



ECONOMETRIC MODELS OF SUSTAINABLE DEVELOPMENT OF TERRITORIES TO LIVING STANDARDS

Hayitova Nigora Ilxomovna

Tashkent Financial Institute Republic of Uzbekistan

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ABSTRACT

In this article, a descriptive analysis of the system of statistical indicators that characterize the sustainable development of the regions, econometric models of the transformation of the sustainable development of the regions into the standard of living of the population, statistical evaluation of the sustainable development of the Khorezm region's economy are studied.

Introduction. Much work is being done by international organizations to combat social inequality in countries. This is widely practiced in our country as well. In particular, one of the main tasks of the Ministry and its affiliated organizations is the reduction of poverty. development of support and mechanisms, implementation of measures to achieve the goals and objectives of socio-economic development of the regions and national sustainable development.

In this sense, international organizations are also fulfilling their responsibilities in this regard, i.e. the International Monetary Fund is also working with countries to support economic stability and sustainable growth as an organization of 190 countries supporting global economic cooperation.

Does the sustainable development of the country's regions reflect the living standards of the population or not? To answer this question, we studied the research conducted by international scientists in this regard, and they chose many indicators as factors influencing the reduction of the share (share) of the poor. These include factors such as agriculture, forestry (Motoe Miyamoto) ¹, poverty reduction through land transfers (Mihai Varga) ², changes in the number of workers (Sabina Alkire, Christian Oldiges, Usha

¹ <https://www.sciencedirect.com/science/article/pii/S0305750X1930395X> (ScienceDirect is Elsevier's well-known literature platform)

² <https://www.sciencedirect.com/science/article/abs/pii/S0305750X20301844> (ScienceDirect is Elsevier's well-known literature platform)



Kanagaratnam)³, GDP per capita (GRP), Gini coefficient, poverty rate (Guanghua Wan, Xiaoshan Hu, Weiqun Liu)⁴GDP per capita (GDP), economic growth, government spending, inflation, trade openness (Johan Rewilak)⁵etc.

Method. Based on the above, we use our econometric models to determine the level of poverty as a result and the factors influencing it: GDP growth rate per capita, population growth rate, the share of the population receiving old-age pensions, gross per capita income growth, employment rate, unemployment level, Gini coefficient, GDP deflator, and the share of small business and private entrepreneurship in GDP. We have identified the factors as follows:

$Y =$ Poverty rate in countries and regions - $LPP_{C(R)}$

$X_1 =$ GDP growth rate per capita - $PC_{GDP(GRP)}$

$X_2 =$ Population growth rate - $PGR_{C(R)}$

$X_3 =$ Percentage of population receiving old age pension - $PPRP_{C(R)}$

$X_4 =$ Growth rate of gross income per capita - $TIPC_{C(R)}$

$X_5 =$ Employment Rate - $ER_{C(R)}$

$X_6 =$ Unemployment Rate - $UR_{C(R)}$

$X_7 =$ Gini coefficients - $GC_{C(R)}$

$X_8 =$ GDP deflator - $DC_{C(R)}$

$X_9 =$ Share of small business and private entrepreneurship in GDP - $SBPE_{GDP(GRP)}$ [1]

These factors were selected from 21 periods on dynamic series and formed into observational tables. After that, when studying the authenticity and quality of the data, X_7 (Gini coefficient) was excluded from the model factors due to the fact that the interval data were not formed in the intervals and regions. The rest of the information was collected as a result of official websites of the State Statistics Committee and territorial departments of the Republic of Uzbekistan, as well as written appeals, and their reliability was assessed.

following mathematical expression has been created, which represents the functional relationships between the variables of the constructed econometric models

³ <https://www.sciencedirect.com/science/article/pii/S0305750X21000668> (ScienceDirect - Elsevier's well-known literature platform)

⁴ <https://www.sciencedirect.com/science/article/abs/pii/S1043951X21000614> (ScienceDirect is Elsevier's well-known literature platform)

⁵ <https://reader.elsevier.com/reader/sd/pii/S1879933717300891?token=6A6DA863A112F4DB2BEAA96CF796C8795D8855827AF51DDF186AA035DCCB6FB22873BFB29DF966EEA4095A67CF2322BF&originRegion=eu-west-1&originCreation=20210927114312>

(ScienceDirect - Elsevierning taniqli adabiyotlar platformasi)



$$Y_{X_{it}} = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \dots + \beta_n X_{nt} + \varepsilon_t \quad (1)$$

