



# **XALQARO NORDIK UNIVERSITETI**

## **Iqtisodiyot va pedagogika fakulteti, Iqtisodiyot va biznesni boshqarish kafedrası**

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# MAVZU: REGRESSION MODELLAR TUZISH STATA DASTURIDA

1. Klassik chiziqli modelni yaratish uchun ma`lumotlarini yuklash.
2. Ma`lumotlarning tahliliy statistikasi
3. Ma`lumotlar asosida SCATTER diagramsini yaratish usullari.
4. STATA dasturida regression model yaratish usuli
5. Regression modelning prognoz qiymatlarini olishda stata dasturidan foydalanishlari



Uy xo`jaliklarining haftalik xarajatlari bilan daromadlari o`rtasidagi munosabatlarning iqtisodiy modelini stata dasturida oziq-ovqat sanoatining dinamik ma`lumotlari asosida tuzishga harakat qilamiz. Birinchidan stata dasturini ishga tushuramiz va ishchi katalogini kiritamiz. Buning qanday qilinishi kompyuterning operatsion tizimiga va stata dasturining do-file lari joylashgan joyiga bog`liq.

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Ishchi katalog turi quyidagicha:

**cd “c:\users\user\documents\stata”** yuqoridagi ishchi katalogni buyruqlar oynasiga kiriting va **enter** ni bosing. Yoki stata ochiladigan menyusidagi **file > change working directory** katalogini tanlang.

Oziq-ovqat xarajatlari misoli haqidagi ma`lumotlar stata nomli faylida va food\_exp faylida joylashgan. Stata ma`lumotlar faylini ochish uchun uskunalar panelidagi **Open** (foydalanish) tugmasini bosing



**food\_exp.dta** toping, uni tanlang va **Open** tugmasini bosing. Yoki buyruqlar oynasida, joriy papkadan ma`lumotlar faylini ochish uchun quyidagi buyruqni kiriting:

***use food\_exp***

Agar Stata xotirasini bir vaqtning o`zida yangi ma`lumotlar faylini ochish hamda tozalash zarur bo`lsa, quyidagicha buyruqni kiriting:

*use food\_exp, clear*

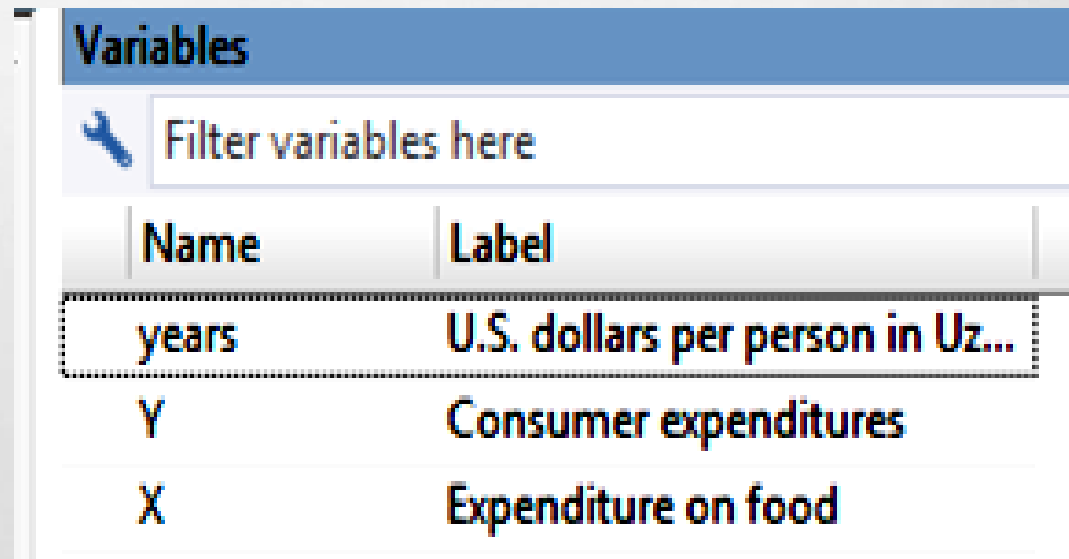
Oldindan ochilgan ma`lumotlar to`plamini xotiradan o`chiradi. Biroq, yangi ma`lumotlar faylini ochishdan oldin "tozalovchi" ma`lumot faylini amalga oshirish xavfsizroqdir.

