

Pedroni Residual Cointegration Test

Series: E MS Y R

Date: 04/30/09 Time: 20:12

Sample: 1999Q1 2008Q2

Included observations: 304

Cross-sections included: 8

Null Hypothesis: No cointegration

Trend assumption: No deterministic trend

Lag selection: Automatic SIC with a max lag of 8

Newey-West bandwidth selection with Bartlett kernel

Alternative hypothesis: common AR coefs. (within-dimension)

	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	-0.568333	0.3394	-0.424649	0.3645
Panel rho-Statistic	-0.579443	0.3373	0.009305	0.3989
Panel PP-Statistic	-2.462381	0.0192	-1.290923	0.1734
Panel ADF-Statistic	-1.819491	0.0762	-0.849772	0.2780

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	-0.869343	0.2734
Group PP-Statistic	-2.652516	0.0118
Group ADF-Statistic	-1.432781	0.1429

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
1	0.514	3.53E-06	3.43E-06	2.00	37
2	0.320	0.002811	0.003768	4.00	37
3	0.551	0.000369	0.000368	3.00	37
4	0.311	0.000578	0.000735	1.00	37
5	0.779	0.001815	0.001331	8.00	37
6	0.350	0.000188	0.000182	2.00	37
7	0.834	0.000149	0.000159	1.00	37
8	0.517	0.000107	0.000120	2.00	37

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
1	0.514	3.53E-06	0	8	37
2	0.320	0.002811	0	8	37
3	0.551	0.000369	0	8	37
4	0.413	0.000424	2	8	35
5	0.779	0.001815	0	8	37
6	0.350	0.000188	0	8	37
7	0.834	0.000149	0	8	37
8	0.517	0.000107	0	8	37

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Null Hypothesis: No cointegration

Trend assumption: **Deterministic intercept and trend**

Lag selection: Automatic SIC with a max lag of 8

Newey-West bandwidth selection with Bartlett kernel

Alternative hypothesis: common AR coeffs. (within-dimension)

	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	3.686139	0.0004	1.566715	0.1169
Panel rho-Statistic	-0.140083	0.3950	-1.070402	0.2250
Panel PP-Statistic	-1.590491	0.1126	-2.860672	0.0067
Panel ADF-Statistic	-0.310471	0.3802	-2.375416	0.0237

Alternative hypothesis: individual AR coeffs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	0.147193	0.3946
Group PP-Statistic	-2.079889	0.0459
Group ADF-Statistic	-0.785116	0.2931

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
1	0.517	3.48E-06	3.38E-06	2.00	37
2	0.833	0.000741	0.000866	4.00	37
3	0.432	0.000353	0.000323	1.00	37
4	0.334	0.000420	0.000430	4.00	37
5	0.210	0.000850	0.000832	3.00	37
6	0.542	0.000126	0.000133	1.00	37
7	0.401	8.80E-05	9.12E-05	3.00	37
8	0.403	0.000111	0.000111	0.00	37

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
1	0.517	3.48E-06	0	8	37
2	0.833	0.000741	0	8	37
3	0.398	0.000151	8	8	29
4	0.256	0.000316	4	8	33
5	0.210	0.000850	0	8	37
6	0.542	0.000126	0	8	37
7	0.401	8.80E-05	0	8	37
8	0.403	0.000111	0	8	37

Pedroni Residual Cointegration Test

Series: E MS Y R

Date: 04/30/09 Time: 20:12

Sample: 1999Q1 2008Q2

Included observations: 304

Cross-sections included: 8

Null Hypothesis: No cointegration

Trend assumption: No deterministic intercept or trend

Lag selection: Automatic SIC with a max lag of 8

Newey-West bandwidth selection with Bartlett kernel

Alternative hypothesis: common AR coefs. (within-dimension)

	<u>Statistic</u>	<u>Prob.</u>	Weighted	
			<u>Statistic</u>	<u>Prob.</u>
Panel v-Statistic	-2.002679	0.0537	-2.260658	0.0310
Panel rho-Statistic	-1.124877	0.2119	-2.134209	0.0409
Panel PP-Statistic	-2.333818	0.0262	-3.420839	0.0011
Panel ADF-Statistic	2.958359	0.0050	0.638195	0.3254

Alternative hypothesis: individual AR coefs. (between-dimension)

	<u>Statistic</u>	<u>Prob.</u>
Group rho-Statistic	-0.963908	0.2507
Group PP-Statistic	-3.744887	0.0004
Group ADF-Statistic	2.050757	0.0487