Based on the theoretical view of this multifactor econometric model, a mathematical expression was created for the correlation relationship between the selected factors.

$$Y_{X_{it}}(LPP_{C(R)}) = \beta_0 + \beta_1 X_{1t}(PC_{GDP(GRP)}) + \beta_2 X_{2t}(PGR_{C(R)}) + \beta_3 X_{3t}(PPRP_{C(R)}) + \beta_4 X_{4t}(TIPC_{C(R)}) + \beta_5 X_{5t}(ER_{C(R)}) + \beta_6 X_{6t}(UR_{C(R)}) + \beta_8 X_{8t}(D_{C(R)}) + \beta_9 X_{9t}(SBPE_{GDP(GRP)}) + \varepsilon_t \quad (2)$$

Statistical data of the variables were collected in tables and their reliability was

assessed. The analysis of statistical indicators of the Republic of the above-listed reliable factors can be considered in Table 1 below. The indicators in this table were developed based on the MINITAB statistical analysis program.

The data formed on the basis of descriptive statistics show that the data on each selected factor is usually distributed and will continue to do so. These, in turn, are sufficient to apply to econometric modeling. To continue the analysis, the excesses and asymmetries gained a decent unity.

Table 1

Descriptive statistics⁶

Indicators	LPP _C	PC _{GDP}	PG _{R_C}	P _{PRP_C}	TIPC _C	ER _C	UR _C	D _C	SBPE _{GDP}
Average	19.0	104.5	101.6	7.4	126.6	67.7	4.2	19.0	104.5
Median	17.7	104.7	101.5	7.4	124.8	67.7	5.0	17.7	104.7
Minimum	11.0	99.8	101.1	7.0	112.7	66.1	0.2	11.0	99.8
Maximum	28.9	107.9	104.0	8.2	155.8	69.4	10.5	28.9	107.9
Standard deviation	6.5	1.9	0.6	0.3	11.8	0.9	3.2	6.5	1.9
Variation	0.343	0.018	0.006	0.044	0.093	0.013	0.765	0.343	0.018
Asymmetry	0.169	-0,413	3,090	1,091	0.968	0.133	0.197	0.169	-0,413
Excess	-1,616	0.075	10,183	0.777	0.257	-0,112	-0,768	-1,616	0.075
5% Percent	11.0	100.0	101.1	7.0	112.8	66.1	0.2	11.0	100.0
9 5% Percent	28.8	107.9	103.8	8.2	155.2	69.4	10.4	28.8	107.9
Range	13.4	3.0	0.4	0.3	15.5	1.0	4.9	13.4	3.0

⁶ Developed by the author on the basis of data from the State Statistics Committee of the Republic of Uzbekistan

The next step, based on the stages of econometric modeling, is that a graph of each variable is formed using descriptive

statistics. They can be seen in Figure 1 below.

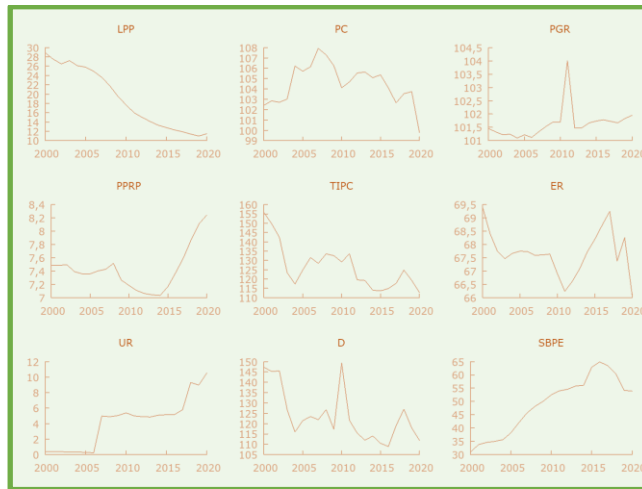


Figure 1 The tendency of factors to change along dynamic series

As can be seen from Figure 1, the outcome sign appears to be declining over the periods studied, with all other factors reflecting unstable trends.

After that, the correlation between the factors was considered. In this case, the correlation of factors X_3 (PPRP_c) and X_5 (ER_c) with other factors appeared to be stronger than the correlation with the

outcome indicator, i.e., the presence of a multicollinearity phenomenon was confirmed in the correlation table (Fig. 2). As can be seen from this matrix, the dependence of the factors on the outcome was weak, strong, and very strong. Therefore, weakly linked factors were excluded.

