

Supplementary Data S5

EUMOD21 Residual analysis

Tests of normality and heteroscedasticity

	Shapiro-Wilk W test for normal data		Shapiro-Francia W' test for normal data		White test of heteroscedasticity		
Country	z	Prob.z	z	Prob. Z	nR2	Chi_sq	Prob. F
AT_IGDPc	0.704	0.24063	1.199	0.11525	10.9934	15.50731	0.2102
BE_IGDPc	0.571	0.28407	0.69	0.24494	5.126	15.50731	0.8401
BG_IGDPc	-0.584	0.72045	-0.092	0.53668	16.1766	15.50731	0.0082
CY_IGDPc	0.453	0.32525	0.732	0.23197	6.0764	15.50731	0.7473
CZ_IGDPc	1.277	0.1008	0.775	0.21904	9.8296	15.50731	0.3182
DE_IGDPc	-1.154	0.87582	-0.525	0.70007	16.6936	15.50731	0.0048
DK_IGDPc	0.523	0.30041	-0.039	0.51543	7.1016	15.50731	0.632
EE_IGDPc	-0.622	0.73312	0.036	0.48553	10.3642	15.50731	0.2657
EL_IGDPc	-0.018	0.5071	0.668	0.25213	8.1554	15.50731	0.5063
ES_IGDPc	0.562	0.28692	0.196	0.42228	2.5718	15.50731	0.982
FI_IGDPc	-0.078	0.53093	0.862	0.19443	10.7316	15.50731	0.2325
FR_IGDPc	-2.05	0.97984	-1.622	0.94761	2.046	15.50731	0.992
HR_IGDPc	-1.528	0.93679	-1.218	0.88847	3.9182	15.50731	0.9281
HU_IGDPc	-0.276	0.6086	-0.258	0.60177	7.1456	15.50731	0.6268
IE_IGDPc	-1.655	0.95103	-0.884	0.81168	4.1008	12.59159	0.7463
IT_IGDPc	-0.059	0.52354	0.166	0.43401	2.772	15.50731	0.9768
LT_IGDPc	1.524	0.06372	1.837	0.03313	11.2552	15.50731	0.1893
LU_IGDPc	-0.195	0.57734	-0.45	0.67349	6.6614	15.50731	0.7052
LV_IGDPc	1.282	0.09999	1.358	0.08719	5.2822	15.50731	0.8261
MT_IGDPc	-0.261	0.60301	-0.701	0.75837	9.3823	15.50731	0.3877
NL_IGDPc	0.829	0.20343	1.313	0.09467	3.4012	15.50731	0.9542
PL_IGDPc	-0.213	0.58452	-0.629	0.73544	10.3708	12.59159	0.0974
PT_IGDPc	1.57	0.0582	1.782	0.03738	5.4076	12.59159	0.5748
RO_IGDPc	0.72	0.23581	0.856	0.19611	5.0776	12.59159	0.6187

SE_IGDPc	0.343	0.3659	-0.073	0.52927	8.211	15.50731	0.5052
SI_IGDPc	-0.179	0.57088	0.305	0.38016	10.0317	15.50731	0.2997
SK_IGDPc	0.02	0.49209	-0.13	0.55155	10.878	15.50731	0.2197
UK_IGDPc	-0.861	0.80527	-0.567	0.71481	6.2433	15.50731	0.7357

Computations: Bianca Pauna

BDS-Test

AT_IGDPC_RES			BE_IGDPC_RES			BG_IGDPC_RES			CY_IGDPC_RES		
Fraction of pairs			Fraction of pairs			Fraction of pairs			Fraction of pairs		
Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.
2	0.1676	0.424	2	0.6593	0.65	2	0.4406	0.586	2	0.0008	0.028
3	0.05	0.222	3	0.6532	0.964	3	0.9982	0.836	3	0.0359	0.174
4	0.0194	0.174	4	0.9346	0.8	4	0.1788	0.38	4	0.0215	0.148
5	0.0252	0.194	5	0.8537	0.658	5	0.0004	0.054	5	0.0433	0.172
6	0.0643	0.28	6	0.8638	0.604	6	0	0.02	6	0.4707	0.43
Standard deviation			Standard deviation			Standard deviation			Standard deviation		
Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.
2	0.0011	0.042	2	0.895	0.718	2	0.6842	0.998	2	0.886	0.764
3	0.1598	0.414	3	0.8571	0.872	3	0.9133	0.82	3	0.3249	0.77
4	0.2174	0.46	4	0.345	0.66	4	0.5337	0.542	4	0.8319	0.664
5	0.2699	0.546	5	0.4742	0.816	5	0.5773	0.51	5	0.874	0.636
6	0.3511	0.594	6	0.5049	0.796	6	0.0852	0.548	6	0.0654	0.36
Fraction of range			Fraction of range			Fraction of range			Fraction of range		
Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.
2	0.0001	0.518	2	0.0002	0.49	2	0.4024	0.994	2	0.4864	0.834
3	0.0214	0.804	3	0.0031	0.628	3	0.0001	0.652	3	0.1092	0.668