Stata dasturida internet saytidan ma`lumotlarni yuklash ham mumkin. Buning uchun quyidagi buyruqni kiritish mumkin:

*use <http://www.stata.com/texts/s4poe4/food>*

Shunda o`zgaruvchilar oynasida ikkita parametr ro`yxatga kiritiladi: Y va X izohi bilan birga.

O`zgaruvchilar Turi va Formatini haqida boshqa ma`lumotlar ham paydo bo`lishi mumkin.



The screenshot shows a software interface with a 'Variables' panel. At the top, there is a blue header with the word 'Variables'. Below it is a search bar with a wrench icon and the text 'Filter variables here'. Underneath is a table with two columns: 'Name' and 'Label'. The table contains three rows of data. The first row is highlighted with a dotted border. The second and third rows are separated from the first by horizontal lines.

Name	Label
years	U.S. dollars per person in Uz...
Y	Consumer expenditures
X	Expenditure on food

Har bir yangi masalani boshlashdan oldin ma`lumotni ko`rib tekshirib chiqish kerak. Buyruqlar oynasiga quyidagi buyruqni kiriting:

### *describe*

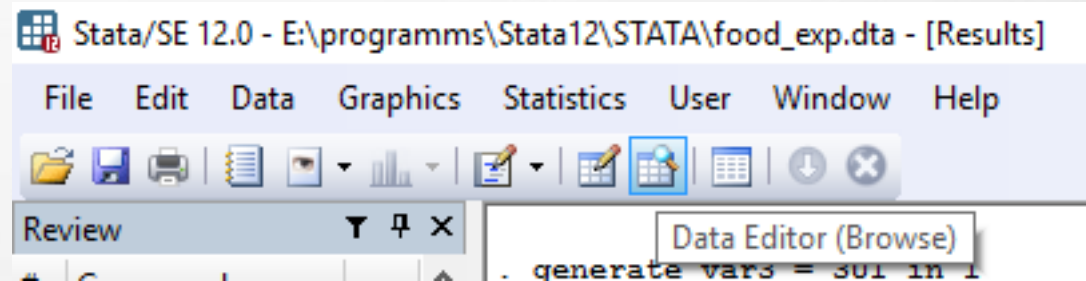
Ushbu o`zgaruvchilar haqida ko`proq ma`lumot olish uchun Buyruqlar oynasida **help describe** buyrug`ini kiriting. Oddiy sarlavha uchun hech narsa talab qilinmaydi, shuning uchun **OK** tugmasini bosning.

```
Contains data from food_exp.dta
```

```
obs:          6
vars:          3                    5 Nov 2019 16:24
size:         60
```

variable name	storage type	display format	value label	variable label
years	int	%8.0g		U.S. dollars per person in Uzbekistan
Y	float	%8.0g		Consumer expenditures
X	float	%8.0g		Expenditure on food

Yuqoridagi ma`lumotlar fayli **food\_exp.dta** haqida umumiy ma`lumot. Biz ma`lumotlarimizni tekshiramiz. Ma`lumotlar brauzeri (**Data Editor**) dan foydalaning.



Data Editor (Edit) - [food\_exp]

File Edit View Data Tools

years[1] 2013

	years	Y	X
1	2013	976.5	301
2	2014	1080.1	331.2
3	2015	1166.2	356
4	2016	1185	360.2
5	2017	801.9	242.8
6	2018	619.2	186.8

