

Лекция

Пример анализа временных рядов в пакете STATA

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Построение графиков

Переменные:

GDP – gross domestic product,

PDI – personal disposal income,

PCE – personal consumption expenditure,

PROFITS – corporate profits after tax,

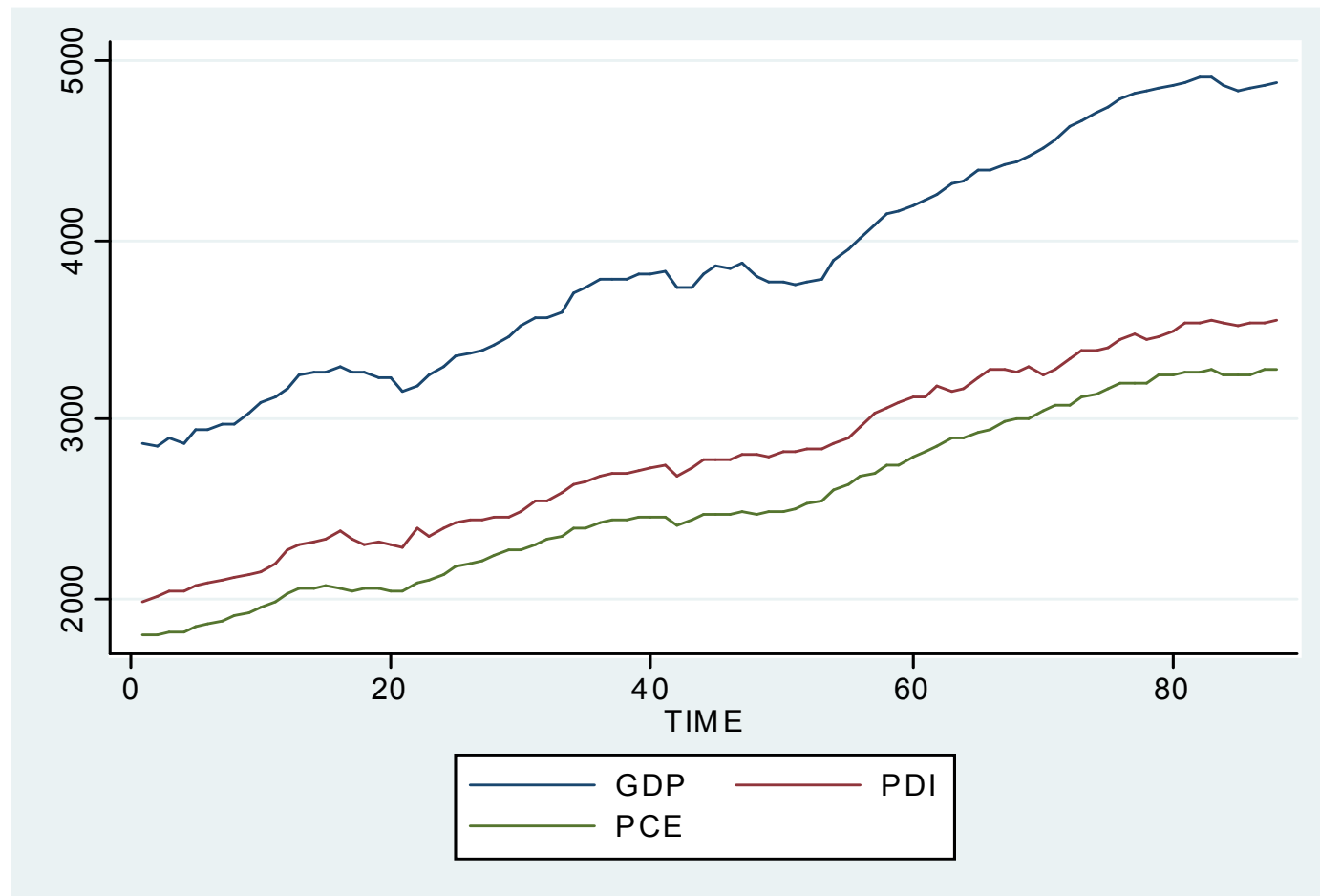
DIVIDENDS – net corporate dividend;

All data are in billions of 1987 dollars and are for the quarterly periods of 1970-1991, for a total of 88 quarterly observations.

