Statistics/Data Analysis

```
      name:  assignments_2
       log:  C:\Users\LENOVO\OneDrive\Desktop\Time_Series_Econometrics_Assignment\Time
> _Series_Econometrics_Assignment.smcl
  log type:  smcl
 opened on:  19 Oct 2023, 18:16:28

1 . tsset t
        time variable:  t, 1 to 100
                delta:  1 unit

2 .
3 .
4 . ***Ploting variable xit.views regarding stationarity*****
5 .
6 . foreach x of varlist x* {
    2. tsline `x'
    3. graph export `x'stationarity_Analysis.png, as(png) replace
    4. }
  (file x1tstationarity_Analysis.png written in PNG format)
  (file x2tstationarity_Analysis.png written in PNG format)
  (file x3tstationarity_Analysis.png written in PNG format)
  (file x4tstationarity_Analysis.png written in PNG format)
  (file x5tstationarity_Analysis.png written in PNG format)
  (file x6tstationarity_Analysis.png written in PNG format)
  (file x7tstationarity_Analysis.png written in PNG format)
  (file x8tstationarity_Analysis.png written in PNG format)
  (file x9tstationarity_Analysis.png written in PNG format)
  (file x10tstationarity_Analysis.png written in PNG format)

7 .
8 . /*****Checking whether xit is stationary or not using Dicky Fuller and
  >  Elliot Rothenberg and Stock(DFGLS) tests statistics.
  > */
9 .
10. **Dicky-fuller test using x4t**
11.
12. reg D.x4t L.x4t
```

Source	SS	df	MS		
Model	2792.99401	1	2792.99401	Number of obs	= 99
Residual	16216.9194	97	167.184736	F(1, 97)	= 16.71
				Prob > F	= 0.0001
Total	19009.9134	98	193.978708	R-squared	= 0.1469
				Adj R-squared	= 0.1381
				Root MSE	= 12.93

D.x4t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x4t L1.	-.2832257	.069294	-4.09	0.000	-.4207552	-.1456962
_cons	7.32688	2.077597	3.53	0.001	3.203426	11.45033

```
13. reg x4t t
```

Source	SS	df	MS		
Model	27070.3004	1	27070.3004	Number of obs	= 100
Residual	8634.78962	98	88.1100981	F(1, 98)	= 307.23
				Prob > F	= 0.0000
Total	35705.09	99	360.657475	R-squared	= 0.7582
				Adj R-squared	= 0.7557
				Root MSE	= 9.3867

x4t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
t	.569979	.0325181	17.53	0.000	.5054479	.6345101
_cons	-5.091405	1.891508	-2.69	0.008	-8.845042	-1.337768

```
14. predict x4t_trendless, resid

15.
16. reg D.x4t_trendless L.x4t_trendless
```

Source	SS	df	MS	Number of obs	=	99
				F(1, 97)	=	122.59
Model	10612.7855	1	10612.7855	Prob > F	=	0.0000
Residual	8397.1281	97	86.568331	R-squared	=	0.5583
				Adj R-squared	=	0.5537
Total	19009.9136	98	193.97871	Root MSE	=	9.3042

D.x4t_trendless	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x4t_trendless						
L1.	-1.108766	.1001394	-11.07	0.000	-1.307515	-.9100173
_cons	.1154466	.9351094	0.12	0.902	-1.740487	1.97138

```
17.
18.
19.
20. foreach var of varlist x*{
    2. *For x`var't*
21.
22. varsoc `var', maxlag(10)
    3. }
```

Selection-order criteria
Sample: 11 - 100 Number of obs = 90

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-491.563				3320.84	10.9458	10.9571	10.9736
1	-330.647	321.83*	1	0.000	95.0387*	7.39215*	7.41456*	7.44771*
2	-330.471	.3518	1	0.553	96.7969	7.41047	7.44407	7.49379
3	-330.45	.04289	1	0.836	98.9282	7.43221	7.47702	7.54332
4	-330.231	.43645	1	0.509	100.668	7.44959	7.50559	7.58846
5	-330.224	.01501	1	0.902	102.921	7.47164	7.53885	7.6383
6	-329.817	.81296	1	0.367	104.3	7.48483	7.56324	7.67926
7	-328.418	2.7995	1	0.094	103.393	7.47595	7.56555	7.69815
8	-328.405	.02432	1	0.876	105.709	7.4979	7.59871	7.74788
9	-328.396	.01929	1	0.890	108.089	7.51991	7.63192	7.79766
10	-327.821	1.1498	1	0.284	109.148	7.52935	7.65256	7.83489

Endogenous: x1t
Exogenous: _cons

Selection-order criteria
Sample: 11 - 100 Number of obs = 90

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-491.899				3345.68	10.9533	10.9645	10.9811
1	-330.645	322.51*	1	0.000	95.034*	7.3921*	7.41451*	7.44766*
2	-330.468	.35335	1	0.552	96.7904	7.4104	7.444	7.49373
3	-330.447	.04243	1	0.837	98.9221	7.43215	7.47695	7.54325
4	-330.229	.43502	1	0.510	100.663	7.44954	7.50554	7.58842
5	-330.222	.01527	1	0.902	102.916	7.47159	7.5388	7.63825
6	-329.814	.81507	1	0.367	104.292	7.48476	7.56316	7.67919
7	-328.416	2.7955	1	0.095	103.39	7.47592	7.56553	7.69812
8	-328.404	.02468	1	0.875	105.706	7.49787	7.59867	7.74785
9	-328.394	.01955	1	0.889	108.085	7.51987	7.63188	7.79763
10	-327.818	1.152	1	0.283	109.141	7.52929	7.6525	7.83483

Endogenous: x2t
Exogenous: _cons

Selection-order criteria
Sample: **11 - 100** Number of obs = **90**

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-332.061				95.9172*	7.40136*	7.41256*	7.42914*
1	-331.913	.29647	1	0.586	97.7506	7.42029	7.44269	7.47584
2	-331.888	.04921	1	0.824	99.8943	7.44196	7.47557	7.52529
3	-331.662	.45318	1	0.501	101.629	7.45915	7.50395	7.57025
4	-331.655	.0129	1	0.910	103.904	7.48123	7.53723	7.62011
5	-331.299	.71327	1	0.398	105.409	7.49553	7.56273	7.66218
6	-329.794	3.0093	1	0.083	104.246	7.48431	7.56272	7.67874
7	-329.786	.01548	1	0.901	106.586	7.50636	7.59597	7.72857
8	-329.783	.00737	1	0.932	108.994	7.5285	7.62931	7.77848
9	-329.274	1.0175	1	0.313	110.218	7.53942	7.65143	7.81718
10	-325.727	7.0941*	1	0.008	104.185	7.48282	7.60603	7.78835

Endogenous: x3t
Exogenous: _cons

Selection-order criteria
Sample: **11 - 100** Number of obs = **90**

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-385.436				314.065	8.58748	8.59868	8.61525
1	-357.8	55.273	1	0.000	173.761	7.99555	8.01795	8.0511
2	-347.681	20.238	1	0.000	141.891	7.79291	7.82652	7.87624
3	-341.941	11.481	1	0.001	127.709	7.68757	7.73237	7.79867
4	-340.178	3.5254	1	0.060	125.57	7.67062	7.72663	7.8095
5	-339.727	.90197	1	0.342	127.122	7.68282	7.75003	7.84948
6	-334.831	9.7911*	1	0.002	116.593*	7.59626*	7.67466*	7.79068*
7	-334.433	.79688	1	0.372	118.181	7.60962	7.69923	7.83183
8	-334.05	.76622	1	0.381	119.836	7.62333	7.72414	7.87331
9	-334.049	.00187	1	0.965	122.557	7.64553	7.75754	7.92329
10	-333.078	1.9429	1	0.163	122.673	7.64617	7.76938	7.9517