Variables

Filter variables here

Properties

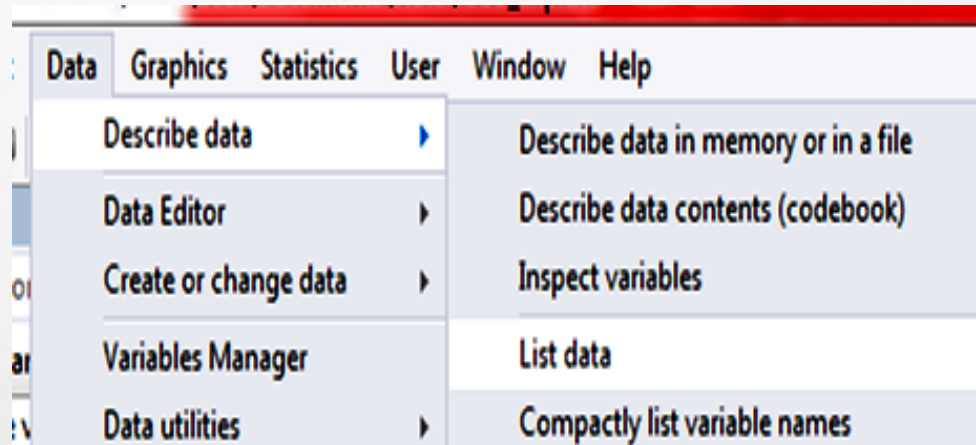
Variables

Name	years
Label	U.S. d

Vars: 3 Order: Dataset Obs: 6 Filter: Off Mode: Edit



Agarda siz u ma`lumotlarni chop qilishni yoki ba`zilarini ro`yxatlamochi bo`lsangiz yuqoridagi menu oynasidan **Data > Describe data > List data** ni bosing.



Ochilgan dialog oynasida, o`zgaruvchini tanlang va Natijalar oynasida barcha ma`lumotlarni ro`yxatlash uchun OK tugmasini bosing. Ro`yxatlash buyrug`i sintaksisi quyidagicha:

*list [varlist] [if] [in] [, options]*

Ro`yxatlangan qiymatlar oralig`i muayyan chiziqlarni ko`rsatish uchun mantiqiy "if" yoki "in" yordamida o`zgartirilishi mumkin. Misol uchun:

*list in 1/5*

*list Y in 1/5*

*list Y if X <= 360*

`list in 1/5`

	years	Y	X
1.	2013	976.5	301
2.	2014	1080.1	331.2
3.	2015	1166.2	356
4.	2016	1185	360.2
5.	2017	801.9	242.8

`list Y in 1/5`

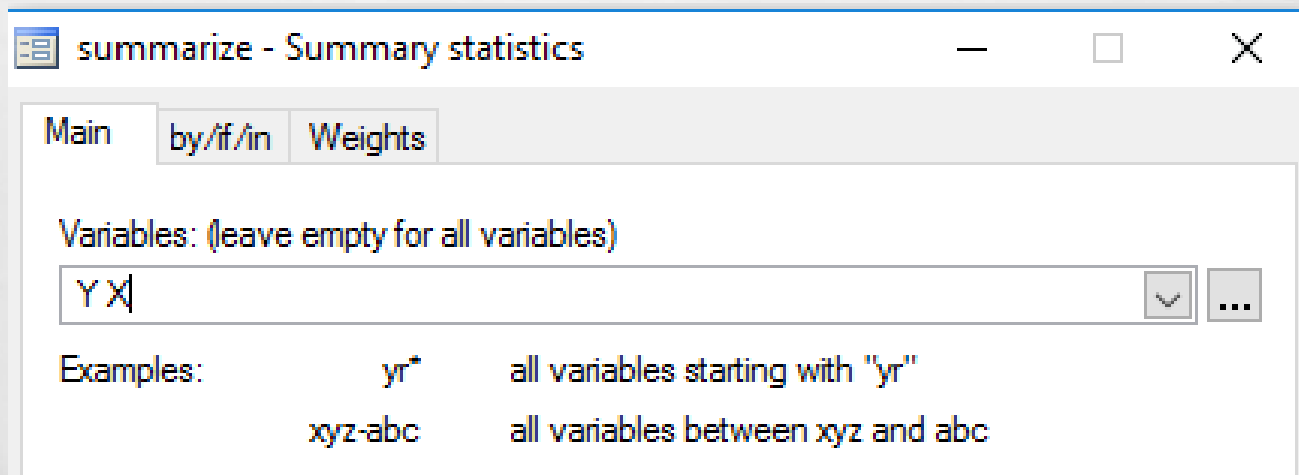
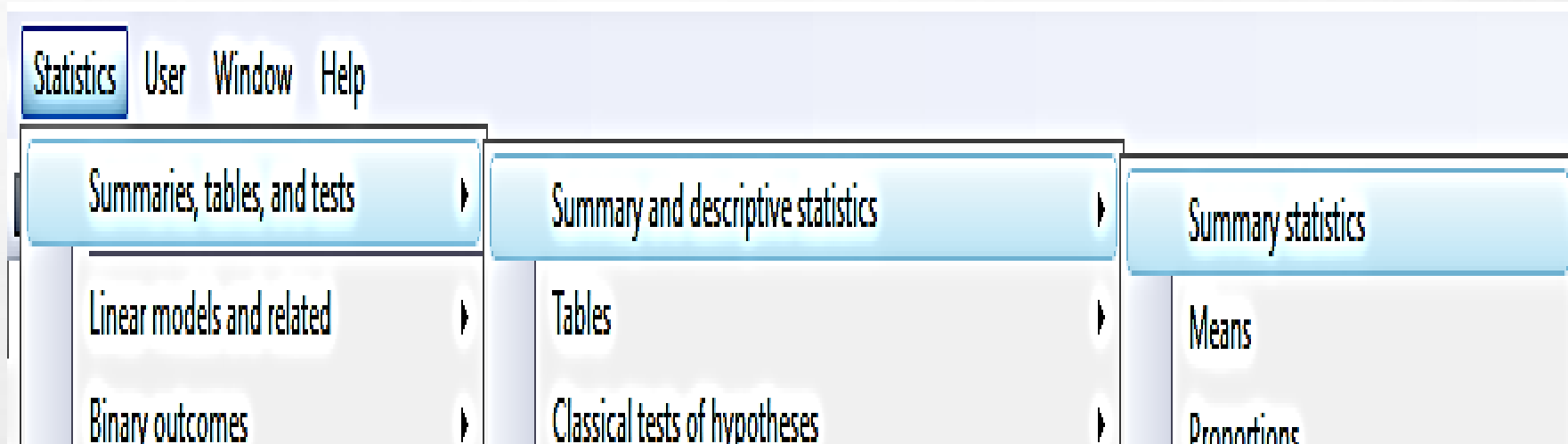
	Y
1.	976.5
2.	1080.1
3.	1166.2
4.	1185
5.	801.9