4	0.0467	0.878	4	0.0013	0.668	4	0.0005	0.476	4	0.0143	0.558
5	0.0402	0.942	5	0.0129	0.798	5	0	0.284	5	0.001	0.456
6	0.0197	0.916	6	0	0.238	6	0	0.324	6	0	0.26

CZ_IGDPC_RES			DE_IGDPC_RES			DK_IGDPC_RES			EE_IGDPC_RES		
Fraction of pairs			Fraction of pairs			Fraction of pairs			Fraction of pairs		
Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.
2	0.6482	0.968	2	0.7022	0.998	2	0.0097	0.382	2	0.1633	0.402
3	0.148	0.45	3	0.6672	0.606	3	0.0382	0.48	3	0.5875	0.562
4	0.0631	0.336	4	0.8094	0.662	4	0.0026	0.26	4	0.4827	0.436
5	0.1149	0.398	5	0.6475	0.946	5	0	0.136	5	0.5706	0.458
6	0.1299	0.388	6	0.4134	0.898	6	0	0.044	6	0.5006	0.382
Standard deviation			Standard deviation			Standard deviation			Standard deviation		
Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.
2	3.56E-01	7.10E-01	2	0.04	0.226	2	0.264	0.778	2	0.06	0.218
3	0.00E+00	2.62E-01	3	0.2047	0.494	3	0.5399	0.704	3	0.219	0.3
4	0	0.302	4	0.363	0.662	4	0.0431	0.698	4	0.0989	0.2
5	0.0052	0.518	5	0.4224	0.808	5	0.0007	0.356	5	0.1747	0.238
6	0.0131	0.87	6	0.6761	0.774	6	0.0075	0.482	6	0.0159	0.128
Fraction of range			Fraction of range			Fraction of range			Fraction of range		
Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension			Dimension	0	0.49
2	0.2308	0.54	2	0.4052	0.926	2	Normal Prob.	Bootstrap Prob.	2	0	0.474

3	0.0132	0.246	3	0.18	0.938	3	0.2725	0.768	3	0	0.398
4	0.076	0.35	4	0.5296	0.764	4	0.7438	0.794	4	0	0.372
5	0.9203	0.706	5	0.2237	0.738	5	0.03	0.606	5	0	0.346
6	0.7611	0.85	6	0.2346	0.724	6	0	0.05	6	0.7524	0.74
							0	0.014			

EL_IGDPC_RES			ES_IGDPC_RES			FI_IGDPC_RES			FR_IGDPC_RES		
Fraction of pairs			Fraction of pairs			Fraction of pairs			Fraction of pairs		
Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.
2	0.7864	0.932	2	0.9786	0.904	2	0.1218	0.378	2	0.1644	0.556
3	0.6553	1	3	0.9537	0.862	3	0.1929	0.492	3	0.8369	0.872
4	0.6956	0.568	4	0.9303	0.87	4	0.1649	0.496	4	0.2904	0.806
5	0.8347	0.806	5	0.1585	0.686	5	0.0937	0.41	5	0.1647	0.68
6	0.6026	0.964	6	0.3937	0.908	6	0.314	0.666	6	0.0308	0.402
Standard deviation			Standard deviation			Standard deviation			Standard deviation		
Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.
2	0.0716	0.406	2	0.0008	0.358	2	0.3333	0.336	2	0.0038	0.15
3	0.0471	0.352	3	0	0.212	3	0.7668	0.622	3	0.0023	0.148
4	0.2387	0.688	4	0.0001	0.354	4	0.9911	0.76	4	0.0248	0.31
5	9.41E-02	4.62E-01	5	0.6861	0.684	5	0.6985	0.942	5	0.2556	0.744
6	0.2902	0.694	6	0	0.368	6	0.6428	0.942	6	0.3315	0.834
Fraction of range			Fraction of range			Fraction of range			Fraction of range		
Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.