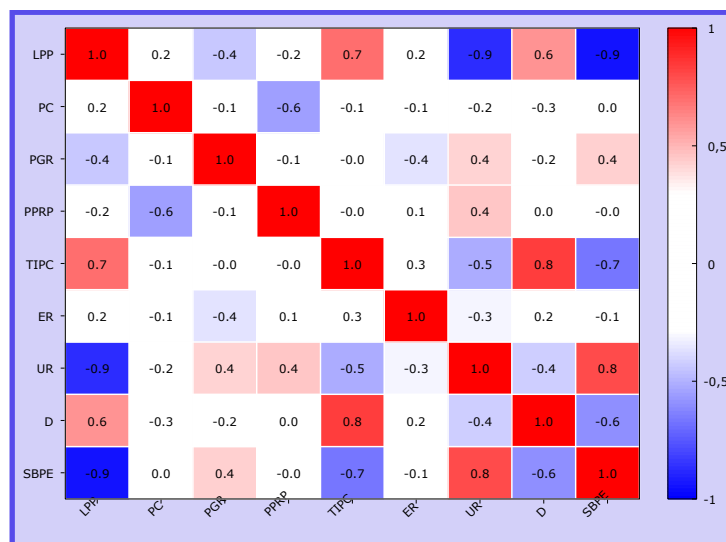


Figure 2. Correlation correlation matrix of factors

One of the reasons for multicollinearity in factors such as the proportion of the population receiving an old-age pension and the level of employment is that the level of employment may not have a direct

impact on the level of employment, i.e. share. The proportion of the population receiving an old-age pension is less likely to be low-income, so the impact of these factors on outcome is less likely.



Growth rates (X_4), unemployment rate (X_6) and the share of small business

and private entrepreneurship in GDP (X_9). Below is a correlation table.

Table 2

Correlation of factors

Variables	LPP _c	PC _c	TIPC _c	UR _c	SBPE _{GDP}
LPP _c	1				
PC _c	-0,44291889	1			
TIPC _c	0.694079996	-0.04598587	1		
UR _c	-0,87847421	0.412981477	-0.523433188	1	
SBPE _{GDP}	-0.94991109	0.420970631	-0.672759863	0.791574 20	1

It can be seen from this table that the GDP growth rate per capita weakly linked to the result however, statistically significant, the growth rate of gross per capita income has a strong direct impact on the outcome indicator (the country's poverty rate), while the unemployment rate and the share of small business and private entrepreneurship in GDP have a very strong impact.

Conclusion. The test results evaluated on the reliability of the model and parameters of the variables are given in Table 3 below.

From the data in Table 3, it can be seen that the factors all have the same meaning in terms of statistical significance. The parameters for t-statistics are also statistically significant. According to Schwartz, Akaike, Hennen-Quinn criteria, the model is also statistically significant. The Darbin-Watsin criterion is also positive and means that this model can be put into practice. The coefficients of determination were also positive, proving once again the reliability of the model.

Table 3

Results of the regression equation⁷

Variables	Coefficient	Std . error	t -statistics	Probability P> t	
const	4,2209000	0.1240235	4.3800	0.0 03 2	***
PC _c	-0.634677 0	0.698585 0	- 4 , 9085	<0.0001	***
TIPC _c	0.0723289	0.0428369	3 , 688 0	0.0142	**
UR _c	-0.674119 0	0.181855 0	- 5 , 707 0	0.0015	***
SBPE _{GDP}	0.401222 0	0.0550556	5,372 0	<0.0001	***
Results of statistical evaluation					
Srednee zav. peremen	18,98914	St. otkl. zav. peremen	6,518579		
Sum kv. remnants	29,40210	St. error model	1,315118		
R-square	0.953773	Ispr. R-square	0.995893		
F (4, 17)	2560,984	R-znachenie (F)	2.19e-23		
Log. pravdopodobie	-33,33142	Crete. Akaike	7 4,66284		
Crete. Schwartz	78,84093	Crete. Xennana-Quinna	75,56959		
Parameter rho	0.318747	Stat. Darbina-Votsona	1,353589		

⁷ Calculated by the author based on the STATA program.



Another major reason for the exclusion of other factors from this model was that the interaction of factors over the period of time we studied was stronger than the outcome indicator. These can be seen in the

strong correlation between factors such as GDP growth rate and the share of people receiving old-age pensions, GDP growth rate and employment rate, and GDP per capita GDP growth rate.

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