Построение графиков

Команда для построения графиков:

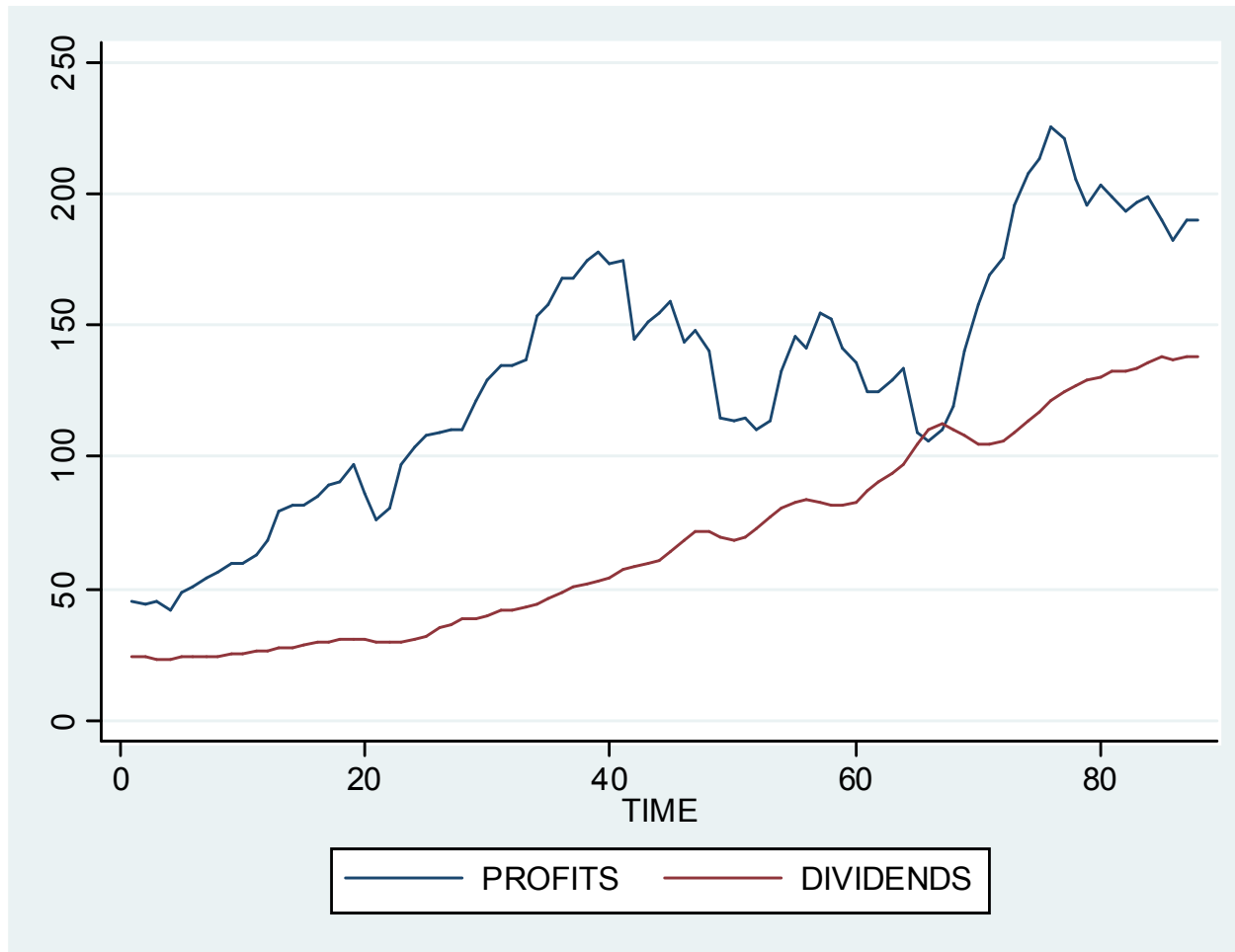
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line gdp pdi pce time
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Построение графиков

