

Assignment 13

Properties Time Series – Unit Root Test

From the data set `assign_timeseries.dta`:

1. Test whether the series `spot` and `future` are stationary series.
2. From `spot` and `future`, generate `spot return (rspot)` and `future return (rfuture)` and test whether they are stationary.

1)

```
. dfuller spot, trend lags(1) reg
```

Augmented Dickey-Fuller test for unit root Number of obs = **793**

	Test Statistic	Interpolated Dickey-Fuller		
		1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-2.737	-3.960	-3.410	-3.120

MacKinnon approximate p-value for Z(t) = **0.2209**

D.spot	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
spot						
L1.	-.0196008	.0071608	-2.74	0.006	-.0336572	-.0055444
LD.	-.0327899	.0356112	-0.92	0.357	-.1026938	.0371139
_trend	.0005148	.000227	2.27	0.024	.0000692	.0009605
_cons	10.36235	3.787864	2.74	0.006	2.926867	17.79783

```
. dfuller spot, lags(1) reg
```

Augmented Dickey-Fuller test for unit root Number of obs = **793**

	Test Statistic	Interpolated Dickey-Fuller		
		1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-1.590	-3.430	-2.860	-2.570

MacKinnon approximate p-value for Z(t) = **0.4884**

D.spot	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
spot						
L1.	-.007966	.0050087	-1.59	0.112	-.0177979	.001866
LD.	-.0374087	.035646	-1.05	0.294	-.1073808	.0325633
_cons	4.308647	2.694513	1.60	0.110	-.9806053	9.597899

1) Continued

```
. dfuller spot, nocon lags(1) reg
```

Augmented Dickey-Fuller test for unit root Number of obs = **793**

	Test Statistic	Interpolated Dickey-Fuller		
		1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	0.628	-2.580	-1.950	-1.620

D.spot	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
spot						
L1.	.0000425	.0000676	0.63	0.530	-.0000903	.0001753
LD.	-.0422961	.0355496	-1.19	0.234	-.1120789	.0274866

```
. dfuller future, trend lags(1) reg
```

Augmented Dickey-Fuller test for unit root Number of obs = **793**

	Test Statistic	Interpolated Dickey-Fuller		
		1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-2.678	-3.960	-3.410	-3.120

MacKinnon approximate p-value for Z(t) = **0.2453**

D.future	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
future						
L1.	-.0178542	.0066667	-2.68	0.008	-.0309414	-.0047669
LD.	.0387151	.0356382	1.09	0.278	-.0312417	.108672
_trend	-.0007967	.0003291	-2.42	0.016	-.0014427	-.0001508
_cons	9.455876	3.550142	2.66	0.008	2.487036	16.42472

```
. dfuller future, lags(1) reg
```

Augmented Dickey-Fuller test for unit root Number of obs = **793**

	Test Statistic	Interpolated Dickey-Fuller		
		1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-1.145	-3.430	-2.860	-2.570

MacKinnon approximate p-value for Z(t) = **0.6968**

D.future	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
future						
L1.	-.0035296	.0030827	-1.14	0.253	-.0095809	.0025217
LD.	.0314855	.035622	0.88	0.377	-.0384394	.1014104
_cons	1.762251	1.587865	1.11	0.267	-1.354683	4.879184

1) Continued

```
. dfuller future, nocon lags(1) reg
```

Augmented Dickey-Fuller test for unit root Number of obs = **793**

	Test Statistic	Interpolated Dickey-Fuller		
		1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-1.611	-2.580	-1.950	-1.620

D.future	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
future						
L1.	-.0001091	.0000677	-1.61	0.108	-.0002421	.0000239
LD.	.0293246	.0355739	0.82	0.410	-.0405059	.099155

After the Tests, it shows that both spot and future are nonstationary

2)

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

```
. dfuller rspot, trend lags(1) reg
```

Augmented Dickey-Fuller test for unit root Number of obs = **792**

	Test Statistic	Interpolated Dickey-Fuller		
		1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-20.989	-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.	-1.081887	.0515453	-20.99	0.000	-1.18307	-.9807049
LD.	.0368358	.0356378	1.03	0.302	-.0331204	.1067921
_trend	1.34e-07	2.96e-07	0.45	0.651	-4.47e-07	7.16e-07
_cons	-5.71e-06	.0001358	-0.04	0.966	-.0002723	.0002609

3) Continued

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

```
. dfuller rfuture, trend lags(1) reg
```

Augmented Dickey-Fuller test for unit root Number of obs = **792**

	Test Statistic	Interpolated Dickey-Fuller		
		1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-19.521	-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.	-.968333	.0496038	-19.52	0.000	-1.065704	-.8709618
LD.	-.0008133	.0356956	-0.02	0.982	-.0708831	.0692565
_trend	-3.05e-08	2.97e-07	-0.10	0.918	-6.13e-07	5.52e-07
_cons	-.0000951	.0001361	-0.70	0.485	-.0003623	.0001722

rspot and rfuture are both stationary.

By Tatre Jantarakolica