Endogenous: x4t
Exogenous: _cons

Selection-order criteria
Sample: **11 - 100** Number of obs = **90**

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-695.786				310599	15.4841	15.4953	15.5119
1	-332.588	726.4*	1	0.000	99.2272*	7.43528*	7.45768*	7.49083*
2	-332.409	.35761	1	0.550	101.056	7.45353	7.48713	7.53686
3	-332.392	.03385	1	0.854	103.292	7.47538	7.52018	7.58648
4	-332.176	.43115	1	0.511	105.114	7.49281	7.54881	7.63169
5	-332.169	.01511	1	0.902	107.467	7.51486	7.58207	7.68152
6	-331.779	.77951	1	0.377	108.947	7.52842	7.60683	7.72285
7	-330.375	2.8084	1	0.094	107.99	7.51944	7.60905	7.74165
8	-330.343	.06441	1	0.800	110.359	7.54095	7.64175	7.79093
9	-330.342	.00064	1	0.980	112.867	7.56316	7.67517	7.84092
10	-329.801	1.0822	1	0.298	114.059	7.57336	7.69657	7.87889

Endogenous: x5t
Exogenous: _cons

Selection-order criteria
Sample: **11 - 100** Number of obs = **90**

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-700.723				346618	15.5939	15.6051	15.6216
1	-367.878	665.69	1	0.000	217.379	8.21951	8.24191	8.27506
2	-354.32	27.116	1	0.000	164.447	7.94044	7.97404	8.02377
3	-350.553	7.5342	1	0.006	154.645	7.87895	7.92375	7.99005*
4	-350.47	.16526	1	0.684	157.839	7.89934	7.95534	8.03821
5	-350.051	.83856	1	0.360	159.902	7.91224	7.97945	8.07889
6	-349.811	.47879	1	0.489	162.647	7.92914	8.00755	8.12357

7	-347.942	3.739	1	0.053	159.559	7.90982	7.99943	8.13203
8	-346.374	3.1351	1	0.077	157.591	7.89721	7.99802	8.14719
9	-343.839	5.0709	1	0.024	152.343	7.86309	7.9751	8.14084
10	-339.306	9.065*	1	0.003	140.884*	7.78459*	7.9078*	8.09012

Endogenous: x6t
Exogenous: _cons

Selection-order criteria
Sample: 11 - 100 Number of obs = 90

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-590.965				30239.3	13.1548	13.166	13.1826
1	-400.686	380.56	1	0.000	450.657	8.94858	8.97098	9.00413
2	-394.299	12.773	1	0.000	399.823*	8.82887*	8.86248*	8.9122*
3	-393.625	1.3488	1	0.245	402.74	8.83611	8.88091	8.94721
4	-392.936	1.3781	1	0.240	405.555	8.84302	8.89902	8.9819
5	-392.267	1.3376	1	0.247	408.586	8.85038	8.91759	9.01703
6	-392.14	.25517	1	0.613	416.633	8.86977	8.94817	9.0642
7	-391.235	1.8091	1	0.179	417.583	8.87189	8.9615	9.09409
8	-390.835	.79906	1	0.371	423.277	8.88523	8.98604	9.13521
9	-390.808	.05467	1	0.815	432.634	8.90685	9.01886	9.1846
10	-387.828	5.961*	1	0.015	414.133	8.86284	8.98605	9.16837

Endogenous: x7t
Exogenous: _cons

Selection-order criteria
Sample: 11 - 100 Number of obs = 90

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-554.282				13382.7	12.3396	12.3508	12.3674
1	-393.028	322.51*	1	0.000	380.136*	8.7784*	8.8008*	8.83395*
2	-392.851	.35335	1	0.552	387.162	8.79669	8.8303	8.88002
3	-392.83	.04243	1	0.837	395.688	8.81845	8.86325	8.92955
4	-392.613	.43502	1	0.510	402.652	8.83583	8.89184	8.97471
5	-392.605	.01527	1	0.902	411.664	8.85789	8.92509	9.02454
6	-392.197	.81507	1	0.367	417.169	8.87105	8.94946	9.06548
7	-390.8	2.7955	1	0.095	413.562	8.86221	8.95182	9.08442
8	-390.787	.02468	1	0.875	422.824	8.88416	8.98497	9.13414
9	-390.777	.01955	1	0.889	432.339	8.90617	9.01817	9.18392
10	-390.1	1.3545	1	0.244	435.585	8.91334	9.03655	9.21887

Endogenous: x8t
Exogenous: _cons

Selection-order criteria
Sample: 11 - 100 Number of obs = 90

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-373.861				242.832	8.33025	8.34145	8.35802
1	-355.176	37.371	1	0.000	163.919	7.93724	7.95964	7.99279
2	-346.675	17.001	1	0.000	138.756	7.77057	7.80417	7.85389
3	-341.469	10.413	1	0.001	126.377	7.67709	7.72189	7.78819
4	-339.873	3.193	1	0.074	124.72	7.66383	7.71984	7.80271
5	-339.478	.78944	1	0.374	126.419	7.67728	7.74449	7.84394
6	-334.702	9.5515*	1	0.002	116.259*	7.59338*	7.67178*	7.78781*
7	-334.325	.75457	1	0.385	117.897	7.60722	7.69682	7.82942
8	-333.962	.72575	1	0.394	119.602	7.62138	7.72218	7.87136
9	-333.96	.00408	1	0.949	122.315	7.64355	7.75556	7.92131
10	-332.957	2.0063	1	0.157	122.344	7.64348	7.76669	7.94901

Endogenous: x9t
Exogenous: _cons

Selection-order criteria
Sample: **11 - 100** Number of obs = **90**

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	**-654.348**				**123674**	**14.5633**	**14.5745**	**14.5911**
1	**-448.252**	**412.19**	**1**	**0.000**	**1296.9**	**10.0056**	**10.028**	**10.0612**
2	**-444.451**	**7.6018**	**1**	**0.006**	**1218.66**	**9.94336**	**9.97697**	**10.0267**
3	**-436.382**	**16.139**	**1**	**0.000**	**1041.53**	**9.78627**	**9.83107**	**9.89737**
4	**-433.04**	**6.6836**	**1**	**0.010**	**988.772**	**9.73423**	**9.79023**	**9.8731***
5	**-432.695**	**.69066**	**1**	**0.406**	**1003.35**	**9.74877**	**9.81598**	**9.91543**
6	**-431.715**	**1.9594**	**1**	**0.162**	**1003.92**	**9.74923**	**9.82763**	**9.94366**
7	**-430.574**	**2.2817**	**1**	**0.131**	**1000.93**	**9.7461**	**9.8357**	**9.9683**
8	**-428.011**	**5.1264**	**1**	**0.024**	**966.955**	**9.71136**	**9.81216**	**9.96134**
9	**-424.051**	**7.9204***	**1**	**0.005**	**905.62***	**9.64558***	**9.75758***	**9.92333**
10	**-423.504**	**1.0931**	**1**	**0.296**	**915.072**	**9.65565**	**9.77886**	**9.96118**