Команда для построения графиков:

`line profits dividends time`



Команда для задания временной структуры: tsset time

Команда для проведения теста Дики и Фуллера для ряда

gdp: dfuller gdp, trend regress

dfuller gdp, trend regress

Dickey-Fuller test for unit root Number of obs = 87

----- Interpolated Dickey-Fuller -----

Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value	
Z(t)	-1.625	-4.069	-3.463	-3.158

MacKinnon approximate p-value for Z(t) = 0.7824

D.gdp Coef. Std. Err. t P>t [95% Conf. Interval]

gdp						
L1.	-.0603169	.0371113	-1.63	0.108	-.1341169	.0134831
_trend	1.477641	.9172438	1.61	0.111	-.346399	3.301681
_cons	190.3836	103.5257	1.84	0.069	-15.48858	396.2559

Команда для проверки стационарности ряда из разностей: dfuller d.gdp, trend regress

dfuller d.gdp, trend regress

Dickey-Fuller test for unit root Number of obs = 86

----- Interpolated Dickey-Fuller -----

Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value	
Z(t)	-6.588	-4.071	-3.464	-3.158

MacKinnon approximate p-value for Z(t) = 0.0000

D2.gdp	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
D.gdp						
L1.	-.6824588	.1035842	-6.59	0.000	-.8884836	-.4764341
_trend	-.0282465	.1497305	-0.19	0.851	-.3260544	.2695615
_cons	17.22668	7.84189	2.20	0.031	1.62948	32.82389

Команда для проведения теста Дики и Фуллера для ряда

pce: dfuller pce, trend regress

dfuller pce, trend regress

Dickey-Fuller test for unit root Number of obs = 87

----- Interpolated Dickey-Fuller -----

Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-1.376	-4.069	-3.463 -3.158

MacKinnon approximate p-value for Z(t) = 0.8678

D.pce	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
pce						
L1.	-.0444637	.0323122	-1.38	0.172	-.10872	.0197926
_trend	.7987188	.5871058	1.36	0.177	-.3688055	1.966243
_cons	94.19098	56.24132	1.67	0.098	-17.65105	206.033

Команда для проверки стационарности ряда из разностей:
dfuller d.pce, trend regress

dfuller d.pce, trend regress

Dickey-Fuller test for unit root Number of obs = 86

----- Interpolated Dickey-Fuller -----

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-7.567	-4.071	-3.464	-3.158

MacKinnon approximate p-value for Z(t) = 0.0000

D2.pce	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
D.pce						
L1.	-.819919	.1083518	-7.57	0.000	-1.035426	-.6044117
_trend	-.0123328	.079425	-0.16	0.877	-.1703059	.1456402
_cons	14.47549	4.364522	3.32	0.001	5.794632	23.15635

Оценка регрессии

Команда для оценки регрессии PCE на PDI:

reg pce dpi

reg pce dpi

Source	SS	df	MS	Number of obs	= 88
				F(1, 86)	=14369.09
Model	18548225.7	1	18548225.7	Prob > F	= 0.0000
Residual	111012.434	86	1290.84225	R-squared	= 0.9941
				Adj R-squared	= 0.9940
Total	18659238.1	87	214474.002	Root MSE	=
35.928					

pce	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
pdi	.9672499	.0080691	119.87	0.000	.9512091	.9832907
_cons	-171.4412	22.91726	-7.48	0.000	-216.9992	-125.8832

