

Table 1
Mean and Variance of $L_T(p)$

T	$p=0$		$p=1$		$p=2$		$p=3$		$p=4$		$p=5$		$p=6$		$p=7$		$p=8$	
	Mean	Var.	Mean	Var.	Mean	Var.	Mean	Var.	Mean	Var.	Mean	Var.	Mean	Var.	Mean	Var.	Mean	Var.
10	-2.012	0.518	-1.997	0.662	-1.761	0.708	-1.751	1.082										
11	-2.009	0.493	-1.994	0.604	-1.781	0.623	-1.765	0.887	-1.590	1.070								
12	-2.003	0.476	-1.991	0.561	-1.795	0.572	-1.776	0.763	-1.611	0.885	-1.604	1.218						
13	-2.002	0.464	-1.990	0.535	-1.810	0.537	-1.790	0.686	-1.635	0.779	-1.620	1.018	-1.489	1.188				
14	-1.999	0.451	-1.990	0.511	-1.823	0.509	-1.803	0.629	-1.655	0.702	-1.638	0.898	-1.511	1.016	-1.503	1.317		
15	-1.998	0.441	-1.988	0.490	-1.833	0.490	-1.814	0.591	-1.675	0.648	-1.657	0.806	-1.534	0.901	-1.521	1.123	-1.412	1.292
16	-1.995	0.435	-1.987	0.480	-1.842	0.470	-1.825	0.557	-1.693	0.605	-1.676	0.737	-1.559	0.821	-1.545	0.998	-1.439	1.116
17	-1.994	0.428	-1.985	0.464	-1.851	0.457	-1.834	0.533	-1.709	0.572	-1.689	0.684	-1.577	0.755	-1.559	0.904	-1.458	0.996
18	-1.992	0.420	-1.985	0.455	-1.858	0.444	-1.843	0.512	-1.725	0.543	-1.705	0.642	-1.598	0.704	-1.580	0.833	-1.481	0.909
19	-1.992	0.417	-1.984	0.446	-1.865	0.438	-1.851	0.498	-1.738	0.521	-1.720	0.607	-1.617	0.664	-1.599	0.779	-1.503	0.844
20	-1.990	0.411	-1.982	0.437	-1.870	0.427	-1.858	0.481	-1.750	0.502	-1.733	0.580	-1.633	0.629	-1.615	0.731	-1.524	0.793
21	-1.988	0.407	-1.983	0.429	-1.875	0.418	-1.864	0.468	-1.760	0.487	-1.745	0.558	-1.649	0.598	-1.632	0.691	-1.543	0.747
22	-1.987	0.402	-1.982	0.424	-1.880	0.413	-1.869	0.456	-1.773	0.473	-1.757	0.536	-1.666	0.574	-1.650	0.657	-1.563	0.706
23	-1.988	0.399	-1.982	0.418	-1.884	0.408	-1.875	0.449	-1.781	0.461	-1.766	0.520	-1.678	0.552	-1.661	0.626	-1.579	0.675
24	-1.987	0.397	-1.982	0.416	-1.889	0.403	-1.879	0.441	-1.789	0.453	-1.775	0.505	-1.690	0.534	-1.675	0.601	-1.595	0.645
25	-1.985	0.393	-1.980	0.410	-1.892	0.399	-1.883	0.434	-1.798	0.445	-1.785	0.494	-1.702	0.520	-1.687	0.581	-1.609	0.620
26	-1.985	0.391	-1.980	0.406	-1.895	0.395	-1.887	0.426	-1.803	0.433	-1.791	0.478	-1.712	0.504	-1.697	0.561	-1.621	0.597
27	-1.985	0.389	-1.980	0.402	-1.898	0.391	-1.890	0.421	-1.810	0.430	-1.799	0.470	-1.722	0.489	-1.709	0.542	-1.636	0.576
28	-1.984	0.386	-1.980	0.399	-1.901	0.387	-1.894	0.415	-1.818	0.420	-1.806	0.458	-1.732	0.479	-1.718	0.528	-1.646	0.557
29	-1.983	0.384	-1.977	0.396	-1.902	0.386	-1.894	0.410	-1.820	0.415	-1.809	0.450	-1.738	0.469	-1.726	0.515	-1.657	0.544
30	-1.983	0.381	-1.978	0.393	-1.906	0.384	-1.900	0.408	-1.828	0.411	-1.818	0.443	-1.748	0.460	-1.735	0.502	-1.667	0.528
31	-1.982	0.381	-1.978	0.391	-1.908	0.382	-1.902	0.403	-1.834	0.407	-1.824	0.437	-1.758	0.453	-1.746	0.494	-1.681	0.516
32	-1.982	0.379	-1.979	0.390	-1.911	0.379	-1.905	0.400	-1.838	0.402	-1.829	0.430	-1.764	0.443	-1.753	0.481	-1.689	0.504
33	-1.981	0.376	-1.977	0.387	-1.912	0.377	-1.906	0.396	-1.841	0.398	-1.833	0.426	-1.770	0.440	-1.759	0.474	-1.697	0.494
34	-1.980	0.375	-1.977	0.386	-1.913	0.375	-1.909	0.395	-1.845	0.394	-1.836	0.419	-1.776	0.432	-1.766	0.464	-1.706	0.485
35	-1.981	0.374	-1.978	0.383	-1.916	0.373	-1.911	0.392	-1.849	0.392	-1.841	0.417	-1.782	0.427	-1.771	0.459	-1.712	0.475