`list Y if X <= 360`

	Y
1.	976.5
2.	1080.1
3.	1166.2
5.	801.9
6.	619.2

–**more**– so`zi pauzani bildiradi. Stata log faylini ishga tushurgandan keyin **set more off** buyrug`ini kiritgan bo`lsa, pauza xususiyatini o`chirib qo`yadi.

# Ma'lumotlarning tahliliy statistikasi olish uchun:



Yoki buyruqlar oynasida quyidagi buyruqni kiriting:  
***summarize Y, detail***

```
. summarize Y, detail
```

Consumer expenditures

	Percentiles	Smallest		
1%	619.2	619.2		
5%	619.2	801.9		
10%	619.2	976.5	Obs	6
25%	801.9	1080.1	Sum of Wgt.	6
50%	1028.3		Mean	971.4833
		Largest	Std. Dev.	222.7953
75%	1166.2	976.5		
90%	1185	1080.1	Variance	49637.74
95%	1185	1166.2	Skewness	-.5982541
99%	1185	1185	Kurtosis	1.936811

Oddiy regressiya modelida ma`lumotlar qiymatlarini Scatter diagramasida chizish muhimdir. Stata ochiladigan menyusida **Graphics> Twoway graph (scatter, line, etc.)** ni tanlang.

Qo`shimcha tafsilotlarni bilish uchun buyruqlar oynasiga **help twoway** buyrug`ini kiriting.

Shuningdek, Stata buyruqlar oynasiga quyidagi buyruqni kiritib yaratsa ham bo`ladi.

*twoway (scatter Y X)*

Grafikga nom qo`shish uchun **Twoway Graph** dialog oynasidagi **Titles** yorlig`ini bosing.