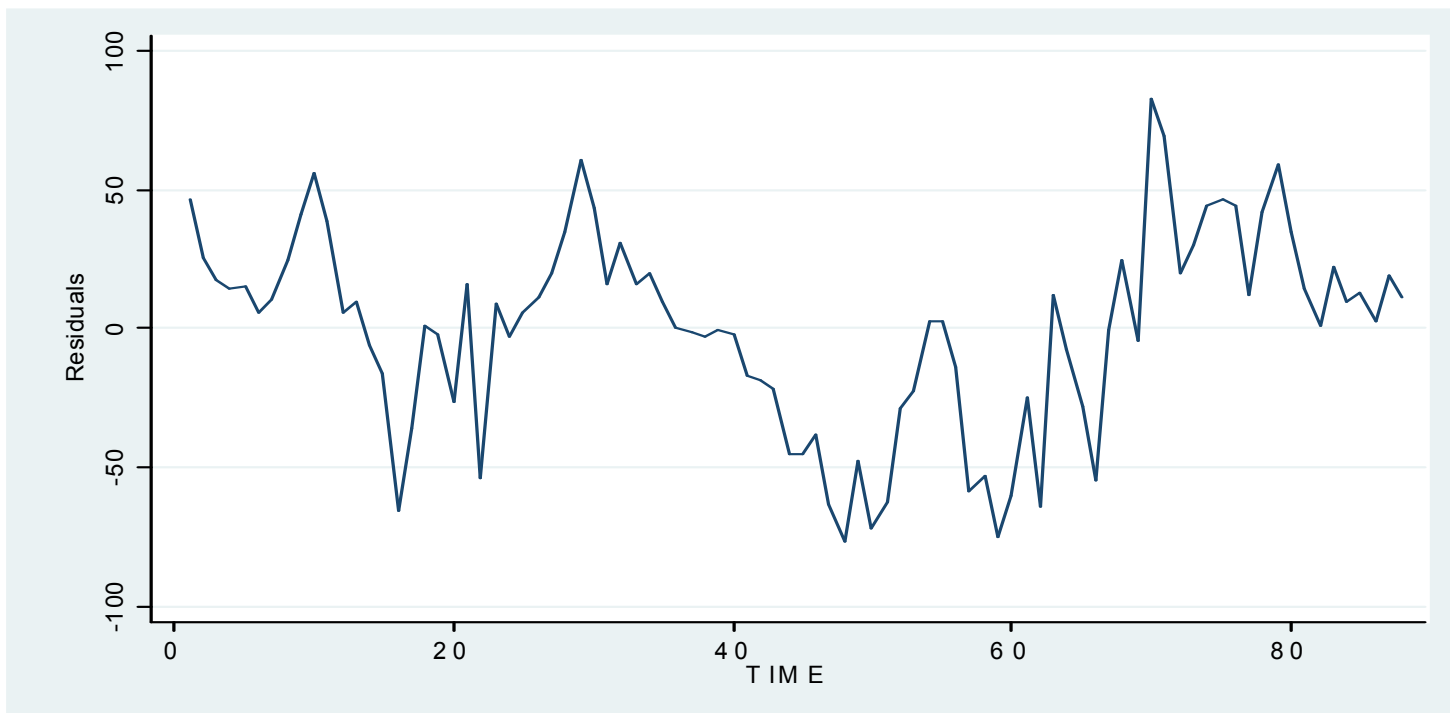
Построение графика остатков

Сохранить остатки регрессии можно с помощью команды:

`predict res, resid`

Построить график остатков можно с помощью команды:

`line res time`



Команда для проведения теста Дики и Фуллера (без константы и тренда):

dfuller res, nocons regress

dfuller res, nocons regress

Dickey-Fuller test for unit root Number of obs = 87

----- Interpolated Dickey-Fuller -----

Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
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Z(t)	-3.779	-2.605	-1.950	-1.610
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D.res	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]
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res

L1.	-.2753123	.0728518	-3.78	0.000	-.4201369 - .1304876
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Проведение теста Дики и Фуллера для ряда dividends:

dfuller dividends, trend regress

Dickey-Fuller test for unit root Number of obs = 87

----- Interpolated Dickey-Fuller -----

Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(t) -2.639	-4.069	-3.463	-3.158

