

**QISHLOQ, O`RMON VA BALIQCHILIK XO`JALIGI TARMOG`I
YALPI QO`SHILGAN QIYMATINING SHAKLLANISHIGA
INVESTITSIYALARNING TA`SIRINI BAHOLASH**

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Annotatsiya. Mazkur maqolada qishloq, o`rmon va baliqchilik xo`jaligi tarmog`i yalpi qo`shilgan qiymatining shakllanishiga investitsiyalarnng ta`siri regression tahlil usuli orqali tadqiq etilgan. Avtoregressiya modeli tuzish orqali qisqa va uzoq muddatli istiqboldagi o`zgarishlar haqida xulosalar qilingan.

Kalit so`zlar: model, avtoregressiya, regressiya tenglamasi, styudent, t mezoni, Fisher, instrumental o`zgaruvchi.

Surxondaryo viloyati ishloq, o`rmon va baliqchilik xo`jaligi tarmog`i yalpi qo`shilgan qiymatiga investitsiyalarning ta`sirini baholash maqsadida 2010-2023 yillarga mo`ljallangan ma`lumotlar www.surxonstat.uz saytidan olindi (1-jadal).

1-jadval

**Surxondaryo viloyati qishloq, o`rmon va baliqchilik xo`jaligi tarmog`i yalpi
qo`shilgan qiymati hamda investitsiyalar hajmi ko`rsatkichlari¹**

<i>Yillar</i>	<i>y</i>	<i>x</i>	<i>Yillar</i>	<i>y</i>	<i>x</i>
2010	1519,7	655,3	2017	7351,3	3 551,0
2011	2819,4	802,9	2018	9169,3	7 240,6
2012	3373,7	980,3	2019	10680,8	11 835,1

¹ Surxondaryo viloyati Statistika boshqarmasi www.surxonstat.uz sayti



2013	3580,4	1 371,0	2020	11610,2	10 068,2
2014	4444,8	1 509,1	2021	13811,5	12 037,8
2015	5375,9	1 843,6	2022	15934,1	11 569,4
2016	5831,4	2 142,4	2023	19448,5	17 956,0

Investitsiyalarning qishloq, oʻrmon va baliqchilik xoʻjaligi tarmogʻi yalpi qoʻshilgan qiymatiga qisqa va uzoq muddatli taʼsirini baholashda avtoregressiya modellari qoʻl keladi. $AR(1) + x$ avtoregressiya modeli umumiy koʻrinishi quyidagicha:

$$y_t = a + b_0 \cdot x_t + c_1 \cdot y_{t-1} + e_t \quad (1)$$

Odatda (1) kabi model parametrlarini hisoblashda instrumental oʻzgaruvchilar usulidan foydalaniladi. Maʼlumki, instrumental oʻzgaruvchilar usuli (*Instrumental variables*) - bu modelda ishtirok etmaydigan qoʻshimcha instrumental oʻzgaruvchilardan foydalanishga asoslangan regressiya modellarining parametrlarini baholash usuli hisoblanadi². Dastlab, instrumental oʻzgaruvchini baholovchi model tuzish talab etiladi.

$$\hat{y}_{t-1} = d_0 + d_1 \cdot x_{t-1} \quad (2)$$

(2) modelni baholash uchun natijaviy hamda omil belgilarning $t - 1$ davr uchun laglarini aniqlashimiz zarur (2-jadval).

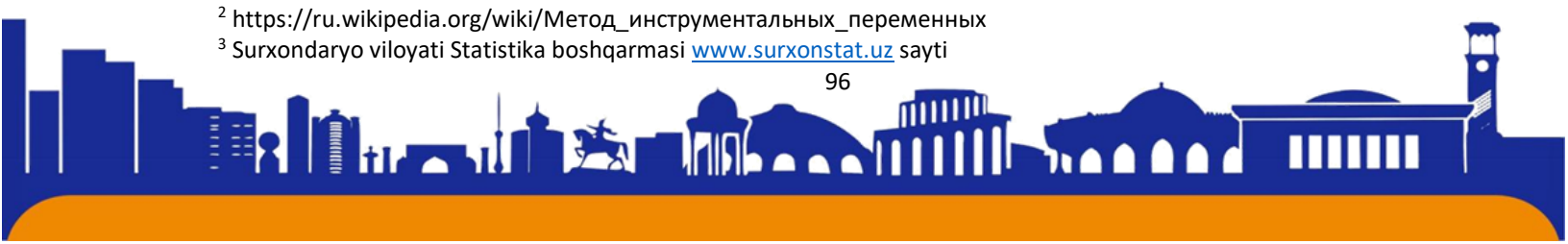
2-jadval

Surxondaryo viloyati q qishloq, oʻrmon va baliqchilik xoʻjaligi tarmogʻi yalpi qoʻshilgan qiymati va asosiy kapitalga oʻzlashtirilgan investitsiyalar hajmi koʻrsatkichlarning $t - 1$ davrdagi qiymatlari³

