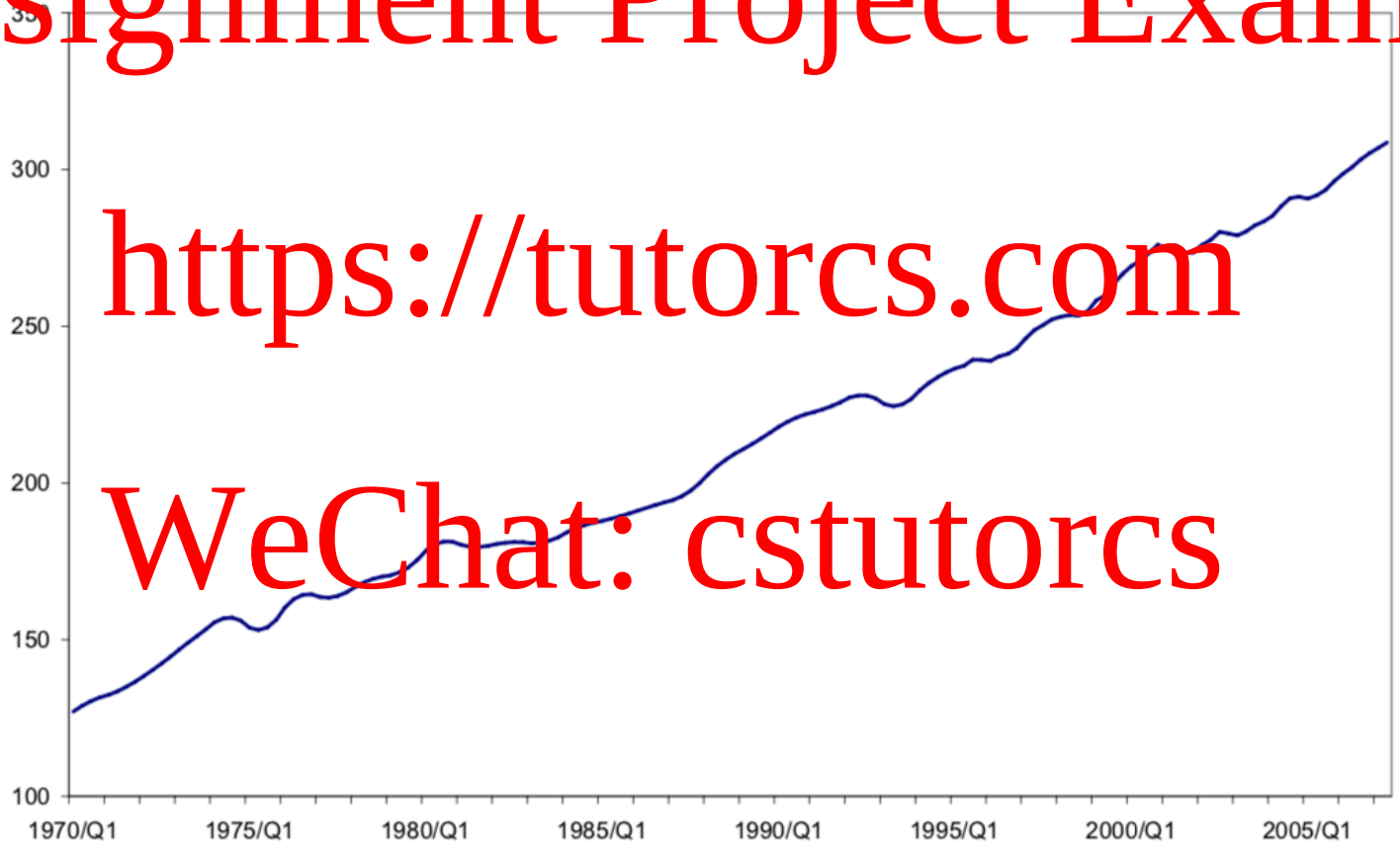
Example

Example: testing for a unit root in Australian real GDP (1970:Q1-2007:Q2)



Example

Dynamic procedure for testing a unit root:

- **Step 1**: Estimate model with intercept and trend (Fig. 27)
  - ADF(5) specification has the smallest AIC and SBI with no autocorrelation in the residuals
  - Unit root not rejected (at 5% level): $-1.03 > -3.44$
  - Linear trend not significant (one-sided test at 5% level): $1.16 < 2.79$
- **Step 2**: Estimate model with intercept (Fig. 31)
  - Unit root cannot be rejected at 5% level of significance as $1.15 > -2.88$
  - Intercept is not significant as $0.80 < 2.54$ (one-sided test at 5% level of significance)
- **Step 3**: Estimate model without deterministic terms (Fig. 32)
  - Unit root not rejected (at 5% level): $4.34 > -1.94$