2	0.0094	0.542	2	0.3546	0.852	2	0.4963	0.908	2	0.1915	0.804
3	0.0276	0.776	3	0.2671	0.896	3	0.2754	0.984	3	0.0334	0.744
4	0.8092	0.85	4	0.7303	0.954	4	0.1167	0.994	4	0	0.342
5	0.1963	0.734	5	0	0.184	5	0	0.622	5	0	0.364
6	0.0137	0.63	6	0.0023	0.538	6	0	0.78	6	0	0.246

HR_IGDPC_RES			HU_IGDPC_RES			IE_IGDPC_RES			IT_IGDPC_RES		
Fraction of pairs			Fraction of pairs			Fraction of pairs			Fraction of pairs		
Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.
2	0.1438	0.552	2	0.258	0.678	2	0.3447	0.778	2	0.0112	0.202
3	0.0363	0.344	3	0.1613	0.642	3	0.0165	0.308	3	0.0125	0.2
4	0.0269	0.288	4	0.2022	0.722	4	0	0.002	4	0.0042	0.172
5	0.011	0.2	5	0.292	0.86	5	0.0001	0.064	5	0	0.032
6	0.0371	0.362	6	0.0681	0.562	6	0.0024	0.194	6	0.0009	0.142
Standard deviation			Standard deviation			Standard deviation			Standard deviation		
Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.
2	0.0131	0.19	2	0.0224	0.286	2	0.0008	0.174	2	0.0003	0.08
3	0.1004	0.462	3	0.6725	0.928	3	0.0027	0.3	3	0.0129	0.254
4	0.0211	0.29	4	0.3566	0.998	4	0	0.098	4	0.0276	0.374
5	0.3191	0.89	5	0.3002	0.774	5	0.0005	0.208	5	0.0566	0.474
6	0.5616	0.884	6	0.3698	0.636	6	0.0119	0.38	6	0.1024	0.564
Fraction of range			Fraction of range			Fraction of range			Fraction of range		

Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.
2	0.0008	0.558	2	0.3083	0.77	2	0	0.644	2	0.0001	0.614
3	0.0049	0.694	3	0.0397	0.634	3	0	0.722	3	0.0141	0.774
4	0.0004	0.648	4	0.1962	0.846	4	0	0.184	4	0	0.588
5	0.0064	0.798	5	0.4802	0.992	5	0	0.366	5	0	0.34
6	0.0029	0.786	6	0	0.416	6	0	0.494	6	0	0.502

LT_IGDPC_RES			LU_IGDPC_RES			LV_IGDPC_RES			MT_IGDPC_RES		
Fraction of pairs			Fraction of pairs			Fraction of pairs			Fraction of pairs		
Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.
2	0.8769	0.936	2	0.0337	0.486	2	0.3442	0.682	2	0.1595	0.484
3	0.3091	0.638	3	0.0009	0.246	3	0.6856	0.98	3	0.8578	0.8
4	0.5685	0.926	4	0	0.054	4	0.3982	0.822	4	0.8249	0.772
5	0.8321	0.856	5	0	0.214	5	0.109	0.522	5	0.5316	0.978
6	0.7088	0.572	6	0	0.076	6	0.1909	0.612	6	0.0086	0.438
Standard deviation			Standard deviation			Standard deviation			Standard deviation		
Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.
2	0.9079	0.834	2	0.0001	0.338	2	0.6969	0.746	2	0.5882	0.668
3	0.6482	0.924	3	0.0411	0.498	3	0.6027	0.674	3	0.5631	0.63
4	0.2549	0.358	4	0.0302	0.446	4	0.6843	0.686	4	0.2684	0.962
5	0.081	0.256	5	0	0.282	5	0.9818	0.722	5	0.6825	0.484
6	0.0405	0.206	6	0.1202	0.98	6	0.436	0.77	6	0.7679	0.41

Fraction of range			Fraction of range			Fraction of range			Fraction of range		
Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.
2	0.4852	0.876	2	0.1312	0.778	2	0.3859	0.752	2	0.0602	0.704
3	0.2578	0.766	3	0	0.43	3	0.8915	0.796	3	0.0125	0.65
4	0.5721	0.99	4	0	0.274	4	0.6968	0.95	4	0.09	0.776
5	0.0629	0.756	5	0	0.426	5	0.1172	0.706	5	0.0582	0.792
6	0.0067	0.658	6	0	0.272	6	0.3707	0.962	6	0	0.288

NL_IGDPC_RES			PL_IGDPC_res			PT_IGDPC_res			RO_IGDPC_res		
Fraction of pairs			Fraction of pairs			Fraction of pairs			Fraction of pairs		
Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.
2	0.4655	0.712	2	0.4851	0.648	2	0.7117	0.876	2	0.0006	0.082
3	0.6833	0.99	3	0.5642	0.95	3	0.6935	0.966	3	0.4311	0.786
4	0.2183	0.606	4	0.2679	0.802	4	0.1431	0.498	4	0.1936	0.606
5	0.2707	0.72	5	0.6761	0.99	5	0.1942	0.602	5	0.3362	0.798
6	0.3551	0.902	6	0.6599	0.654	6	0.2174	0.694	6	0.1023	0.484
Standard deviation			Standard deviation			Standard deviation			Standard deviation		
Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.
2	0.9464	0.76	2	0.0004	0.294	2	0.395	0.558	2	0.677	0.964
3	0.399	0.368	3	0.5356	0.736	3	0.5787	0.638	3	0.2498	0.4
4	0.38	0.366	4	0.4201	0.666	4	0.7438	0.846	4	0.5189	0.508