<i>Yillar</i>	y_t	x_t	y_{t-1}	x_{t-1}
2010	1519,7	655,3	-	-

² https://ru.wikipedia.org/wiki/Метод_инструментальных_переменных

³ Surxondaryo viloyati Statistika boshqarmasi www.surxonstat.uz sayti





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2011	2819,4	802,9	1519,7	655,3
2012	3373,7	980,3	2819,4	802,9
2013	3580,4	1 371,0	3373,7	980,3
2014	4444,8	1 509,1	3580,4	1 371,0
2015	5375,9	1 843,6	4444,8	1 509,1
2016	5831,4	2 142,4	5375,9	1 843,6
2017	7351,3	3 551,0	5831,4	2 142,4
2018	9169,3	7 240,6	7351,3	3 551,0
2019	10680,8	11 835,1	9169,3	7 240,6
2020	11610,2	10 068,2	10680,8	11 835,1
2021	13811,5	12 037,8	11610,2	10 068,2
2022	15934,1	11 569,4	13811,5	12 037,8
2023	19448,5	17 956,0	15934,1	11 569,4

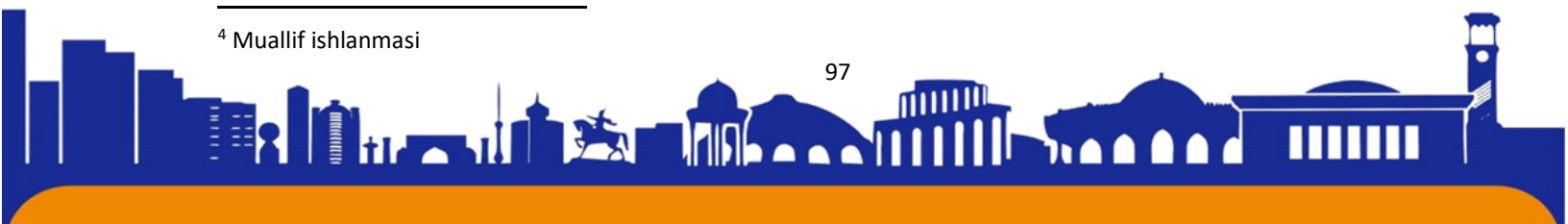
Gretl dasturida OLS usulidan foydalanib, 2-jadvaldagi lag ko'rsatkichlarining (2) ko'rinishidagi chiziqli regression bog'lanish shaklini baholaymiz (3-jadval).

3-jadval

Regression tahlil natijalari⁴

Model 1: OLS, using observations 2011-2023 (T = 13)			
Dependent variable: yt-1			
<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>

⁴ Muallif ishlanmasi





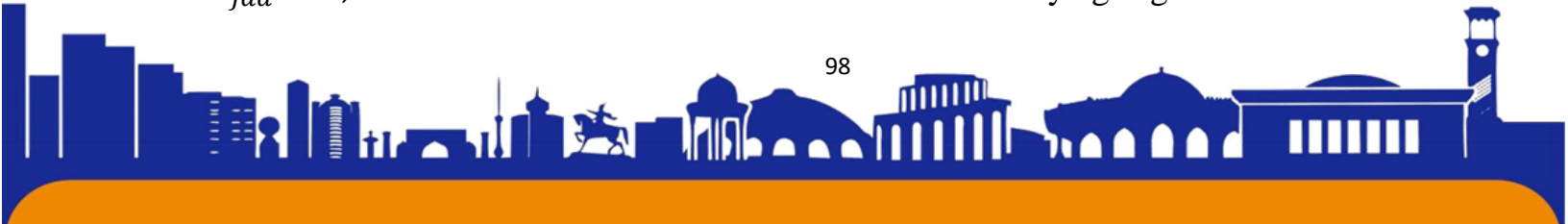
const	2737.82	604.913	4.526	0.0009	***
x_{t-1}	0.913181	0.0890842	10.25	<0.0001	***
Mean dependent var	7346.346	S.D. dependent var	4538.482		
Sum squared resid	23423142	S.E. of regression	1459.238		
R-squared	0.905236	Adjusted R-squared	0.896621		
F(1, 11)	105.0781	p-value(F)	5.77e-07		
Log-likelihood	-112.0741	Akaike criterion	228.1481		
Schwarz criterion	229.2780	Hannan-Quinn	227.9159		
Fo	0.343082	Durbin-Watson	1.080189		