Endogenous: x10t
Exogenous: _cons

Selection-order criteria
Sample: **11 - 100** Number of obs = **90**

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	**-330.628**				**92.9107***	**7.36951***	**7.38072***	**7.39729***
1	**-330.238**	**.78116**	**1**	**0.377**	**94.1781**	**7.38306**	**7.40546**	**7.43861**
2	**-330.236**	**.00355**	**1**	**0.953**	**96.2922**	**7.40524**	**7.43884**	**7.48857**
3	**-330.153**	**.16517**	**1**	**0.684**	**98.2788**	**7.42563**	**7.47043**	**7.53673**
4	**-330.085**	**.13556**	**1**	**0.713**	**100.342**	**7.44634**	**7.50235**	**7.58522**
5	**-329.381**	**1.4097**	**1**	**0.235**	**101.01**	**7.4529**	**7.52011**	**7.61956**
6	**-328.419**	**1.9224**	**1**	**0.166**	**101.109**	**7.45376**	**7.53217**	**7.64819**
7	**-328.325**	**.18953**	**1**	**0.663**	**103.18**	**7.47388**	**7.56349**	**7.69609**
8	**-328.256**	**.13754**	**1**	**0.711**	**105.358**	**7.49457**	**7.59538**	**7.74456**
9	**-327.351**	**1.8104**	**1**	**0.178**	**105.607**	**7.49668**	**7.60869**	**7.77444**
10	**-322.159**	**10.384***	**1**	**0.001**	**96.2431**	**7.40353**	**7.52674**	**7.70906**

Endogenous: x4t_trendless
Exogenous: _cons

```
23.
24. *PART 1:(Augmented Dicky Fuller test)*
25. dfuller x1t, regress trend lags(1)
```

Augmented Dickey-Fuller test for unit root Number of obs = **98**

	Test Statistic	Interpolated Dickey-Fuller: 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**-0.309**	**-4.044**	**-3.452**	**-3.151**

MacKinnon approximate p-value for Z(t) = **0.9893**

D.x1t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x1t						
L1.	**-.0098037**	**.0316979**	**-0.31**	**0.758**	**-.0727406**	**.0531331**
LD.	**-.096259**	**.1055916**	**-0.91**	**0.364**	**-.3059136**	**.1133955**
_trend	**.0524146**	**.0722891**	**0.73**	**0.470**	**-.091117**	**.1959463**
_cons	**-5.541951**	**2.288306**	**-2.42**	**0.017**	**-10.08544**	**-.9984647**

26. dfuller x1t, regress lags(1)

Augmented Dickey-Fuller test for unit root Number of obs = **98**

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**-2.003**	**-3.513**	**-2.892**	**-2.581**

MacKinnon approximate p-value for Z(t) = **0.2854**

D.x1t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x1t						
L1.	**-.0300366**	**.0149985**	**-2.00**	**0.048**	**-.0598123**	**-.0002609**
LD.	**-.0733567**	**.1005047**	**-0.73**	**0.467**	**-.2728838**	**.1261704**
_cons	**-5.639785**	**2.278616**	**-2.48**	**0.015**	**-10.16341**	**-1.116161**

27. dfuller x2t, regress trend lags(1)

Augmented Dickey-Fuller test for unit root Number of obs = **98**

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**-0.309**	**-4.044**	**-3.452**	**-3.151**

MacKinnon approximate p-value for Z(t) = **0.9893**

D.x2t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x2t						
L1.	**-.0098037**	**.0316979**	**-0.31**	**0.758**	**-.0727406**	**.0531332**
LD.	**-.0962592**	**.1055916**	**-0.91**	**0.364**	**-.3059137**	**.1133954**
_trend	**.0523166**	**.0725683**	**0.72**	**0.473**	**-.0917694**	**.1964027**
_cons	**-5.535267**	**2.261499**	**-2.45**	**0.016**	**-10.02553**	**-1.045007**

28. dfuller x2t, regress lags(1)

Augmented Dickey-Fuller test for unit root Number of obs = **98**

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**-2.004**	**-3.513**	**-2.892**	**-2.581**

MacKinnon approximate p-value for Z(t) = **0.2847**

D.x2t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x2t						
L1.	**-.0299435**	**.0149403**	**-2.00**	**0.048**	**-.0596037**	**-.0002832**
LD.	**-.0734943**	**.1005044**	**-0.73**	**0.466**	**-.2730208**	**.1260322**
_cons	**-5.599156**	**2.254043**	**-2.48**	**0.015**	**-10.074**	**-1.124316**

29. dfuller x3t, regress trend lags(0)

Dickey-Fuller test for unit root Number of obs = **99**

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**-11.018**	**-4.042**	**-3.451**	**-3.151**

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

D.x3t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x3t						
L1.	**-1.108826**	**.1006344**	**-11.02**	**0.000**	**-1.308584**	**-.9090682**
_trend	**.0703354**	**.0336109**	**2.09**	**0.039**	**.0036184**	**.1370524**
_cons	**-5.097098**	**1.961097**	**-2.60**	**0.011**	**-8.989846**	**-1.204351**

30. dfuller x3t, regress lags(0)

Dickey-Fuller test for unit root Number of obs = **99**

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**-10.636**	**-3.511**	**-2.891**	**-2.580**

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

D.x3t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x3t						
L1.	**-1.065255**	**.1001572**	**-10.64**	**0.000**	**-1.26404**	**-.866471**
_cons	**-1.51032**	**.9694074**	**-1.56**	**0.122**	**-3.434325**	**.4136853**

31. dfuller x4t, regress trend lags(6)

Augmented Dickey-Fuller test for unit root Number of obs = **93**

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**-3.530**	**-4.055**	**-3.457**	**-3.154**

MacKinnon approximate p-value for Z(t) = **0.0363**

D.x4t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x4t						
L1.	**-1.110185**	**.3145104**	**-3.53**	**0.001**	**-1.735623**	**-.4847462**
LD.	**.022825**	**.2917026**	**0.08**	**0.938**	**-.5572576**	**.6029076**
L2D.	**.0309258**	**.2610137**	**0.12**	**0.906**	**-.4881286**	**.5499802**
L3D.	**.0520696**	**.2317056**	**0.22**	**0.823**	**-.4087024**	**.5128416**
L4D.	**-.001094**	**.2010016**	**-0.01**	**0.996**	**-.4008077**	**.3986196**
L5D.	**-.104476**	**.1618605**	**-0.65**	**0.520**	**-.4263534**	**.2174014**
L6D.	**.0292662**	**.1086823**	**0.27**	**0.788**	**-.1868604**	**.2453928**
_trend	**.6229644**	**.1808771**	**3.44**	**0.001**	**.2632704**	**.9826583**
_cons	**-4.453849**	**3.031648**	**-1.47**	**0.146**	**-10.48261**	**1.574915**

32. dfuller x4t, regress lags(6)

Augmented Dickey-Fuller test for unit root Number of obs = **93**

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**-0.729**	**-3.520**	**-2.896**	**-2.583**

MacKinnon approximate p-value for Z(t) = **0.8391**

D.x4t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x4t						
L1.	**-.0509056**	**.0698263**	**-0.73**	**0.468**	**-.189739**	**.0879279**
LD.	**-.8999252**	**.1225165**	**-7.35**	**0.000**	**-1.143521**	**-.6563294**
L2D.	**-.7265885**	**.1492555**	**-4.87**	**0.000**	**-1.023349**	**-.4298285**
L3D.	**-.5542449**	**.1599899**	**-3.46**	**0.001**	**-.8723476**	**-.2361422**
L4D.	**-.4655119**	**.158298**	**-2.94**	**0.004**	**-.7802507**	**-.1507732**
L5D.	**-.4142856**	**.1429028**	**-2.90**	**0.005**	**-.6984147**	**-.1301565**
L6D.	**-.1091785**	**.1072332**	**-1.02**	**0.312**	**-.3223867**	**.1040298**
_cons	**3.719279**	**2.003581**	**1.86**	**0.067**	**-.2643763**	**7.702935**