Example

ADF(5) with intercept on Australian real GDP (1970:Q1–2007:Q2)

ADF Test Statistic	1.150628	1% Critical Value*	-3.4767
		5% Critical Value	-2.8815
		10% Critical Value	-2.5773

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP)
Method: Least Squares
Date: 9/1/20 Time: 16:5
Sample: 1972:1 2007:4
Included observations: 144

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	0.001767	0.001535	1.150628	0.2519
D(GDP(-1))	0.666251	0.083848	7.945915	0.0000
D(GDP(-2))	0.038060	0.097357	0.390930	0.6965
D(GDP(-3))	0.109394	0.096958	1.128261	0.2613
D(GDP(-4))	-0.327802	0.097760	-3.367954	0.0010
D(GDP(-5))	0.206761	0.086389	2.393409	0.0181
C	0.265527	0.332839	0.797762	0.4264

R-squared	0.485086	Mean dependent var	1.219947
Adjusted R-squared	0.462536	S.D. dependent var	1.162932
S.E. of regression	0.852569	Akaike info criterion	2.566264
Sum squared resid	99.58163	Schwarz criterion	2.710630
Log likelihood	-177.7710	F-statistic	21.51068
Durbin-Watson stat	1.984737	Prob(F-statistic)	0.000000

Example

ADF 5) with no deterministic terms on Australian real GDP

ADF Test Statistic	4.340524	1% Critical Value*	-2.5799
		5% Critical Value	-1.9421
		10% Critical Value	-1.6169

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP)
Method: Least Squares
Date: 09/13/07 Time: 17:39
Sample: 1972:1 2007:4
Included observations: 144

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	0.002871	0.000662	4.340524	0.0000
D(GDP(-1))	0.671389	0.083490	8.041519	0.0000
D(GDP(-2))	0.037654	0.097126	0.387569	0.6990
D(GDP(-3))	-0.104408	0.096730	-1.079894	0.2605
D(GDP(-4))	0.327521	0.097102	3.373150	0.0010
D(GDP(-5))	0.206418	0.083481	2.472642	0.0146

R-squared	0.482694	Mean dependent var	1.219947
Adjusted R-squared	0.463952	S.D. dependent var	1.162932
S.E. of regression	0.851445	Akaike info criterion	2.557010
Sum squared resid	100.0442	Schwarz criterion	2.680752
Log likelihood	-178.1047	Durbin-Watson stat	1.987609

Example

Imposing a unit root process with no intercept on real GDP

Dependent Variable: D(GDP)
Method: Least Squares
Date: 09/13/07 Time: 17:24
Sample: 1972:1 2007:4
Included observations: 144

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	0.837903	0.078770	10.63732	0.0000
D(GDP(-2))	0.068511	0.103018	0.665041	0.5071
D(GDP(-3))	-0.099994	0.102831	-0.972413	0.3325
D(GDP(-4))	-0.297399	0.102984	-2.887813	0.0045
D(GDP(-5))	0.371345	0.078958	4.703054	0.0000

R-squared	0.412071	Mean dependent var	1.219947
Adjusted R-squared	0.395152	S.D. dependent var	1.162932
S.E. of regression	0.904436	Akaike info criterion	2.671094
Sum squared resid	113.7026	Schwarz criterion	2.774213
Log likelihood	-187.3188	Durbin-Watson stat	2.066021

Example

Imposing a unit root process allowing for an intercept on real GDP

Dependent Variable: D(GDP)
Method: Least Squares
Date: 09/13/07 Time: 17:25
Sample: 1972:1 2007:4
Included observations: 144

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	0.678637	0.083252	8.151586	0.0000
D(GDP(-2))	0.040706	0.097444	0.417739	0.6768
D(GDP(-3))	-0.108298	0.097067	-1.115700	0.2665
D(GDP(-4))	-0.324436	0.097400	-3.330967	0.0011
D(GDP(-5))	0.212335	0.083384	2.546480	0.0120
C	0.611019	0.143777	4.249776	0.0000

R-squared	0.480110	Mean dependent var	1.219947
Adjusted R-squared	0.461274	S.D. dependent var	1.162932
S.E. of regression	0.853569	Akaike info criterion	2.561992
Sum squared resid	100.5440	Schwarz criterion	2.685734
Log likelihood	-178.4634	F-statistic	25.48820
Durbin-Watson stat	1.986059	Prob(F-statistic)	0.000000