

Example: PPP test of OLS and Unit root tests

1. OLS

Dependent Variable: LNEXCAN

Method: Least Squares

Date: 10/01/17 Time: 21:03

Sample: 1991M10 2012M06

Included observations: 249

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.211777	0.008852	23.92365	0.0000
DP	2.035146	0.234538	8.677266	0.0000
R-squared	0.233621	Mean dependent var	0.241169	
Adjusted R-squared	0.230518	S.D. dependent var	0.147121	
S.E. of regression	0.129054	Akaike info criterion	-1.249168	
Sum squared resid	4.113787	Schwarz criterion	-1.220915	
Log likelihood	157.5214	Hannan-Quinn criter.	-1.237795	
F-statistic	75.29494	Durbin-Watson stat	0.034430	
Prob(F-statistic)	0.000000			

2. Unit root test (ADF)

(1) Level

a. ADF without trend

Null Hypothesis: RE has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=6)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.504928	0.5297
Test critical values:		
1% level	-3.456622	
5% level	-2.872998	
10% level	-2.572951	

*MacKinnon (1996) one-sided p-values.

b. ADF with trend

Null Hypothesis: RE has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=6)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.559056	0.2997
Test critical values:		
1% level	-3.995492	
5% level	-3.428049	
10% level	-3.137397	

*MacKinnon (1996) one-sided p-values.

(2) Difference

a. ADF without trend

Null Hypothesis: D(RE) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-17.12446	0.0000
Test critical values:	1% level	-3.456730	
	5% level	-2.873045	
	10% level	-2.572976	

*MacKinnon (1996) one-sided p-values.

b. ADF with trend

Null Hypothesis: D(RE) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-17.33613	0.0000
Test critical values:	1% level	-3.995645	
	5% level	-3.428123	
	10% level	-3.137440	

*MacKinnon (1996) one-sided p-values.

c.

3. Unit root test(PP)

(1) Level

a. Without trend

Null Hypothesis: RE has a unit root

Exogenous: Constant

Bandwidth: 7 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-1.526959	0.5184
Test critical values:		
1% level	-3.456622	
5% level	-2.872998	
10% level	-2.572951	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000535
HAC corrected variance (Bartlett kernel)	0.000554

b. with trend

Null Hypothesis: RE has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-2.546372	0.3056
Test critical values:		
1% level	-3.995492	
5% level	-3.428049	
10% level	-3.137397	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000519
HAC corrected variance (Bartlett kernel)	0.000484

2. Difference

a. Without trend

Null Hypothesis: D(RE) has a unit root

Exogenous: Constant

Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-17.06433	0.0000
Test critical values:	1% level	-3.456730	
	5% level	-2.873045	
	10% level	-2.572976	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000537
HAC corrected variance (Bartlett kernel)	0.000615

b. With trend

Null Hypothesis: D(RE) has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-17.28313	0.0000
Test critical values:	1% level	-3.995645	
	5% level	-3.428123	
	10% level	-3.137440	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000529
HAC corrected variance (Bartlett kernel)	0.000571

c.

4. Zivot-Andrews unit root test with structural break

(1) Model A – Intercept

Zivot-Andrews Unit Root Test

Date: 10/01/17 Time: 21:10

Sample: 1991M10 2012M06

Included observations: 249

Null Hypothesis: RE has a unit root with a structural
break in the intercept

Chosen lag length: 1 (maximum lags: 4)

Chosen break point: 2003M01

	t-Statistic	Prob. *
Zivot-Andrews test statistic	-3.788671	0.003951
1% critical value:	-5.34	
5% critical value:	-4.93	
10% critical value:	-4.58	

* Probability values are calculated from a standard t-distribution
and do not take into account the breakpoint selection process

(2) Model B – Trend

Zivot-Andrews Unit Root Test

Date: 10/01/17 Time: 21:10

Sample: 1991M10 2012M06

Included observations: 249

Null Hypothesis: RE has a unit root with a structural
break in the trend

Chosen lag length: 1 (maximum lags: 4)

Chosen break point: 2000M04

	t-Statistic	Prob. *
Zivot-Andrews test statistic	-3.220861	0.044284
1% critical value:	-4.80	
5% critical value:	-4.42	
10% critical value:	-4.11	

* Probability values are calculated from a standard t-distribution
and do not take into account the breakpoint selection process

(3) Model C – Both

Zivot-Andrews Unit Root Test

Date: 10/01/17 Time: 21:10

Sample: 1991M10 2012M06

Included observations: 249

Null Hypothesis: RE has a unit root with a structural
break in both the intercept and trend

Chosen lag length: 1 (maximum lags: 4)

Chosen break point: 2003M01

	t-Statistic	Prob. *
Zivot-Andrews test statistic	-4.458445	6.04E-05
1% critical value:	-5.57	
5% critical value:	-5.08	
10% critical value:	-4.82	

* Probability values are calculated from a standard t-distribution
and do not take into account the breakpoint selection process

Results of unit-root tests for real exchange rate

	Model	ADF		PP	
		T-Statistic (lag)	P value	T-Statistic (bandwith)	P value
Level	Without trend	-1.5049 (0)	0.5297	-1.5269 (7)	0.5184
	With trend	-2.5590 (0)	0.2997	-2.5463 (6)	0.3056
First Difference	Without trend	-17.1244*** (0)	0.0000	-17.0643*** (6)	0.0000
	With trend	-17.3361*** (0)	0.0000	-17.2831*** (6)	0.0000

Notes: The lag lengths are determined via the SIC and are in parentheses. The bandwiths are for the Newey-West method of the PP tests in parentheses.

Results of Zivot-Andrews unit root test for real exchange (level)

Model	T-Statistic	P value	structural break dates
A	-3.7886 ***	0.0039	2003M01
B	-3.2208 ***	0.0442	2000M04
C	-4.4584 ***	0.00006	2003M01

Notes: Model A of ZA allows for a change in the level of the series, Model B of AZ allows for a change in the slope of the trend of a series, while Model C of ZA combines both changes in the level and the slope of the trend.