33. dfuller x5t, regress trend lags(1)

Augmented Dickey-Fuller test for unit root Number of obs = **98**

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**1.101**	**-4.044**	**-3.452**	**-3.151**

MacKinnon approximate p-value for Z(t) = **1.0000**

D.x5t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x5t						
L1.	**.0062547**	**.0056816**	**1.10**	**0.274**	**-.0050262**	**.0175355**
LD.	**-.1218633**	**.10307**	**-1.18**	**0.240**	**-.3265111**	**.0827846**
_trend	**.4078324**	**.1122271**	**3.63**	**0.000**	**.185003**	**.6306619**
_cons	**-2.676803**	**2.921522**	**-0.92**	**0.362**	**-8.477554**	**3.123948**

34. dfuller x5t, regress lags(1)

Augmented Dickey-Fuller test for unit root Number of obs = **98**

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**7.717**	**-3.513**	**-2.892**	**-2.581**

MacKinnon approximate p-value for Z(t) = **1.0000**

D.x5t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x5t						
L1.	**.0239601**	**.0031048**	**7.72**	**0.000**	**.0177963**	**.0301238**
LD.	**-.0168428**	**.1050993**	**-0.16**	**0.873**	**-.2254913**	**.1918057**
_cons	**6.536399**	**1.542216**	**4.24**	**0.000**	**3.474714**	**9.598084**

35. dfuller x6t, regress trend lags(10)

Augmented Dickey-Fuller test for unit root Number of obs = **89**

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**-0.023**	**-4.064**	**-3.461**	**-3.157**

MacKinnon approximate p-value for Z(t) = **0.9940**

D.x6t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x6t						
L1.	-.0002153	.0093444	-0.02	0.982	-.0188264	.0183958
LD.	-.8922658	.110584	-8.07	0.000	-1.112513	-.6720187
L2D.	-.751545	.150557	-4.99	0.000	-1.051405	-.4516847
L3D.	-.5762522	.172316	-3.34	0.001	-.9194493	-.2330552
L4D.	-.4881828	.1833846	-2.66	0.009	-.8534249	-.1229406
L5D.	-.5206725	.1891668	-2.75	0.007	-.8974308	-.1439141
L6D.	-.2273674	.190225	-1.20	0.236	-.6062333	.1514985
L7D.	-.1522003	.1853184	-0.82	0.414	-.5212939	.2168932
L8D.	-.082482	.1732318	-0.48	0.635	-.4275031	.2625391
L9D.	-.122574	.1517557	-0.81	0.422	-.4248217	.1796738
L10D.	-.2702678	.1108496	-2.44	0.017	-.491044	-.0494916
_trend	-2.02643	.4987403	-4.06	0.000	-3.019757	-1.033103
_cons	5.973368	5.787153	1.03	0.305	-5.552746	17.49948

36. dfuller x6t, regress lags(10)

Augmented Dickey-Fuller test for unit root Number of obs = **89**

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**1.552**	**-3.525**	**-2.899**	**-2.584**

MacKinnon approximate p-value for Z(t) = **0.9977**

D.x6t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x6t						
L1.	.0146286	.0094271	1.55	0.125	-.0041432	.0334004
LD.	-.7514416	.1151027	-6.53	0.000	-.9806404	-.5222428
L2D.	-.4444049	.1427156	-3.11	0.003	-.7285881	-.1602218
L3D.	-.1271997	.1449086	-0.88	0.383	-.4157496	.1613502
L4D.	.0584575	.1365918	0.43	0.670	-.2135315	.3304465
L5D.	.088712	.1263596	0.70	0.485	-.1629022	.3403262
L6D.	.3915079	.1249029	3.13	0.002	.1427944	.6402213
L7D.	.4196838	.1321327	3.18	0.002	.1565739	.6827937
L8D.	.3944015	.1396544	2.82	0.006	.1163142	.6724889
L9D.	.2137914	.1394076	1.53	0.129	-.0638047	.4913875
L10D.	-.1052594	.1130533	-0.93	0.355	-.3303772	.1198585
_cons	-11.51892	4.239008	-2.72	0.008	-19.95986	-3.077974

37. dfuller x7t, regress trend lags(2)

Augmented Dickey-Fuller test for unit root Number of obs = **97**

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**-0.230**	**-4.047**	**-3.453**	**-3.152**

MacKinnon approximate p-value for Z(t) = **0.9910**

D.x7t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x7t						
L1.	**-.005158**	**.0224688**	**-0.23**	**0.819**	**-.049783**	**.0394671**
LD.	**.3780867**	**.1043631**	**3.62**	**0.000**	**.1708125**	**.585361**
L2D.	**-.1411494**	**.1053936**	**-1.34**	**0.184**	**-.3504701**	**.0681713**
_trend	**.1191714**	**.1582511**	**0.75**	**0.453**	**-.1951289**	**.4334717**
_cons	**-11.43742**	**4.839166**	**-2.36**	**0.020**	**-21.04843**	**-1.826422**

38. dfuller x7t, regress lags(2)

Augmented Dickey-Fuller test for unit root Number of obs = **97**

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**-1.944**	**-3.514**	**-2.892**	**-2.581**

MacKinnon approximate p-value for Z(t) = **0.3115**

D.x7t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x7t						
L1.	**-.0201596**	**.0103681**	**-1.94**	**0.055**	**-.0407485**	**.0004293**
LD.	**.3952935**	**.1015938**	**3.89**	**0.000**	**.1935484**	**.5970387**
L2D.	**-.1193842**	**.1011168**	**-1.18**	**0.241**	**-.3201822**	**.0814138**
_cons	**-11.41749**	**4.827818**	**-2.36**	**0.020**	**-21.00458**	**-1.830402**

39. dfuller x8t, regress trend lags(1)

Augmented Dickey-Fuller test for unit root Number of obs = **98**

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**-0.321**	**-4.044**	**-3.452**	**-3.151**

MacKinnon approximate p-value for Z(t) = **0.9890**

D.x8t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x8t						
L1.	**-.0101569**	**.0316424**	**-0.32**	**0.749**	**-.0729836**	**.0526699**
LD.	**-.0943836**	**.1054572**	**-0.89**	**0.373**	**-.3037713**	**.115004**
_trend	**.1039812**	**.1451807**	**0.72**	**0.476**	**-.1842784**	**.3922408**
_cons	**-11.18482**	**4.591827**	**-2.44**	**0.017**	**-20.302**	**-2.067639**

40. dfuller x8t, regress lags(1)

Augmented Dickey-Fuller test for unit root Number of obs = **98**

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**-2.014**	**-3.513**	**-2.892**	**-2.581**

MacKinnon approximate p-value for Z(t) = **0.2807**

D.x8t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x8t						
L1.	**-.0301138**	**.0149556**	**-2.01**	**0.047**	**-.0598044**	**-.0004232**
LD.	**-.0717629**	**.1003583**	**-0.72**	**0.476**	**-.2709993**	**.1274735**
_cons	**-11.37222**	**4.5726**	**-2.49**	**0.015**	**-20.44998**	**-2.294458**

41. dfuller x9t, regress trend lags(6)