Table 1 Continued

T	$p=0$		$p=1$		$p=2$		$p=3$		$p=4$		$p=5$		$p=6$		$p=7$		$p=8$	
	Mean	Var.	Mean	Var.	Mean	Var.	Mean	Var.	Mean	Var.	Mean	Var.	Mean	Var.	Mean	Var.	Mean	Var.
36	-1.980	0.373	-1.977	0.381	-1.918	0.373	-1.913	0.389	-1.853	0.391	-1.845	0.414	-1.787	0.421	-1.777	0.452	-1.719	0.469
37	-1.979	0.371	-1.977	0.381	-1.919	0.372	-1.914	0.388	-1.856	0.387	-1.849	0.409	-1.793	0.420	-1.783	0.447	-1.728	0.463
38	-1.980	0.371	-1.977	0.379	-1.919	0.369	-1.915	0.383	-1.858	0.384	-1.852	0.405	-1.797	0.412	-1.788	0.439	-1.734	0.454
39	-1.979	0.370	-1.977	0.377	-1.922	0.368	-1.918	0.382	-1.863	0.382	-1.856	0.403	-1.803	0.408	-1.795	0.434	-1.742	0.447
40	-1.978	0.368	-1.974	0.375	-1.921	0.367	-1.917	0.381	-1.864	0.380	-1.858	0.399	-1.806	0.405	-1.798	0.429	-1.747	0.441
41	-1.979	0.367	-1.976	0.375	-1.924	0.365	-1.920	0.378	-1.868	0.377	-1.862	0.395	-1.810	0.401	-1.802	0.425	-1.752	0.436
42	-1.979	0.367	-1.977	0.374	-1.926	0.364	-1.921	0.376	-1.871	0.376	-1.865	0.392	-1.815	0.398	-1.807	0.419	-1.758	0.430
43	-1.979	0.366	-1.977	0.373	-1.927	0.364	-1.924	0.377	-1.874	0.375	-1.868	0.391	-1.820	0.396	-1.812	0.417	-1.764	0.428
44	-1.978	0.364	-1.975	0.371	-1.927	0.362	-1.923	0.374	-1.875	0.371	-1.870	0.388	-1.822	0.392	-1.815	0.412	-1.768	0.422
45	-1.977	0.363	-1.975	0.370	-1.928	0.361	-1.924	0.372	-1.877	0.370	-1.872	0.386	-1.825	0.390	-1.818	0.408	-1.772	0.418
46	-1.978	0.364	-1.975	0.369	-1.928	0.360	-1.925	0.371	-1.879	0.369	-1.874	0.384	-1.828	0.388	-1.821	0.407	-1.776	0.415
47	-1.977	0.362	-1.974	0.368	-1.928	0.359	-1.925	0.370	-1.880	0.368	-1.875	0.381	-1.831	0.384	-1.824	0.403	-1.780	0.411
48	-1.977	0.362	-1.974	0.367	-1.930	0.360	-1.927	0.369	-1.882	0.365	-1.878	0.380	-1.835	0.382	-1.830	0.399	-1.787	0.407
49	-1.978	0.361	-1.976	0.368	-1.933	0.360	-1.929	0.369	-1.886	0.366	-1.881	0.379	-1.838	0.381	-1.832	0.398	-1.789	0.405
50	-1.976	0.360	-1.974	0.365	-1.932	0.357	-1.930	0.366	-1.888	0.363	-1.884	0.377	-1.841	0.379	-1.835	0.394	-1.794	0.402
55	-1.976	0.358	-1.974	0.363	-1.936	0.355	-1.933	0.363	-1.894	0.360	-1.891	0.371	-1.854	0.371	-1.850	0.385	-1.812	0.390
60	-1.975	0.355	-1.974	0.359	-1.939	0.353	-1.937	0.360	-1.902	0.357	-1.899	0.366	-1.864	0.365	-1.859	0.377	-1.824	0.379
65	-1.975	0.352	-1.973	0.356	-1.941	0.351	-1.939	0.356	-1.907	0.351	-1.904	0.360	-1.872	0.359	-1.868	0.370	-1.835	0.372
70	-1.974	0.351	-1.972	0.355	-1.943	0.349	-1.941	0.353	-1.912	0.349	-1.909	0.357	-1.880	0.357	-1.876	0.366	-1.846	0.367
75	-1.974	0.350	-1.973	0.353	-1.945	0.347	-1.943	0.351	-1.914	0.347	-1.913	0.354	-1.885	0.353	-1.882	0.361	-1.854	0.361
80	-1.973	0.348	-1.971	0.351	-1.945	0.347	-1.944	0.350	-1.918	0.347	-1.916	0.352	-1.890	0.350	-1.887	0.358	-1.861	0.358
85	-1.973	0.347	-1.972	0.349	-1.947	0.344	-1.946	0.347	-1.921	0.343	-1.920	0.349	-1.895	0.347	-1.892	0.354	-1.869	0.355
90	-1.973	0.348	-1.971	0.349	-1.949	0.344	-1.948	0.348	-1.925	0.345	-1.923	0.349	-1.900	0.348	-1.898	0.352	-1.875	0.352
95	-1.973	0.346	-1.971	0.347	-1.949	0.342	-1.948	0.345	-1.926	0.342	-1.925	0.346	-1.904	0.345	-1.902	0.350	-1.880	0.349
100	-1.973	0.346	-1.972	0.347	-1.951	0.343	-1.950	0.346	-1.929	0.343	-1.928	0.347	-1.908	0.346	-1.905	0.350	-1.885	0.350
200	-1.970	0.337	-1.969	0.337	-1.960	0.336	-1.959	0.337	-1.949	0.334	-1.949	0.335	-1.938	0.333	-1.938	0.336	-1.927	0.334