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
1	0.667	0.000493	0.000578	17.00	37
2	0.742	0.030349	0.025479	2.00	37
3	0.094	0.014351	0.012065	1.00	37
4	0.350	0.000312	0.000963	4.00	37
5	0.865	0.002012	0.003196	29.00	37
6	0.564	0.000860	0.000860	0.00	37
7	0.603	0.000817	0.000866	9.00	37
8	0.849	0.000134	0.000133	5.00	37

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
1	0.789	0.000197	4	8	33
2	0.893	0.022241	1	8	36
3	0.776	0.002901	4	8	33
4	0.717	4.62E-05	8	8	29
5	0.956	0.000376	4	8	33
6	0.564	0.000860	0	8	37
7	0.662	0.000125	8	8	29
8	0.956	0.000106	2	8	35

Kao Residual Cointegration Test

Series: E MS Y R

Date: 04/30/09 Time: 20:13

Sample: 1999Q1 2008Q2

Included observations: 304

Null Hypothesis: No cointegration

Trend assumption: No deterministic trend

Lag selection: Automatic 8 lags by SIC with a max lag of 9

Newey-West bandwidth selection using Bartlett kernel

	t-Statistic	Prob.
ADF	-1.199544	0.1152
Residual variance	0.000560	
HAC variance	0.000590	

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(RESID)

Method: Least Squares

Date: 04/30/09 Time: 20:13

Sample (adjusted): 2001Q2 2008Q2

Included observations: 232 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
RESID(-1)	-0.109382	0.036252	-3.017304	0.0028
D(RESID(-1))	-0.117285	0.068790	-1.704964	0.0896
D(RESID(-2))	0.052856	0.066841	0.790777	0.4299
D(RESID(-3))	0.115964	0.065482	1.770923	0.0779
D(RESID(-4))	0.103027	0.064123	1.606704	0.1095
D(RESID(-5))	0.040832	0.064618	0.631902	0.5281
D(RESID(-6))	-0.003417	0.060218	-0.056751	0.9548
D(RESID(-7))	0.120435	0.056453	2.133383	0.0340
D(RESID(-8))	-0.101722	0.049574	-2.051937	0.0413
R-squared	0.144142	Mean dependent var		-0.000230
Adjusted R-squared	0.113439	S.D. dependent var		0.023711
S.E. of regression	0.022326	Akaike info criterion		-4.728103
Sum squared resid	0.111155	Schwarz criterion		-4.594393
Log likelihood	557.4599	Hannan-Quinn criter.		-4.674179
Durbin-Watson stat	1.965204			

Johansen Fisher

Panel

Cointegration

Test

Series: E MS Y R

Date: 04/30/09 Time: 20:13

Sample: 1999Q1 2008Q2
Included observations: 304
Trend assumption: Linear deterministic trend
Lags interval (in first differences): 1 1

Unrestricted Cointegration Rank Test (Trace and Maximum Eigenvalue)

Hypothesized No. of CE(s)	Fisher Stat.* (from trace test)	Prob.	Fisher Stat.* (from max-eigen test)	Prob.
None	63.76	0.0000	53.39	0.0000
At most 1	28.88	0.0247	18.88	0.2750
At most 2	19.79	0.2297	17.26	0.3688
At most 3	21.21	0.1705	21.21	0.1705

* Probabilities are
computed using
asymptotic Chi-
square
distribution.

Individual cross section results

Cross Section	Trace Test Statistics	Prob.**	Max-Eign Test Statistics	Prob.**
Hypothesis of no cointegration				
1	31.7162	0.6277	18.2160	0.4772
2	52.7007	0.0164	28.0089	0.0441
3	45.1489	0.0879	26.4271	0.0697
4	66.2571	0.0004	27.1803	0.0562
5	49.4205	0.0354	22.6474	0.1890
6	66.1177	0.0004	36.4076	0.0029
7	55.4152	0.0083	44.8119	0.0001
8	37.3862	0.3295	17.1020	0.5712
Hypothesis of at most 1 cointegration relationship				
1	13.5002	0.8674	8.8824	0.8418
2	24.6918	0.1728	13.9499	0.3691
3	18.7218	0.5130	13.6860	0.3913
4	39.0768	0.0032	19.9132	0.0733
5	26.7731	0.1073	18.2352	0.1213
6	29.7102	0.0512	16.8283	0.1802
7	10.6033	0.9699	5.8624	0.9855
8	20.2842	0.4038	13.4234	0.4141
Hypothesis of at most 2 cointegration relationship				
1	4.6178	0.8480	3.4241	0.9145
2	10.7420	0.2278	7.8285	0.3964
3	5.0358	0.8050	4.4369	0.8106
4	19.1636	0.0134	15.2452	0.0349
5	8.5379	0.4098	8.4947	0.3306
6	12.8818	0.1192	12.0460	0.1089
7	4.7409	0.8357	2.8887	0.9539
8	6.8608	0.5939	6.8547	0.5065
Hypothesis of at most 3 cointegration relationship				
1	1.1937	0.2746	1.1937	0.2746