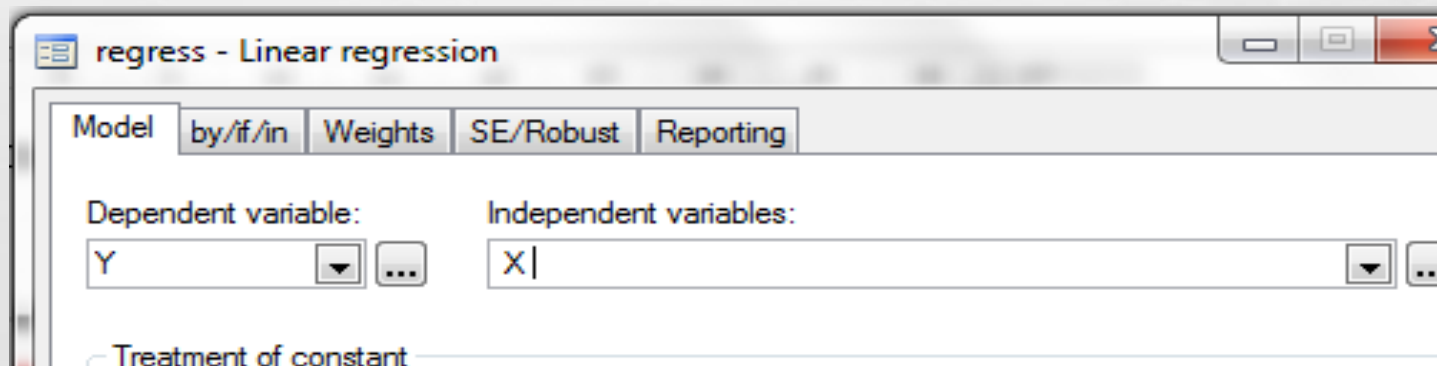
**twoway (scatter Y X), title(Consumer exp & food exp)**

Oddiy chiziqli regressiya modeli:

$$y = \beta_1 + \beta_2 x + e$$

Asosiy omil,  $y$  (**consumer expenditure**) va ta`sir etuvchi omil  $x$  (**expenditure on food**) bo`yicha ma`lumot berilgan holda, noma`lum parametrlarni topish va baholash uchun Stata dasturidan foydalanamiz. Regression tahlilni amalga oshirish uchun yuqoridagi menu dan foydalanilgan holda quyidagicha amalga oshiramiz:

**Statistics > Linear models and related > Linear regression**



Shu bilan bir qatorda, quyidagi buyruq orqali amalga oshirish ham mumkin.

*regress Y X*

buni qisqartirilishi ham mumkin

*reg Y X*

. regress Y X

Source	SS	df	MS	Number of obs	=	6
Model	248002.086	1	248002.086	F(1, 4)	=	5315.64
Residual	186.620714	4	46.6551785	Prob > F	=	0.0000
Total	248188.707	5	49637.7414	R-squared	=	0.9992
				Adj R-squared	=	0.9991
				Root MSE	=	6.8305

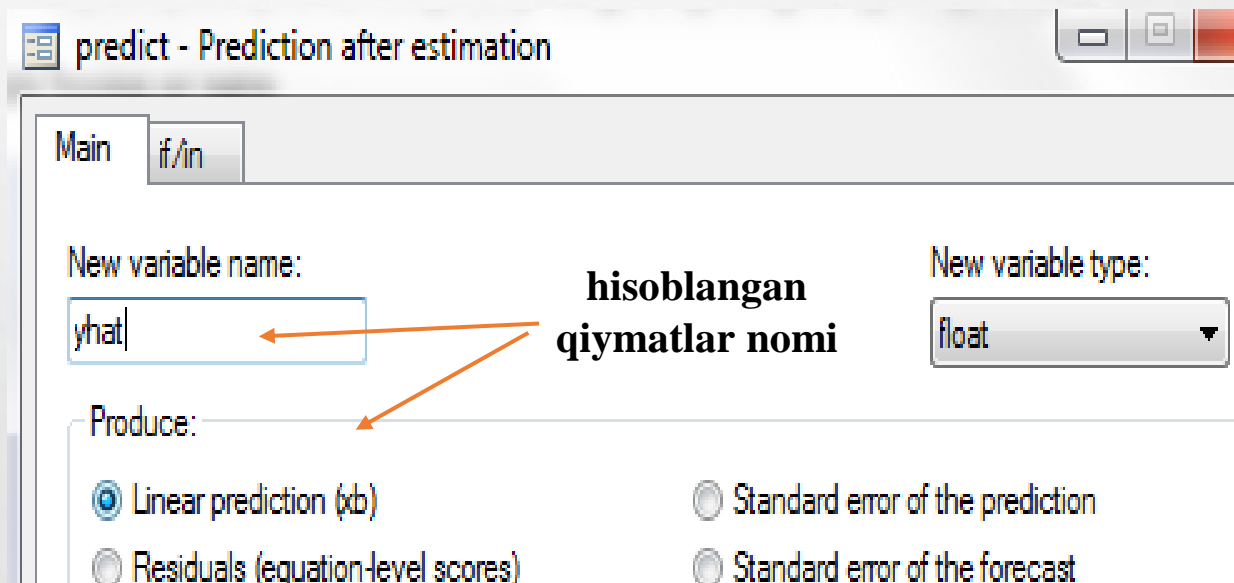
  

Y	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
X	3.232126	.0443313	72.91	0.000	3.109042	3.355209
_cons	13.69666	13.42954	1.02	0.365	-23.58972	50.98304

Hisoblangan  $y$  qiymatlari va qoldiqlarni "**postestimation**" buyruqlaridan foydalanib topiladi. Ularni "**postestimation**" parametri deb atashadi, chunki ular regressiya modelini baholashadi.