See Definition 2 and Remark 3 in the text.

Table 2
Size and Power of Panel Unit Root Tests
(Experiment 1: No Structural Breaks, No Serial Correlation)

		<u>T = 10</u>		<u>T = 25</u>		<u>T = 50</u>		<u>T = 100</u>	
		Size	Power	Size	Power	Size	Power	Size	Power
<u>N=10</u>	LM	0.065	0.086	0.068	0.149	0.068	0.484	0.051	0.990
	IPS	0.063	0.062	0.062	0.124	0.059	0.357	0.050	0.961
<u>N=25</u>	LM	0.064	0.080	0.054	0.207	0.058	0.802	0.060	1.000
	IPS	0.051	0.066	0.051	0.162	0.059	0.622	0.055	1.000
<u>N=50</u>	LM	0.050	0.072	0.056	0.325	0.053	0.974	0.058	1.000
	IPS	0.046	0.071	0.051	0.261	0.047	0.899	0.057	1.000
<u>N=100</u>	LM	0.051	0.083	0.060	0.518	0.052	1.000	0.042	1.000
	IPS	0.051	0.072	0.063	0.415	0.054	0.997	0.049	1.000

Table 3
Size and Power of Panel Unit Root Tests
(Experiment 2: Structural Breaks, No Serial Correlation)

		<u>T = 10</u>		<u>T = 25</u>		<u>T = 50</u>		<u>T = 100</u>	
		Size	Power	Size	Power	Size	Power	Size	Power
<u>I = 0.5</u>									
<u>N=10</u>	LM_N	0.008	0.008	0.033	0.055	0.049	0.226	0.065	0.863
	IPS_N	0.001	0.002	0.017	0.038	0.033	0.144	0.047	0.745
	LM_B	0.083	0.094	0.074	0.160	0.072	0.460	0.064	0.985
<u>N=25</u>	LM_N	0.001	0.002	0.021	0.051	0.042	0.379	0.067	0.997
	IPS_N	0.001	0.001	0.016	0.040	0.033	0.272	0.044	0.989
	LM_B	0.060	0.074	0.054	0.201	0.067	0.775	0.075	1.000
<u>N=50</u>	LM_N	0.001	0.001	0.013	0.050	0.036	0.622	0.043	1.000
	IPS_N	0.000	0.000	0.007	0.043	0.023	0.486	0.030	1.000
	LM_B	0.062	0.086	0.064	0.297	0.060	0.968	0.059	1.000
<u>N=100</u>	LM_N	0.000	0.000	0.006	0.050	0.028	0.870	0.043	1.000
	IPS_N	0.000	0.000	0.005	0.048	0.017	0.763	0.036	1.000
	LM_B	0.068	0.106	0.058	0.473	0.059	1.000	0.050	1.000
<u>I = 0.3</u>									
<u>N=10</u>	LM_N	0.006	0.007	0.029	0.046	0.057	0.199	0.056	0.851
	IPS_N	0.000	0.000	0.006	0.007	0.025	0.046	0.035	0.534
	LM_B	0.070	0.081	0.070	0.144	0.068	0.452	0.061	0.986
<u>N=25</u>	LM_N	0.001	0.000	0.019	0.048	0.046	0.353	0.046	0.998
	IPS_N	0.000	0.000	0.002	0.003	0.009	0.058	0.016	0.877
	LM_B	0.068	0.085	0.056	0.204	0.060	0.781	0.072	1.000
<u>N=50</u>	LM_N	0.000	0.000	0.009	0.032	0.033	0.536	0.048	1.000
	IPS_N	0.000	0.000	0.000	0.000	0.003	0.077	0.017	0.995
	LM_B	0.061	0.087	0.056	0.291	0.056	0.961	0.060	1.000
<u>N=100</u>	LM_N	0.000	0.000	0.004	0.028	0.024	0.810	0.040	1.000
	IPS_N	0.000	0.000	0.000	0.000	0.000	0.085	0.007	1.000
	LM_B	0.070	0.104	0.051	0.459	0.054	1.000	0.050	1.000