Augmented Dickey-Fuller test for unit root Number of obs = **93**

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**-3.530**	**-4.055**	**-3.457**	**-3.154**

MacKinnon approximate p-value for Z(t) = **0.0363**

D.x9t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x9t						
L1.	**-1.110185**	**.3145104**	**-3.53**	**0.001**	**-1.735623**	**-.4847463**
LD.	**.022825**	**.2917026**	**0.08**	**0.938**	**-.5572576**	**.6029076**
L2D.	**.0309258**	**.2610137**	**0.12**	**0.906**	**-.4881286**	**.5499802**
L3D.	**.0520696**	**.2317056**	**0.22**	**0.823**	**-.4087024**	**.5128416**
L4D.	**-.0010941**	**.2010016**	**-0.01**	**0.996**	**-.4008077**	**.3986196**
L5D.	**-.104476**	**.1618605**	**-0.65**	**0.520**	**-.4263534**	**.2174014**
L6D.	**.0292662**	**.1086823**	**0.27**	**0.788**	**-.1868604**	**.2453928**
_trend	**.5119459**	**.1502649**	**3.41**	**0.001**	**.2131276**	**.8107642**
_cons	**-4.550897**	**2.962556**	**-1.54**	**0.128**	**-10.44226**	**1.34047**

42. dfuller x9t, regress lags(6)

Augmented Dickey-Fuller test for unit root Number of obs = **93**

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**-0.871**	**-3.520**	**-2.896**	**-2.583**

MacKinnon approximate p-value for Z(t) = **0.7972**

D.x9t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x9t						
L1.	-.0731451	.0839397	-0.87	0.386	-.2400397	.0937494
LD.	-.8808066	.1287729	-6.84	0.000	-1.136842	-.6247715
L2D.	-.7111132	.1525544	-4.66	0.000	-1.014432	-.4077942
L3D.	-.5420795	.1617994	-3.35	0.001	-.8637801	-.2203789
L4D.	-.4565501	.1591909	-2.87	0.005	-.7730643	-.1400359
L5D.	-.4085373	.1432103	-2.85	0.005	-.6932778	-.1237968
L6D.	-.1069341	.1071832	-1.00	0.321	-.3200431	.1061749
_cons	3.444523	1.917623	1.80	0.076	-.3682258	7.257272

43. dfuller x10t, regress trend lags(9)

Augmented Dickey-Fuller test for unit root Number of obs = 90

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	0.842	-4.062	-3.460	-3.156

MacKinnon approximate p-value for Z(t) = 1.0000

D.x10t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x10t						
L1.	.0198879	.0236116	0.84	0.402	-.0271192	.0668949
LD.	.1817585	.1177366	1.54	0.127	-.0526371	.416154
L2D.	.5869634	.1078657	5.44	0.000	.3722194	.8017075
L3D.	-.2826926	.1247321	-2.27	0.026	-.5310152	-.0343701
L4D.	-.3961417	.1248059	-3.17	0.002	-.6446113	-.1476722
L5D.	.1150026	.1327674	0.87	0.389	-.1493169	.3793222
L6D.	.3707946	.1232989	3.01	0.004	.1253254	.6162638
L7D.	-.2299481	.1281776	-1.79	0.077	-.48513	.0252338
L8D.	-.3416317	.1065929	-3.21	0.002	-.5538417	-.1294216
L9D.	.0380441	.1116305	0.34	0.734	-.1841951	.2602833
_trend	.608999	.3769005	1.62	0.110	-.1413521	1.35935
_cons	-24.176	9.286518	-2.60	0.011	-42.66404	-5.687961

44. dfuller x10t, regress lags(9)

Augmented Dickey-Fuller test for unit root Number of obs = 90

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-1.792	-3.524	-2.898	-2.584

MacKinnon approximate p-value for Z(t) = 0.3843

D.x10t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x10t						
L1.	-.0156245	.0087172	-1.79	0.077	-.0329756	.0017267
LD.	.251318	.1106956	2.27	0.026	.030984	.4716521
L2D.	.622452	.1066772	5.83	0.000	.4101164	.8347876
L3D.	-.2765293	.1259384	-2.20	0.031	-.5272035	-.0258552
L4D.	-.3522395	.1230482	-2.86	0.005	-.5971607	-.1073182
L5D.	.1806382	.1276828	1.41	0.161	-.0735081	.4347845
L6D.	.3993844	.1232605	3.24	0.002	.1540405	.6447282
L7D.	-.2215839	.1293721	-1.71	0.091	-.4790927	.0359249
L8D.	-.2912101	.1029568	-2.83	0.006	-.4961404	-.0862797
L9D.	.1032906	.1051269	0.98	0.329	-.1059592	.3125404

_cons	**-18.39841**	**8.65747**	**-2.13**	**0.037**	**-35.63067**	**-1.166144**

```
45.
46.
47.  foreach var of varlist x*{
    2. *PART 2: (GLS-Augmented Dicky Fuller test)*
48. dfgls `var'
    3.
49. /**PART 3: Exponential trends**
  > dis "Using log values, we can check if log of `var' is stationary "
  > gen ln`var' = ln(`var')
  > dfuller ln`var', trend*/
50. }
```

DF-GLS for **x1t** Number of obs = **87**
Maxlag = **12** chosen by Schwert criterion

[lags]	DF-GLS tau Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
12	**-1.017**	**-3.580**	**-2.745**	**-2.472**
11	**-0.623**	**-3.580**	**-2.776**	**-2.502**
10	**-0.457**	**-3.580**	**-2.808**	**-2.532**
9	**-0.830**	**-3.580**	**-2.839**	**-2.562**
8	**-1.014**	**-3.580**	**-2.869**	**-2.590**
7	**-0.980**	**-3.580**	**-2.898**	**-2.617**
6	**-0.935**	**-3.580**	**-2.926**	**-2.643**
5	**-0.548**	**-3.580**	**-2.952**	**-2.668**
4	**-0.664**	**-3.580**	**-2.977**	**-2.690**
3	**-0.715**	**-3.580**	**-3.000**	**-2.711**
2	**-0.542**	**-3.580**	**-3.021**	**-2.730**
1	**-0.528**	**-3.580**	**-3.039**	**-2.747**

Opt Lag (Ng-Perron seq t) = **12** with RMSE **8.508436**
Min SC = **4.627715** at lag **1** with RMSE **9.607318**
Min MAIC = **4.554893** at lag **1** with RMSE **9.607318**

DF-GLS for **x2t** Number of obs = **87**
Maxlag = **12** chosen by Schwert criterion

[lags]	DF-GLS tau Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
12	**-1.017**	**-3.580**	**-2.745**	**-2.472**
11	**-0.623**	**-3.580**	**-2.776**	**-2.502**
10	**-0.457**	**-3.580**	**-2.808**	**-2.532**
9	**-0.830**	**-3.580**	**-2.839**	**-2.562**
8	**-1.014**	**-3.580**	**-2.869**	**-2.590**
7	**-0.980**	**-3.580**	**-2.898**	**-2.617**
6	**-0.935**	**-3.580**	**-2.926**	**-2.643**
5	**-0.548**	**-3.580**	**-2.952**	**-2.668**
4	**-0.664**	**-3.580**	**-2.977**	**-2.690**
3	**-0.715**	**-3.580**	**-3.000**	**-2.711**
2	**-0.542**	**-3.580**	**-3.021**	**-2.730**
1	**-0.528**	**-3.580**	**-3.039**	**-2.747**