Test for normality of residual -
Null hypothesis: error is normally distributed
Test statistic: Chi-square(2) = 2.7532
with p-value = 0.252436

\hat{y}_{t-1} instrumental o‘zgaruvchini aniqlovchi regressiya tenglamasining umumiy ko‘rinishi

$$\hat{y}_{t-1} = 2737,82 + 0,913181 \cdot x_{t-1} \tag{3}$$

Ushbu (3) model bo‘yicha Fisherning F mezonining hisoblangan qiymati $F_{his} = 105,0781$ ga teng. Bu esa $df_1 = m = 1$ va $df_2 = n - m - 1 = 11$ erkinlik darajasida hamda, $\alpha = 0,05$ ahamiyatlilik darajasidagi Fisherning jadval qiymati $F_{jad} = 4.84$ dan katta. Shuningdek (3) modelning parametrlari bo‘yicha Styudentning t mezon qiymatlari $t_{d_0} = 10,25$ $t_{d_1} = 4,526$ ga teng, bu esa $\alpha = 0,05$ ahamiyatlilik darajasi hamda $df = n - m = 12$ erkinlik darajasida Styudentning t mezon jadval qiymati $t_{jad} = 2,179$ dan katta. Shu sababli model statistik ahamiyatga ega hisoblanadi.



\hat{y}_{t-1} instrumental o'zgaruvchining nazariy qiymatlarini aniqlaymiz. (4-jadval).

4-jadval

Instrumental o'zgaruvchining nazariy qiymatlari⁵

Yillar	y_t	x_t	y_{t-1}	x_{t-1}	\hat{y}_{t-1}
2010	1519,7	655,3	-	-	-
2011	2819,4	802,9	1519,7	655,3	3336,229
2012	3373,7	980,3	2819,4	802,9	3471,014
2013	3580,4	1 371,0	3373,7	980,3	3633,012
2014	4444,8	1 509,1	3580,4	1 371,0	3989,785
2015	5375,9	1 843,6	4444,8	1 509,1	4115,943
2016	5831,4	2 142,4	5375,9	1 843,6	4421,372
2017	7351,3	3 551,0	5831,4	2 142,4	4694,23
2018	9169,3	7 240,6	7351,3	3 551,0	5980,526
2019	10680,8	11 835,1	9169,3	7 240,6	9349,797
2020	11610,2	10 068,2	10680,8	11 835,1	13545,41
2021	13811,5	12 037,8	11610,2	10 068,2	11931,91
2022	15934,1	11 569,4	13811,5	12 037,8	13730,51
2023	19448,5	17 956,0	15934,1	11 569,4	13302,77

4-jadvaldagi y_t , x_t hamda \hat{y}_{t-1} o'zgaruvchilar ishtirokida (1) modelni baholash mumkin. Buning uchun yana Gretl imkoniyatlaridan foydalandik. Biroq tajribalarda model parametrlari statistik ahamiyatga ega bo'lmadi. Shu sababli, o'zgaruvchi qatnashmagan model turini baholashga qaror qildik (5-jadval).

⁵ Surxondaryo viloyati Statistika boshqarmasi www.surxonstat.uz sayti





Avtoregressiya modelini baholash natijalari⁶

Model 2: OLS, using observations 2011-2023 (T = 13)

Dependent variable: y

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
x	0.476001	0.210408	2.262	0.0449	**
yt1_fitted	0.736086	0.202084	3.642	0.0039	***
Mean dependent var	8725.485	S.D. dependent var	5283.307		
Sum squared resid	30154236	S.E. of regression	1655.685		
Uncentered R-squared	0.977237	Centered R-squared	0.909977		
F(2, 11)	236.1200	P-value(F)	9.22e-10		
Log-likelihood	-113.7160	Akaike criterion	231.4319		
Schwarz criterion	232.5618	Hannan-Quinn	231.1997		
Rho	0.620963	Durbin-Watson	0.792156		