See Section 4.2 for the definition of LM_N, IPS_N and LM_B.

Table 4
Size and Power of Panel LM Unit Root Tests
(Experiment 3: Structural Breaks, Serial Correlation)

T	N	$p = 0$		$p = 1$		$p = 2$		$p = 3$		$p = 4$	
		Size	Power	Size	Power	Size	Power	Size	Power	Size	Power
<u>AR(1) Error: $r = 0.3$</u>											
25	10	0.000	0.000	0.059	0.111	0.061	0.105	0.064	0.098	0.070	0.088
	25	0.000	0.000	0.064	0.163	0.086	0.160	0.075	0.135	0.070	0.110
	50	0.000	0.000	0.061	0.229	0.075	0.180	0.061	0.144	0.075	0.130
	100	0.000	0.000	0.058	0.357	0.077	0.283	0.072	0.207	0.073	0.165
50	10	0.000	0.000	0.061	0.343	0.067	0.299	0.065	0.253	0.059	0.208
	25	0.000	0.000	0.065	0.632	0.079	0.540	0.073	0.462	0.073	0.361
	50	0.000	0.000	0.063	0.883	0.068	0.810	0.069	0.703	0.069	0.584
	100	0.000	0.000	0.066	0.993	0.073	0.972	0.070	0.916	0.059	0.823
100	10	0.000	0.024	0.066	0.954	0.076	0.913	0.066	0.859	0.067	0.808
	25	0.000	0.027	0.060	1.000	0.061	1.000	0.061	0.998	0.059	0.991
	50	0.000	0.032	0.044	1.000	0.050	1.000	0.047	1.000	0.056	1.000
	100	0.000	0.044	0.063	1.000	0.070	1.000	0.069	1.000	0.076	1.000
<u>MA(1) Error: $q = -0.3$</u>											
25	10	0.880	0.961	0.165	0.267	0.063	0.106	0.043	0.073	0.042	0.052
	25	1.000	1.000	0.237	0.441	0.059	0.132	0.040	0.063	0.030	0.051
	50	1.000	1.000	0.334	0.656	0.052	0.160	0.024	0.066	0.021	0.053
	100	1.000	1.000	0.540	0.890	0.058	0.237	0.021	0.078	0.019	0.053
50	10	0.974	1.000	0.232	0.705	0.081	0.356	0.052	0.233	0.044	0.186
	25	1.000	1.000	0.410	0.965	0.098	0.658	0.055	0.431	0.042	0.330
	50	1.000	1.000	0.620	1.000	0.110	0.884	0.049	0.677	0.042	0.493
	100	1.000	1.000	0.859	1.000	0.138	0.994	0.050	0.898	0.029	0.732
100	10	0.992	1.000	0.304	1.000	0.096	0.967	0.065	0.890	0.054	0.810
	25	1.000	1.000	0.542	1.000	0.137	1.000	0.074	0.999	0.061	0.992
	50	1.000	1.000	0.774	1.000	0.162	1.000	0.066	1.000	0.051	1.000
	100	1.000	1.000	0.956	1.000	0.211	1.000	0.054	1.000	0.035	1.000

All the tests are conducted based on the statistic $\Gamma_{LM}^B(p)$ defined in (3.14) of the text. See Section 4.3.

Table 5
Panel LM Unit Root Tests For PPP

DATA SET	Monthly	Quarterly
EMU countries	-1.924*	-3.980**
EC countries	-2.365**	-4.837**
OECD countries	-3.150**	-5.973**
Choi's selection	-2.125*	-3.628**

All models include an intercept and time trend and use data from the post-Bretton Woods float through 1999. Two asterisks indicate significance at the 1% level; one asterisk indicates significance at the 5% level.