Opt Lag (Ng-Perron seq t) = **12** with RMSE **8.508435**
Min SC = **4.627715** at lag **1** with RMSE **9.607317**
Min MAIC = **4.554893** at lag **1** with RMSE **9.607317**

DF-GLS for **x3t** Number of obs = **87**
Maxlag = **12** chosen by Schwert criterion

[lags]	DF-GLS tau Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
12	**-2.608**	**-3.580**	**-2.745**	**-2.472**
11	**-2.786**	**-3.580**	**-2.776**	**-2.502**
10	**-3.189**	**-3.580**	**-2.808**	**-2.532**
9	**-3.725**	**-3.580**	**-2.839**	**-2.562**
8	**-3.320**	**-3.580**	**-2.869**	**-2.590**

7	**-3.216**	**-3.580**	**-2.898**	**-2.617**
6	**-3.392**	**-3.580**	**-2.926**	**-2.643**
5	**-3.577**	**-3.580**	**-2.952**	**-2.668**
4	**-4.442**	**-3.580**	**-2.977**	**-2.690**
3	**-4.651**	**-3.580**	**-3.000**	**-2.711**
2	**-5.136**	**-3.580**	**-3.021**	**-2.730**
1	**-6.795**	**-3.580**	**-3.039**	**-2.747**

Opt Lag (Ng-Perron seq t) = **11** with RMSE **8.413303**
Min SC = **4.627797** at lag **1** with RMSE **9.607711**
Min MAIC = **5.602521** at lag **12** with RMSE **8.315217**

DF-GLS for **x4t** Number of obs = **87**
Maxlag = **12** chosen by Schwert criterion

[lags]	DF-GLS tau Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
12	**-2.608**	**-3.580**	**-2.745**	**-2.472**
11	**-2.786**	**-3.580**	**-2.776**	**-2.502**
10	**-3.189**	**-3.580**	**-2.808**	**-2.532**
9	**-3.725**	**-3.580**	**-2.839**	**-2.562**
8	**-3.320**	**-3.580**	**-2.869**	**-2.590**
7	**-3.216**	**-3.580**	**-2.898**	**-2.617**
6	**-3.392**	**-3.580**	**-2.926**	**-2.643**
5	**-3.577**	**-3.580**	**-2.952**	**-2.668**
4	**-4.442**	**-3.580**	**-2.977**	**-2.690**
3	**-4.651**	**-3.580**	**-3.000**	**-2.711**
2	**-5.136**	**-3.580**	**-3.021**	**-2.730**
1	**-6.795**	**-3.580**	**-3.039**	**-2.747**

Opt Lag (Ng-Perron seq t) = **11** with RMSE **8.413303**
Min SC = **4.627797** at lag **1** with RMSE **9.607711**
Min MAIC = **5.602521** at lag **12** with RMSE **8.315217**

DF-GLS for **x5t** Number of obs = **87**
Maxlag = **12** chosen by Schwert criterion

[lags]	DF-GLS tau Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
12	**-2.235**	**-3.580**	**-2.745**	**-2.472**
11	**-1.613**	**-3.580**	**-2.776**	**-2.502**
10	**-1.272**	**-3.580**	**-2.808**	**-2.532**
9	**-1.484**	**-3.580**	**-2.839**	**-2.562**
8	**-1.538**	**-3.580**	**-2.869**	**-2.590**
7	**-1.380**	**-3.580**	**-2.898**	**-2.617**
6	**-1.177**	**-3.580**	**-2.926**	**-2.643**
5	**-0.635**	**-3.580**	**-2.952**	**-2.668**
4	**-0.478**	**-3.580**	**-2.977**	**-2.690**
3	**-0.259**	**-3.580**	**-3.000**	**-2.711**
2	**0.203**	**-3.580**	**-3.021**	**-2.730**
1	**0.808**	**-3.580**	**-3.039**	**-2.747**

Opt Lag (Ng-Perron seq t) = **12** with RMSE **8.81921**
Min SC = **4.955714** at lag **6** with RMSE **9.956187**
Min MAIC = **4.776433** at lag **6** with RMSE **9.956187**

DF-GLS for **x6t** Number of obs = **87**
Maxlag = **12** chosen by Schwert criterion

[lags]	DF-GLS tau Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
12	**-1.712**	**-3.580**	**-2.745**	**-2.472**
11	**-1.617**	**-3.580**	**-2.776**	**-2.502**
10	**-1.967**	**-3.580**	**-2.808**	**-2.532**
9	**-2.497**	**-3.580**	**-2.839**	**-2.562**
8	**-1.973**	**-3.580**	**-2.869**	**-2.590**
7	**-1.487**	**-3.580**	**-2.898**	**-2.617**
6	**-1.142**	**-3.580**	**-2.926**	**-2.643**
5	**-0.619**	**-3.580**	**-2.952**	**-2.668**

4	**-0.425**	**-3.580**	**-2.977**	**-2.690**
3	**0.089**	**-3.580**	**-3.000**	**-2.711**
2	**0.745**	**-3.580**	**-3.021**	**-2.730**
1	**1.384**	**-3.580**	**-3.039**	**-2.747**

Opt Lag (Ng-Perron seq t) = **9** with RMSE **11.34343**
Min SC = **5.370601** at lag **9** with RMSE **11.34343**
Min MAIC = **5.169076** at lag **11** with RMSE **11.0626**

DF-GLS for **x7t** Number of obs = **87**
Maxlag = **12** chosen by Schwert criterion

[lags]	DF-GLS tau Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
12	**-1.069**	**-3.580**	**-2.745**	**-2.472**
11	**-0.757**	**-3.580**	**-2.776**	**-2.502**
10	**-0.335**	**-3.580**	**-2.808**	**-2.532**
9	**-0.438**	**-3.580**	**-2.839**	**-2.562**
8	**-0.824**	**-3.580**	**-2.869**	**-2.590**
7	**-0.836**	**-3.580**	**-2.898**	**-2.617**
6	**-0.934**	**-3.580**	**-2.926**	**-2.643**
5	**-0.606**	**-3.580**	**-2.952**	**-2.668**
4	**-0.411**	**-3.580**	**-2.977**	**-2.690**
3	**-0.647**	**-3.580**	**-3.000**	**-2.711**
2	**-0.391**	**-3.580**	**-3.021**	**-2.730**
1	**-0.609**	**-3.580**	**-3.039**	**-2.747**

Opt Lag (Ng-Perron seq t) = **12** with RMSE **16.83834**
Min SC = **6.055008** at lag **1** with RMSE **19.61259**
Min MAIC = **5.970424** at lag **12** with RMSE **16.83834**

DF-GLS for **x8t** Number of obs = **87**
Maxlag = **12** chosen by Schwert criterion

[lags]	DF-GLS tau Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
12	**-0.920**	**-3.580**	**-2.745**	**-2.472**
11	**-0.526**	**-3.580**	**-2.776**	**-2.502**
10	**-0.357**	**-3.580**	**-2.808**	**-2.532**
9	**-0.733**	**-3.580**	**-2.839**	**-2.562**
8	**-0.918**	**-3.580**	**-2.869**	**-2.590**
7	**-0.884**	**-3.580**	**-2.898**	**-2.617**
6	**-0.840**	**-3.580**	**-2.926**	**-2.643**
5	**-0.458**	**-3.580**	**-2.952**	**-2.668**
4	**-0.573**	**-3.580**	**-2.977**	**-2.690**
3	**-0.623**	**-3.580**	**-3.000**	**-2.711**
2	**-0.451**	**-3.580**	**-3.021**	**-2.730**
1	**-0.436**	**-3.580**	**-3.039**	**-2.747**