2	2.9135	0.0878	2.9135	0.0878
3	0.5989	0.4390	0.5989	0.4390
4	3.9184	0.0478	3.9184	0.0478
5	0.0432	0.8352	0.0432	0.8352
6	0.8358	0.3606	0.8358	0.3606
7	1.8522	0.1735	1.8522	0.1735
8	0.0061	0.9370	0.0061	0.9370

**MacKinnon-Haug-Michelis (1999) p-values

Vector Error Correction Estimates

Date: 04/30/09 Time: 20:13

Sample (adjusted): 1999Q4 2008Q2

Included observations: 280 after adjustments

Standard errors in () & t-statistics in []

Cointegrating Eq:	CointEq1			
E(-1)	1.000000			
MS(-1)	-2.864056 (1.10549) [-2.59075]			
Y(-1)	0.458066 (1.59395) [0.28738]			
R(-1)	-3.803056 (0.86137) [-4.41511]			
C	-10.83038			
Error Correction:	D(E)	D(MS)	D(Y)	D(R)
CointEq1	0.001603 (0.00084) [1.91596]	-0.001498 (0.00097) [-1.54152]	0.002388 (0.00150) [1.58963]	0.038815 (0.00965) [4.02302]
D(E(-1))	-0.245175 (0.09794) [-2.50338]	0.151832 (0.11370) [1.33537]	-0.279383 (0.17579) [-1.58932]	-2.865605 (1.12913) [-2.53788]
D(E(-2))	0.015497 (0.10040) [0.15435]	0.263368 (0.11656) [2.25956]	0.243759 (0.18020) [1.35268]	-3.152490 (1.15750) [-2.72353]
D(MS(-1))	-0.069945 (0.08650) [-0.80859]	0.020445 (0.10043) [0.20359]	-0.194007 (0.15526) [-1.24954]	-1.759083 (0.99730) [-1.76384]
D(MS(-2))	-0.019159 (0.08897)	0.280424 (0.10329)	0.518496 (0.15969)	-3.085255 (1.02575)

	[-0.21534]	[2.71491]	[3.24685]	[-3.00781]
D(Y(-1))	-0.039311 (0.04151) [-0.94702]	0.071833 (0.04819) [1.49057]	-0.391909 (0.07451) [-5.26003]	-0.683812 (0.47858) [-1.42883]
D(Y(-2))	-0.016964 (0.04089) [-0.41481]	0.077747 (0.04748) [1.63758]	-0.221616 (0.07340) [-3.01920]	-0.017606 (0.47148) [-0.03734]
D(R(-1))	0.009330 (0.00538) [1.73290]	-0.004083 (0.00625) [-0.65325]	0.007075 (0.00966) [0.73214]	-0.333343 (0.06207) [-5.37016]
D(R(-2))	0.004614 (0.00519) [0.88842]	0.000389 (0.00603) [0.06452]	0.002950 (0.00932) [0.31647]	-0.156977 (0.05987) [-2.62183]
C	-0.001172 (0.00233) [-0.50378]	0.004462 (0.00270) [1.65204]	0.013200 (0.00418) [3.16111]	0.043616 (0.02682) [1.62612]
R-squared	0.052442	0.058522	0.189982	0.223700
Adj. R-squared	0.020857	0.027140	0.162981	0.197824
Sum sq. resid	0.354157	0.477336	1.140965	47.07471
S.E. equation	0.036217	0.042047	0.065006	0.417553
F-statistic	1.660324	1.864799	7.036213	8.644874
Log likelihood	536.8900	495.1026	373.1053	-147.6753
Akaike AIC	-3.763500	-3.465019	-2.593610	1.126252
Schwarz SC	-3.633686	-3.335205	-2.463796	1.256066
Mean dependent	-0.002147	0.007760	0.009752	0.014902
S.D. dependent	0.036601	0.042629	0.071054	0.466205
Determinant resid covariance (dof adj.)		3.87E-10		
Determinant resid covariance		3.34E-10		
Log likelihood		1465.470		
Akaike information criterion		-10.15336		
Schwarz criterion		-9.582179		