Stata dasturidagi yuqoridagi **menu** lar orqali bajarish yo`li:

**Statistics > Postestimation > Predictions, residuals, etc.**





# Qoldiqlarni olish uchun

predict - Prediction after estimation

Main if/in

New variable name:

New variable type:

Produce:

Linear prediction ( $\hat{x}$ )

Residuals (equation-level scores)

Standardized residuals

Standard error of the prediction

Standard error of the forecast

Standard error of the residual

Variables

Filter variables here

Name	Label
years	U.S. dollars per person in Uz...
Y	Consumer expenditures
X	Expenditure on food
yhat	Linear prediction
ehat	Residuals

Hisoblangan  $\hat{y}$  qiymatlari va qoldiqlarni hisoblaydigan Stata komandalari asosiy **predict** buyrug`i yordamida taxmin qilinadi.

*predict yhat*

Qolgan qoldiqlarni olish uchun **options** ga **residuals** dan foydalaning. Oziq-ovqat sarf-xarajatlari modeli uchun bu:

*predict ehat, residuals*

Qoldiqlarni bir necha turlarda yozish mumkin minimal darajasiga qisqartmasi **r** yoki **res** yoki **resid** ga o`xshab biroz qisqartirilishi mumkin.

Stata dasturining **postestimation** komandalaridan yana biri bu elastiklikni avtomatik ravishda hisoblash imkonini beradi. Bu quyidagicha:

**Statistics > Postestimation > Marginal effects.**

margins - Marginal means, predictive margins, and marginal effects

Main **At** if/in/over Within Weights SE Advanced Reporting Contrast Pairwise comp

Factor terms to compute margins for: *alohida qiymatlar*

Add grand margin, default if no factor terms specified

Select response

Default prediction

Specify a prediction

Specify an expression of estimated parameters

Marginal effects of response

Marginal effects  $d(y)/d(x)$

Elasticities  $d(\ln y)/d(\ln x)$

Semielasticities  $d(y)/d(\ln x)$

Semielasticities  $d(\ln y)/d(x)$  *o`zgaruvchi*

Variables: X

Treat factor-variable level indicator covariates as continuous

OK Cancel Submit

margins - Marginal means, predictive margins, and marginal effects

Main At if/in/over Within Weights SE Advanced Reporting Contrast Pairwise comp: < >

All covariates at observed values in the sample  
 All covariates at their means in the sample  
 For each factor variable, treat all levels as though equally probable

```
. margins, eyex( X) atmeans
```

```

Conditional marginal effects                Number of obs   =           6
Model VCE      : OLS

Expression    : Linear prediction, predict()
ey/ex w.r.t.  : X
at            : X                =    296.3333 (mean)
  
```

	Delta-method					
	ey/ex	Std. Err.	z	P> z	[95% Conf. Interval]	
x	.9859013	.0138154	71.36	0.000	.9588236	1.012979

Hisoblangan regression model chizig`ini grafikda joylashtirish  
*twoway (scatter Y X) (lfit Y X), title(Fitted Regression Line)*

Iste`mol va oziq-ovqat sarf-xarajatlari modeliga asoslanib, oziq-ovqat xarajatlari uchun yilda 20 dollar xarajat keltiradigan taxminiy qiymatini olaylik.

$$\hat{y}_i = 13.696 + 3.21x_i = 13.696 + 3.21(20) = 77.896$$

*edit*

*set obs 7*

*replace X = 20 in 7 predict yhat0*

Kuzatishdagi 7-X va yhat0 ma`lumotlarini ro`yxatlash.

*list X yhat0 in 7*

```
. list X yhat0 in 7
```

	X	yhat0
7.	20	78.33918

**E`TIBORINGIZ  
UCHUN  
RAHMAT!**