Opt Lag (Ng-Perron seq t) = **12** with RMSE **17.01205**
Min SC = **6.016083** at lag **1** with RMSE **19.23457**
Min MAIC = **5.941082** at lag **1** with RMSE **19.23457**

DF-GLS for **x9t** Number of obs = **87**
Maxlag = **12** chosen by Schwert criterion

[lags]	DF-GLS tau Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
12	**-2.608**	**-3.580**	**-2.745**	**-2.472**
11	**-2.786**	**-3.580**	**-2.776**	**-2.502**
10	**-3.189**	**-3.580**	**-2.808**	**-2.532**
9	**-3.725**	**-3.580**	**-2.839**	**-2.562**
8	**-3.320**	**-3.580**	**-2.869**	**-2.590**
7	**-3.216**	**-3.580**	**-2.898**	**-2.617**
6	**-3.392**	**-3.580**	**-2.926**	**-2.643**
5	**-3.577**	**-3.580**	**-2.952**	**-2.668**
4	**-4.442**	**-3.580**	**-2.977**	**-2.690**
3	**-4.651**	**-3.580**	**-3.000**	**-2.711**
2	**-5.136**	**-3.580**	**-3.021**	**-2.730**

1	**-6.795**	**-3.580**	**-3.039**	**-2.747**

Opt Lag (Ng-Perron seq t) = **11** with RMSE **8.413303**
Min SC = **4.627797** at lag **1** with RMSE **9.607711**
Min MAIC = **5.602521** at lag **12** with RMSE **8.315217**

DF-GLS for **x10t** Number of obs = **87**
Maxlag = **12** chosen by Schwert criterion

[lags]	DF-GLS tau Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
12	**-1.157**	**-3.580**	**-2.745**	**-2.472**
11	**-0.832**	**-3.580**	**-2.776**	**-2.502**
10	**-0.566**	**-3.580**	**-2.808**	**-2.532**
9	**-0.467**	**-3.580**	**-2.839**	**-2.562**
8	**-0.296**	**-3.580**	**-2.869**	**-2.590**
7	**-0.664**	**-3.580**	**-2.898**	**-2.617**
6	**-1.125**	**-3.580**	**-2.926**	**-2.643**
5	**-0.765**	**-3.580**	**-2.952**	**-2.668**
4	**-0.399**	**-3.580**	**-2.977**	**-2.690**
3	**-0.519**	**-3.580**	**-3.000**	**-2.711**
2	**-1.000**	**-3.580**	**-3.021**	**-2.730**
1	**-0.260**	**-3.580**	**-3.039**	**-2.747**

Opt Lag (Ng-Perron seq t) = **12** with RMSE **26.02755**
Min SC = **7.023501** at lag **3** with RMSE **30.2376**
Min MAIC = **6.825646** at lag **8** with RMSE **27.64055**

DF-GLS for **x4t_trendless** Number of obs = **87**
Maxlag = **12** chosen by Schwert criterion

[lags]	DF-GLS tau Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
12	**-2.608**	**-3.580**	**-2.745**	**-2.472**
11	**-2.786**	**-3.580**	**-2.776**	**-2.502**
10	**-3.189**	**-3.580**	**-2.808**	**-2.532**
9	**-3.725**	**-3.580**	**-2.839**	**-2.562**
8	**-3.320**	**-3.580**	**-2.869**	**-2.590**
7	**-3.216**	**-3.580**	**-2.898**	**-2.617**
6	**-3.392**	**-3.580**	**-2.926**	**-2.643**
5	**-3.577**	**-3.580**	**-2.952**	**-2.668**
4	**-4.442**	**-3.580**	**-2.977**	**-2.690**
3	**-4.651**	**-3.580**	**-3.000**	**-2.711**
2	**-5.136**	**-3.580**	**-3.021**	**-2.730**
1	**-6.795**	**-3.580**	**-3.039**	**-2.747**

Opt Lag (Ng-Perron seq t) = **11** with RMSE **8.413303**
Min SC = **4.627797** at lag **1** with RMSE **9.607711**
Min MAIC = **5.602521** at lag **12** with RMSE **8.315217**

```
51.
52. **Further study of x5t and x6t**
53.
54. dis "Using log values, we can detrend these Series and turn them stationary"
```
Using log values, we can detrend these Series and turn them stationary

```
55. gen ln_x5t = ln(x5t)
  (12 missing values generated)
```

56. gen ln_x6t = ln(x6t*(-1))

57. varsoc x5t, maxlag(10)

Selection-order criteria
Sample: **11 - 100** Number of obs = **90**

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	**-695.786**				**310599**	**15.4841**	**15.4953**	**15.5119**
1	**-332.588**	**726.4***	**1**	**0.000**	**99.2272***	**7.43528***	**7.45768***	**7.49083***
2	**-332.409**	**.35761**	**1**	**0.550**	**101.056**	**7.45353**	**7.48713**	**7.53686**
3	**-332.392**	**.03385**	**1**	**0.854**	**103.292**	**7.47538**	**7.52018**	**7.58648**
4	**-332.176**	**.43115**	**1**	**0.511**	**105.114**	**7.49281**	**7.54881**	**7.63169**
5	**-332.169**	**.01511**	**1**	**0.902**	**107.467**	**7.51486**	**7.58207**	**7.68152**
6	**-331.779**	**.77951**	**1**	**0.377**	**108.947**	**7.52842**	**7.60683**	**7.72285**
7	**-330.375**	**2.8084**	**1**	**0.094**	**107.99**	**7.51944**	**7.60905**	**7.74165**
8	**-330.343**	**.06441**	**1**	**0.800**	**110.359**	**7.54095**	**7.64175**	**7.79093**
9	**-330.342**	**.00064**	**1**	**0.980**	**112.867**	**7.56316**	**7.67517**	**7.84092**
10	**-329.801**	**1.0822**	**1**	**0.298**	**114.059**	**7.57336**	**7.69657**	**7.87889**

Endogenous: x5t
Exogenous: _cons

58. dfuller ln_x5t, regress lags(1)

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

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**-5.265**	**-3.530**	**-2.901**	**-2.586**

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

D.ln_x5t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_x5t						
L1.	**-.0835753**	**.015874**	**-5.26**	**0.000**	**-.115148**	**-.0520026**
LD.	**-.1285976**	**.0827119**	**-1.55**	**0.124**	**-.2931083**	**.035913**
_cons	**.569746**	**.0947443**	**6.01**	**0.000**	**.3813033**	**.7581886**

59. dfuller ln_x5t, trend regress lags(1)

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

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**-8.198**	**-4.071**	**-3.464**	**-3.158**

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

D.ln_x5t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_x5t						
L1.	**-.3313746**	**.0404228**	**-8.20**	**0.000**	**-.4117883**	**-.2509608**
LD.	**-.0217552**	**.0696779**	**-0.31**	**0.756**	**-.1603667**	**.1168562**
_trend	**.015212**	**.0023498**	**6.47**	**0.000**	**.0105374**	**.0198866**
_cons	**1.31215**	**.1384361**	**9.48**	**0.000**	**1.036757**	**1.587544**

60. dfgls ln_x5t

DF-GLS for **ln_x5t** Number of obs = **76**
Maxlag = **11** chosen by Schwert criterion