MacKinnon approximate p-value for Z(t) = 0.2621

D.dividends	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]
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dividends

L1.	-.0632267	.0239544	-2.64	0.010	-.1108625	-.0155908
_trend	.112616	.0358928	3.14	0.002	.0412393	.1839927
_cons	.6779097	.3739169	1.81	0.073	-.0656651	1.421484

Проведение теста Дики и Фуллера для первых разностей ряда dividends:

dfuller d.dividends, trend regress

Dickey-Fuller test for unit root Number of obs = 86

----- Interpolated Dickey-Fuller -----

Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-3.902	-4.071	-3.158

MacKinnon approximate p-value for Z(t) = 0.0120

D2.dividends	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
D.dividends						
L1.	-.314085	.0804892	-3.90	0.000	-.4741748	-.1539952
_trend	.0043526	.0058159	0.75	0.456	-.007215	.0159202
_cons	.2371742	.2802646	0.85	0.400	-.3202608	.7946092

Проведение теста Дики и Фуллера для ряда profits:

dfuller profits, trend regress

Dickey-Fuller test for unit root Number of obs = 87

----- Interpolated Dickey-Fuller -----

Test Statistic		1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-1.715	-4.069	-3.463	-3.158

MacKinnon approximate p-value for Z(t) = 0.7444

D.profits	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
profits						
L1.	-.0658814	.0384211	-1.71	0.090	-.142286	.0105232
_trend	.0835008	.0731167	1.14	0.257	-.0618998	.2289015
_cons	6.605	3.050947	2.16	0.033	.5378582	12.67214

Проведение теста Дики и Фуллера для первых разностей ряда profits:

dfuller d.profits, trend regress

Dickey-Fuller test for unit root Number of obs = 86

----- Interpolated Dickey-Fuller -----

Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-6.948	-4.071	-3.464

MacKinnon approximate p-value for Z(t) = 0.0000

D2.profits	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
D.profits						
L1.	-.7348941	.1057679	-6.95	0.000	-.9452621	-.5245261
_trend	-.0186699	.0395891	-0.47	0.638	-.0974111	.0600712
_cons	2.061981	1.999053	1.03	0.305	-1.914056	6.038018

