

1.) For spot

. dfuller spot, trend lags(1) regress

Augmented Dickey-Fuller test for unit root Number of obs = 7682

Test Statistic	Interpolated Dickey-Fuller		
	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-2.438	-3.960	-3.410

MacKinnon approximate p-value for Z(t) = 0.3597

D.spot	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
spot						
L1.	-.001489	.0006108	-2.44	0.015	-.0026862	-.0002917
LD.	.0440347	.0114011	3.86	0.000	.0216855	.0663839
_trend	.0000171	8.32e-06	2.05	0.040	7.62e-07	.0000334
_cons	.7447753	.302873	2.46	0.014	.1510615	1.338489

The result shows p-value = 0.3597 which is more than 0.05, we fail to reject null hypothesis of unit root.

The trend has the p-value of 0.04 (< 0.05). we reject $H_0: \alpha_1 = 0$, there is unit root and it is nonstationary.

For future

. dfuller future, trend lags(1) regress

Augmented Dickey-Fuller test for unit root Number of obs = 7682

Test Statistic	Interpolated Dickey-Fuller		
	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-2.563	-3.960	-3.410

MacKinnon approximate p-value for Z(t) = 0.2971

D.future	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
future						
L1.	-.001768	.0006898	-2.56	0.010	-.0031202	-.0004159
LD.	-.0275938	.0114077	-2.42	0.016	-.0499561	-.0052315
_trend	.0000222	.00001	2.22	0.026	2.62e-06	.0000418
_cons	.86276	.3338726	2.58	0.010	.2082785	1.517241

The result shows p-value = 0.2971 which is more than 0.05, we fail to reject null hypothesis of unit root.

The trend has the p-value of 0.026 (< 0.05). we reject $H_0: \alpha_1 = 0$, there is unit root and it is nonstationary.

2.)

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. dfuller d.spot, trend lags(1) regress
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Augmented Dickey-Fuller test for unit root Number of obs = 7681

Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z(t)	-63.765	-3.960	-3.410	-3.120

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

D2.spot	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
D.spot						
L1.	-1.005364	.0157667	-63.77	0.000	-1.036271	-.974457
LD.	.0508571	.011398	4.46	0.000	.0285139	.0732003
_trend	7.82e-07	4.94e-06	0.16	0.874	-8.90e-06	.0000105
_cons	.0088178	.0219189	0.40	0.687	-.0341492	.0517848

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. dfuller d.future, trend lags(1) regress
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Augmented Dickey-Fuller test for unit root Number of obs = 7681

		Interpolated Dickey-Fuller		
	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-65.269	-3.960	-3.410	-3.120

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

D2.future	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
D.future						
L1.	-1.067592	.0163567	-65.27	0.000	-1.099655	-1.035528
LD.	.038008	.0114045	3.33	0.001	.0156522	.0603639
_trend	1.01e-06	5.59e-06	0.18	0.856	-9.94e-06	.000012
_cons	.0096235	.0247823	0.39	0.698	-.0389566	.0582036

3.)

```
. g rspot= (spot/l.spot)-1
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(1 missing value generated)

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. g rfuture= (future/l.future)-1
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(1 missing value generated)

```
. dfuller rspot, trend lags(1) regress
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Augmented Dickey-Fuller test for unit root Number of obs = 7681

Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z(t)	-63.787	-3.960	-3.410	-3.120

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

D.rspot	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
rspot						
L1.	-1.005168	.0157581	-63.79	0.000	-1.036058	-.9742776
LD.	.0517018	.0113974	4.54	0.000	.0293598	.0740439
_trend	9.56e-10	9.19e-09	0.10	0.917	-1.71e-08	1.90e-08
_cons	.0000199	.0000408	0.49	0.626	-.000006	.0000998

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. dfuller rfuture, trend lags(1) regress
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Augmented Dickey-Fuller test for unit root Number of obs = 7681

Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z(t)	-65.070	-3.960	-3.410	-3.120

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

D.rfuture	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
rfuture						
L1.	-1.063572	.0163449	-65.07	0.000	-1.095612	-1.031531
LD.	.03575	.0114053	3.13	0.002	.0133924	.0581076
_trend	1.17e-09	1.06e-08	0.11	0.912	-1.96e-08	2.19e-08
_cons	.0000231	.000047	0.49	0.624	-.0000691	.0001152

The tests show that both spot and future have p-value = 0.0000 which is less than 0.05. We reject the null hypothesis. Hence, we conclude that spot and future are integrated series of order 1.

Both tests shows that p-value = 0.0000 (< 0.05), we fail to accept the null hypothesis of unit root.

For spot, the p-value for trend is 0.917 (> 0.05) and for

future the p-value is 0.912 (< 0.05). Both test reject the null hypothesis. Hence, both are stationary.