[lags]	DF-GLS tau Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
11	**-1.161**	**-3.626**	**-2.755**	**-2.481**
10	**-0.642**	**-3.626**	**-2.791**	**-2.516**
9	**-0.833**	**-3.626**	**-2.827**	**-2.550**
8	**-0.969**	**-3.626**	**-2.863**	**-2.584**
7	**-1.185**	**-3.626**	**-2.897**	**-2.617**
6	**-1.446**	**-3.626**	**-2.930**	**-2.648**
5	**-0.653**	**-3.626**	**-2.962**	**-2.677**
4	**-0.064**	**-3.626**	**-2.992**	**-2.705**
3	**-0.314**	**-3.626**	**-3.019**	**-2.730**
2	**0.011**	**-3.626**	**-3.044**	**-2.752**
1	**0.056**	**-3.626**	**-3.066**	**-2.772**

Opt Lag (Ng-Perron seq t) = **11** with RMSE **.0343502**
Min SC = **-6.058496** at lag **11** with RMSE **.0343502**
Min MAIC = **-6.401335** at lag **11** with RMSE **.0343502**

61.
62. varsoc x6t, maxlag(10)

Selection-order criteria
Sample: **11 - 100** Number of obs = **90**

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	**-700.723**				**346618**	**15.5939**	**15.6051**	**15.6216**
1	**-367.878**	**665.69**	**1**	**0.000**	**217.379**	**8.21951**	**8.24191**	**8.27506**
2	**-354.32**	**27.116**	**1**	**0.000**	**164.447**	**7.94044**	**7.97404**	**8.02377**
3	**-350.553**	**7.5342**	**1**	**0.006**	**154.645**	**7.87895**	**7.92375**	**7.99005***
4	**-350.47**	**.16526**	**1**	**0.684**	**157.839**	**7.89934**	**7.95534**	**8.03821**
5	**-350.051**	**.83856**	**1**	**0.360**	**159.902**	**7.91224**	**7.97945**	**8.07889**
6	**-349.811**	**.47879**	**1**	**0.489**	**162.647**	**7.92914**	**8.00755**	**8.12357**
7	**-347.942**	**3.739**	**1**	**0.053**	**159.559**	**7.90982**	**7.99943**	**8.13203**
8	**-346.374**	**3.1351**	**1**	**0.077**	**157.591**	**7.89721**	**7.99802**	**8.14719**
9	**-343.839**	**5.0709**	**1**	**0.024**	**152.343**	**7.86309**	**7.9751**	**8.14084**
10	**-339.306**	**9.065***	**1**	**0.003**	**140.884***	**7.78459***	**7.9078***	**8.09012**

Endogenous: x6t
Exogenous: _cons

63. dfuller ln_x6t, regress lags(10)

Augmented Dickey-Fuller test for unit root Number of obs = **89**

	Test Statistic	Interpolated Dickey-Fuller: 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**-4.900**	**-3.525**	**-2.899**	**-2.584**

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

D.ln_x6t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_x6t						
L1.	**-.085746**	**.0175009**	**-4.90**	**0.000**	**-.1205948**	**-.0508972**
LD.	**-.543958**	**.0910623**	**-5.97**	**0.000**	**-.7252863**	**-.3626297**
L2D.	**-.4171046**	**.1091429**	**-3.82**	**0.000**	**-.634436**	**-.1997733**
L3D.	**.0988037**	**.1078903**	**0.92**	**0.363**	**-.1160333**	**.3136407**
L4D.	**.1981809**	**.0868626**	**2.28**	**0.025**	**.0252155**	**.3711464**
L5D.	**-.0798323**	**.0810632**	**-0.98**	**0.328**	**-.2412497**	**.081585**
L6D.	**-.0701868**	**.0774269**	**-0.91**	**0.368**	**-.2243635**	**.0839899**
L7D.	**-.0832075**	**.0702845**	**-1.18**	**0.240**	**-.2231619**	**.0567469**
L8D.	**-.1365996**	**.0574218**	**-2.38**	**0.020**	**-.250941**	**-.0222581**

L9D.	-.0699035	.0512915	-1.36	0.177	-.172038	.0322309
L10D.	-.2044621	.0415424	-4.92	0.000	-.2871836	-.1217407
_cons	.6538361	.1310419	4.99	0.000	.3928984	.9147739

64. dfuller ln_x6t, trend regress lags(10)

Augmented Dickey-Fuller test for unit root Number of obs = **89**

	Test Statistic	Interpolated Dickey-Fuller: 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**-7.846**	**-4.064**	**-3.461**	**-3.157**

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

D.ln_x6t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_x6t						
L1.	-.2553713	.0325471	-7.85	0.000	-.3201944	-.1905482
LD.	-.632266	.0776597	-8.14	0.000	-.7869386	-.4775933
L2D.	-.6817816	.1019417	-6.69	0.000	-.884816	-.4787472
L3D.	-.1508287	.0998732	-1.51	0.135	-.3497433	.048086
L4D.	.0295234	.0781957	0.38	0.707	-.1262168	.1852637
L5D.	-.0922855	.0678404	-1.36	0.178	-.2274015	.0428304
L6D.	-.0565053	.0648077	-0.87	0.386	-.185581	.0725703
L7D.	-.1077335	.0589409	-1.83	0.072	-.2251245	.0096575
L8D.	-.1621111	.0482302	-3.36	0.001	-.2581698	-.0660524
L9D.	-.1301679	.0441293	-2.95	0.004	-.2180591	-.0422768
L10D.	-.2264971	.0349535	-6.48	0.000	-.296113	-.1568811
_trend	.0063617	.0010902	5.84	0.000	.0041904	.0085331
_cons	1.392656	.167469	8.32	0.000	1.059113	1.7262

65. dfgls ln_x6t

DF-GLS for **ln_x6t** Number of obs = **87**
Maxlag = **12** chosen by Schwert criterion

[lags]	DF-GLS tau Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
12	**-1.972**	**-3.580**	**-2.745**	**-2.472**
11	**-1.683**	**-3.580**	**-2.776**	**-2.502**
10	**-1.385**	**-3.580**	**-2.808**	**-2.532**
9	**-1.749**	**-3.580**	**-2.839**	**-2.562**
8	**-1.221**	**-3.580**	**-2.869**	**-2.590**
7	**-1.503**	**-3.580**	**-2.898**	**-2.617**
6	**-1.383**	**-3.580**	**-2.926**	**-2.643**
5	**-1.570**	**-3.580**	**-2.952**	**-2.668**
4	**-1.335**	**-3.580**	**-2.977**	**-2.690**
3	**-0.781**	**-3.580**	**-3.000**	**-2.711**
2	**-0.605**	**-3.580**	**-3.021**	**-2.730**
1	**-0.922**	**-3.580**	**-3.039**	**-2.747**

Opt Lag (Ng-Perron seq t) = **12** with RMSE **.0650416**
Min SC = **-4.798138** at lag **12** with RMSE **.0650416**
Min MAIC = **-5.054911** at lag **12** with RMSE **.0650416**

```
66. tsline ln_x5t

67. graph export Ln-x5tstationarity_Analysis.png, as(png) replace
  (file Ln-x5tstationarity_Analysis.png written in PNG format)

68. tsline ln_x6t

69. graph export Ln-x6tstationarity_Analysis.png, as(png) replace
  (file Ln-x6tstationarity_Analysis.png written in PNG format)

70. log close assignments_2
        name:  assignments_2
         log:  C:\Users\LENOVO\OneDrive\Desktop\Time_Series_Econometrics_Assignment\Time
  > _Series_Econometrics_Assignment.smcl
    log type:  smcl
   closed on:  19 Oct 2023, 18:20:56
  ------------------------------------------------------------------------------------------
```