Оценка регрессии dividends на profits

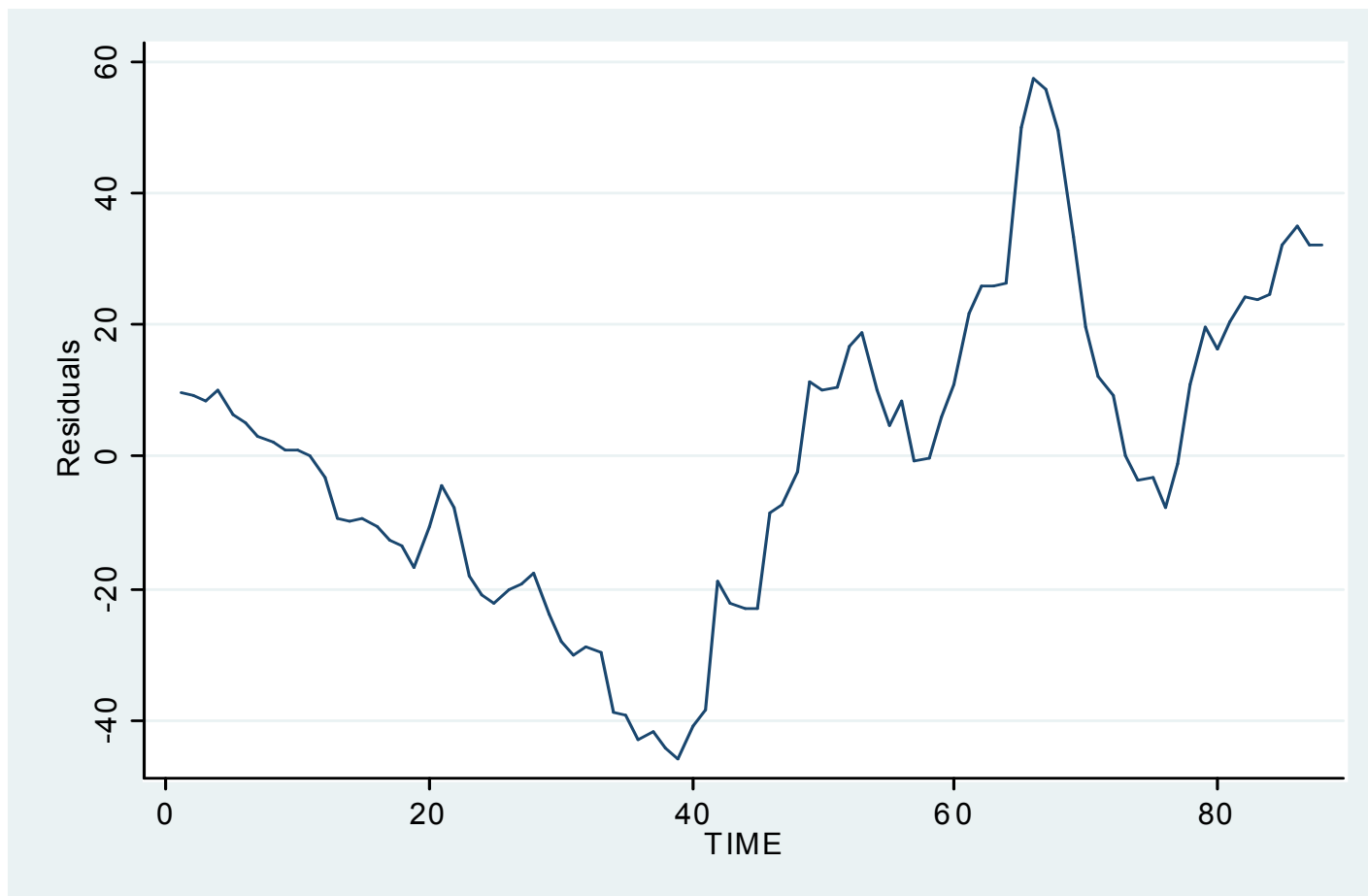
reg dividends profits

Source	SS	df	MS	Number of obs	=	88
				F(1, 86)	=	142.21
Model	79795.1672	1	79795.1672		Prob > F =	0.0000
Residual	48254.2752	86	561.096223		R-squared =	0.6232
					Adj R-squared	= 0.6188
Total	128049.442	87	1471.83267		Root MSE	= 23.687
Dividends	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
profits	.6281563	.0526742	11.93	0.000	.5234434	.7328692
_cons	-13.31143	7.362611	-1.81	0.074	-27.94782	1.324954

estat dwatson

Durbin-Watson-d-statistic (2,88) = .0712106

График остатков регрессии res1



Проверка нестационарности остатков

dfuller res1, regress

Dickey-Fuller test for unit root Number of obs = 87

----- Interpolated Dickey-Fuller -----

Test Statistic		1% Critical Value	5% Critical Value	10% Critical Value
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Z(t)	-0.900	-3.528	-2.900	-2.585
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MacKinnon approximate p-value for Z(t) = 0.7880

D.res1	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
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res1

L1.	-.026193	.0291023	-0.90	0.371	-.0840561	.0316702
_cons	.2493691	.6779492	0.37	0.714	-1.098575	1.597314

Проверка нестационарности остатков

dfuller res1, trend regress

Dickey-Fuller test for unit root Number of obs = 87

----- Interpolated Dickey-Fuller -----

Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-1.782	-4.069	-3.463

Mackinnon approximate p-value for Z(t) = 0.7132

D.res1	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
res1						
L1.	-.0587718	.0329729	-1.78	0.078	-.124342	.0067984
_trend	.0607841	.0305824	1.99	0.050	-.0000324	.1216006
_cons	-2.437218	1.507086	-1.62	0.110	-5.434224	.5597879