Date: 04/30/09 Time: 20:14

Sample (adjusted): 1999Q4 2008Q2

Included observations: 280 after adjustments

Trend assumption: Linear deterministic trend

Series: E MS Y R

Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.100913	52.41405	47.85613	0.0175
At most 1	0.058644	22.62893	29.79707	0.2648

At most 2	0.020166	5.707323	15.49471	0.7298
At most 3	1.11E-05	0.003096	3.841466	0.9540

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.100913	29.78511	27.58434	0.0257
At most 1	0.058644	16.92161	21.13162	0.1757
At most 2	0.020166	5.704228	14.26460	0.6514
At most 3	1.11E-05	0.003096	3.841466	0.9540

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b*S11*b=I):

E	MS	Y	R
-0.386647	1.107378	-0.177110	1.470440
-0.203701	-0.528848	1.533957	-1.197546
-0.750465	-2.913467	5.511070	0.157215
-0.053767	0.266933	-1.738494	0.021733

Unrestricted Adjustment Coefficients (alpha):

D(E)	-0.004147	-0.000270	-0.001708	-0.000103
D(MS)	0.003873	-0.002593	0.004551	6.89E-05
D(Y)	-0.006175	-0.009344	0.002055	0.000150
D(R)	-0.100389	0.059765	0.018405	8.35E-05

1 Cointegrating Equation(s): Log likelihood 1465.470

Normalized cointegrating coefficients (standard error in parentheses)

E	MS	Y	R
1.000000	-2.864056 (1.10549)	0.458066 (1.59395)	-3.803056 (0.86137)

Adjustment coefficients (standard error in parentheses)

D(E)	0.001603 (0.00084)
D(MS)	-0.001498 (0.00097)
D(Y)	0.002388 (0.00150)
D(R)	0.038815 (0.00965)

2 Cointegrating Equation(s): Log likelihood 1473.931

Normalized cointegrating coefficients (standard error in parentheses)

E	MS	Y	R
1.000000	0.000000	-3.732128 (1.06383)	1.275422 (0.90591)
0.000000	1.000000	-1.463028 (0.37594)	1.773177 (0.32014)

Adjustment coefficients (standard error in parentheses)

D(E)	0.001658 (0.00095)	-0.004450 (0.00266)
D(MS)	-0.000969 (0.00110)	0.005661 (0.00308)
D(Y)	0.004291 (0.00168)	-0.001897 (0.00472)
D(R)	0.026641 (0.01079)	-0.142775 (0.03030)

3 Cointegrating Equation(s): Log likelihood 1476.783

Normalized cointegrating coefficients (standard error in parentheses)

E	MS	Y	R
1.000000	0.000000	0.000000	-13.82497 (3.15087)
0.000000	1.000000	0.000000	-4.146314 (1.24730)
0.000000	0.000000	1.000000	-4.046055 (1.04202)

Adjustment coefficients (standard error in parentheses)

D(E)	0.002940 (0.00188)	0.000527 (0.00683)	-0.009093 (0.01237)
D(MS)	-0.004385 (0.00216)	-0.007598 (0.00788)	0.020416 (0.01427)
D(Y)	0.002749 (0.00334)	-0.007884 (0.01214)	-0.001915 (0.02198)
D(R)	0.012828 (0.02142)	-0.196398 (0.07796)	0.210889 (0.14115)

Dependent Variable: E

Method: Panel Least Squares

Date: 04/30/09 Time: 20:18

Sample: 1999Q1 2008Q2

Periods included: 38

Cross-sections included: 8

Total panel (balanced) observations: 304

Coefficient	Std. Error	t-Statistic	Prob.
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MS	-0.442657	0.059152	-7.483366	0.0000
Y	0.033591	0.044197	0.760039	0.4479
R	-0.005188	0.007556	-0.686626	0.4929
C	2.580157	0.175519	14.70018	0.0000

Effects Specification

Cross-section fixed (dummyvariables)

Period fixed (dummyvariables)

R-squared	0.999562	Mean dependent var	3.883944
Adjusted R-squared	0.999482	S.D. dependent var	2.711390
S.E. of regression	0.061708	Akaike info criterion	-2.588881
Sum squared resid	0.974803	Schwarz criterion	-2.001982
Log likelihood	441.5099	Hannan-Quinn criter.	-2.354107
F-statistic	12441.19	Durbin-Watson stat	0.194968
Prob(F-statistic)	0.000000		