Test for normality of residual -

Null hypothesis: error is normally distributed

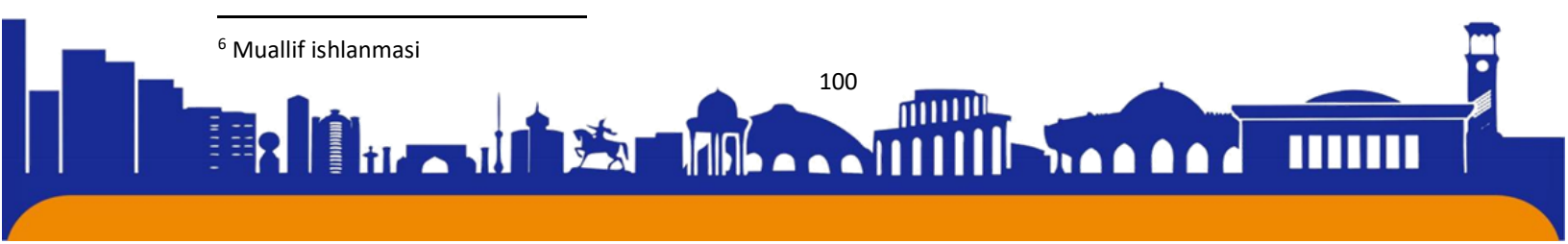
Test statistic: Chi-square(2) = 2.99073

with p-value = 0.224167

3-jadvalga ko'ra avtoregressiya tenglamamiz:

$$y_t = 0,476001x_t + 0,736086y_{t-1} \tag{4}$$

⁶ Muallif ishlanmasi





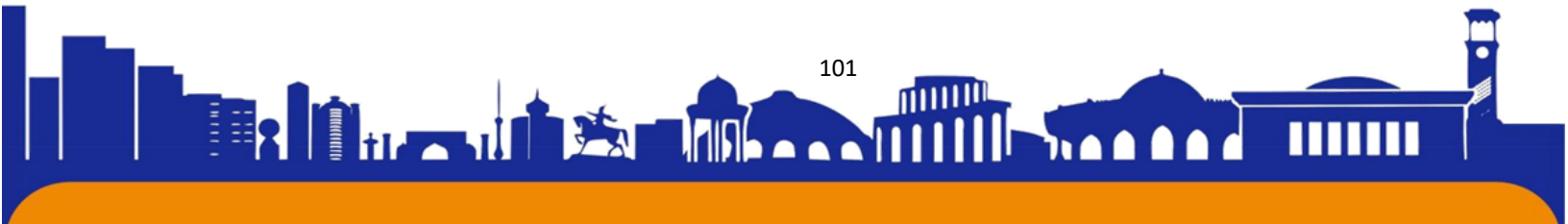
ko'rinishga ega bo'ladi. 5-jadvaldan model parametrlari statistik ahamiyatga egaligi, modelning o'zi esa Fisherning F mezoniga ko'ra iqtisodiy jarayonga mosligini ko'rish mumkin. Xi-kvadrat testi natijalari ($p - qiymat > 0,05$) esa qoldiqlar normal taqsimlanganligini ko'rsatmoqda.

(4) modeldan ko'rinib turibdiki qisqa muddatli multiplikator $b_0 = 0,476001$ ga, uzoq muddatli multiplikator $b = \frac{b_0}{1-c} = \frac{0,0476001}{1-0,736086} = 1,803623$ ga teng.

Xulosa qilib aytganda, x_t - asosiy kapitalga o'zlashtirilgan investitsiyalar hajmining 1 mlrd so'mga ortishi y_t - qishloq, o'rmon va baliqchilik xo'jaligi tarmog'i yalpi qo'shilgan qiymatini o'rtacha 0,476001 mlrd so'mga oshiradi. x_t ning 1 mlrd so'mga oshishi, y_t ni uzoq muddatda 0,546096 mlrd so'mga oshishiga sabab bo'ladi.

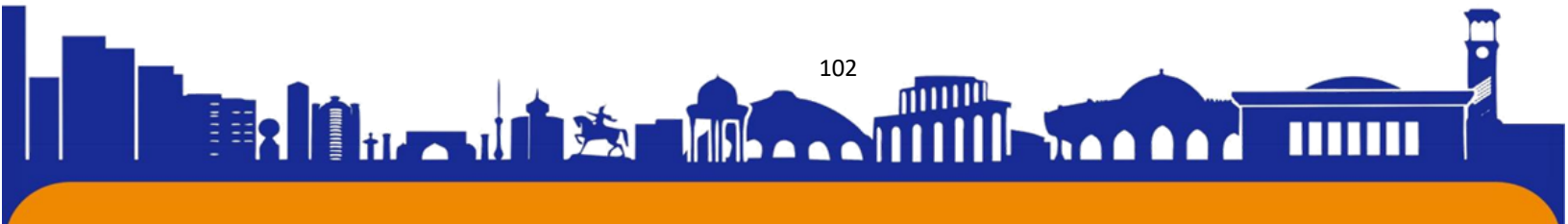
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