as the "Department of Risk Analysis" and "Taxpayer Segmentation", the "Department of Strategic Development", and the "Department of Budget Revenue Forecasting" have been formed. The main tasks and functions of these departments are as follows: occurrence of taxpayers' obligations, segmentation of taxpayers into groups on the basis of internal and external data, development of medium and long-term development strategies of public tax authorities, analysis of macroeconomic environment, identification of opportunities to expand the tax base and risk assessment of state budget revenues, Regular analysis of the impact of tax reforms in the Republic of Uzbekistan on macroeconomic indicators and the development of proposals to eliminate the factors that negatively affect these indicators, the development of a single method for forecasting revenues to the state budget in the state tax service, control and analysis of the implementation of the forecast indicators, calculation of expected revenues to the budget and state trust funds and develop measures to increase revenues through a systematic analysis of the dynamics of macroeconomic indicators and the tax potential of the regions, identify additional sources to expand the tax base, identify honest taxpayers, keep records and tax them. The implementation of functional-organizational strategic tasks, such as comprehensive assistance in addressing current issues of taxation, the essence of these processes is the forecasting of tax revenues to the budgets of different levels and the analysis of potential risks associated with the forecasting process and achieving the goal set on the basis of management.

It can be seen that in modern highly competitive market relations, taxpayers who provide tax revenues to the state budget always operate in a competitive environment that risks not falling within the established forecast indicators of tax revenues, and the taxpayer always acts on risk - As long as there is a situation that is not protected from economic and man-made events, the tax risk will also be constant. This axiom requires that any objectively oriented process, including the process of forecasting taxes on individuals, be studied in the context of tax risk.

Development of a medium-term increase of state budget revenues based on the correlation-regression analysis of forecasted indicators of income from property tax for individuals, assessing the influence of factors affecting the forecast indicators for each type of tax, including medium-term planning of the state. Budget revenues Property tax revenues are an important methodological tool for maximizing forecast indicators.

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