5	0.8375	0.702	5	0.0049	0.35	5	0.6219	0.778	5	0.1319	0.308
6	0.5868	0.948	6	0.2979	0.51	6	0.0585	0.64	6	0.5573	0.872
Fraction of range			Fraction of range			Fraction of range			Fraction of range		
Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.
2	0.1888	0.502	2	0.0978	0.538	2	0.6139	0.936	2	0.1049	0.52
3	0.1308	0.59	3	0.2337	0.61	3	0.4877	0.886	3	0.0565	0.564
4	0.0944	0.598	4	0.5099	0.944	4	0.2629	0.7	4	0.1597	0.74
5	0.0681	0.598	5	0.3746	0.674	5	0.163	0.662	5	0.0298	0.54
6	0.0742	0.62	6	0.1156	0.566	6	0.1547	0.684	6	0.0056	0.486

SE_IGDPC_res			SI_IGDPC_res			SK_IGDPC_res			UK_IGDPC_res		
Fraction of pairs			Fraction of pairs			Fraction of pairs			Fraction of pairs		
Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.
2	0	0.046	2	0.0946	0.48	2	0.5617	0.7	2	0.1376	0.5
3	0.0002	0.108	3	0.277	0.48	3	0.4322	0.62	3	0.1344	0.56
4	0.016	0.254	4	0.1546	0.36	4	0.4596	0.58	4	0.285	0.66
5	0.2752	0.458	5	0.0951	0.28	5	0.5493	0.74	5	0.3893	0.84
6	0.3369	0.472	6	0.0908	0.24	6	0.4602	0.56	6	0.2047	0.66
Standard deviation			Standard deviation			Standard deviation			Standard deviation		
Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.
2	0	0.134	2	0.0282	0.28	2	0.6305	0.56	2	0.3993	0.82

3	0.4922	0.71	3	0.4624	0.84	3	0.6411	0.48	3	0.6165	0.96
4	0.4684	0.972	4	0.7276	0.68	4	0.9729	0.58	4	0.186	0.52
5	0.1576	0.904	5	0.8255	0.56	5	0.3748	0.88	5	0.5591	1
6	0.4812	0.442	6	0.5112	0.96	6	0.6489	0.56	6	0.8664	0.48
Fraction of range			Fraction of range			Fraction of range			Fraction of range		
Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.	Dimension	Normal Prob.	Bootstrap Prob.
2	0.0668	0.532	2	0.405	0.96	2	0	0.22	2	0.1859	0.78
3	0.0078	0.362	3	0.0029	0.48	3	0	0.18	3	0.0302	0.84
4	0.1048	0.538	4	0.0386	0.4	4	0	0.12	4	0.7244	1
5	0.2499	0.61	5	0.2709	0.56	5	0	0.1	5	0.5215	0.9
6	0.335	0.636	6	0.018	0.48	6	0	0.1	6	0.2201	0.84

ADF (none); null hypothesis "series has unit root"		PP (none); null hypothesis "series has unit root"
	level	level
AT_IGDPc_res	0.0012	
BE_IGDPc_res	0.0011	
BG_IGDPc_res	0.0639	0.0002
CY_IGDPc_res	0.0012	
CZ_IGDPc_res	0.0766	0.0007
DE_IGDPc_res	0.0003	
DK_IGDPc_res	0.0029	
EE_IGDPc_res	0.0216	
EL_IGDPc_res	0.0004	
ES_IGDPc_res	0.001	
FI_IGDPc_res	0.0019	

FR_IGDPc_res	0.0004	
HR_IGDPc_res	0.0002	
HU_IGDPc_res	0.0016	
IE_IGDPc_res	0.0053	
IT_IGDPc_res	0.0001	
LT_IGDPc_res	0.0001	
LU_IGDPc_res	0.0001	
LV_IGDPc_res	0.002	
MT_IGDPc_res	0.0001	
NL_IGDPc_res	0.0001	
PL_IGDPc_res	0.0018	
PT_IGDPc_res	0.0014	
RO_IGDPc_res	0.0001	
SE_IGDPc_res	0.0001	
SI_IGDPc_res	0	
SK_IGDPc_res	0.0001	
UK_IGDPc_res	0.0001	

MacKinnon (1996) one-sided p-values