

Table 1: Summary Results for Bai–Perron Estimates.

Commodity	\hat{k}	$\hat{\rho}$	$t_{\rho} = 0$	R^2	AIC	UD_{max}	sup- $F(1)$	sup- $F(9)$	$LM_{SC}(4)$
Maize	6	-0.102	-7.837	0.168	216.46	13.748	13.748	9.450	0.826
Wheat	8	-0.093	-6.749	0.235	276.81	11.705	11.348	8.200	0.038
Soy	7	-0.164	-9.652	0.220	267.85	17.007	17.007	11.708	0.329
Sorghum	9	-0.170	-8.955	0.228	279.47	11.068	10.820	10.631	0.004
Palmoil	9	-0.134	-9.172	0.251	545.30	16.195	16.195	9.281	0.628
Rice	8	-0.189	-10.589	0.272	372.10	17.231	17.231	9.695	0.437
Cotton	6	-0.105	-7.024	0.346	-41.11	10.859	9.193	8.412	0.010
Coffee	9	-0.150	-10.216	0.234	522.63	12.203	9.450	11.813	0.145
Cocoa	9	-0.126	-8.819	0.154	528.99	9.830	6.385	9.830	0.078
Sugar	7	-0.051	-5.449	0.200	1048.46	10.815	6.272	8.710	0.034
Beef	9	-0.192	-10.649	0.285	-1.13	14.248	12.343	13.257	0.729
Logs	9	-0.153	-10.272	0.280	157.47	11.943	9.047	11.290	0.356
Rubber	6	-0.061	-6.380	0.147	395.45	17.665	17.665	8.783	0.002
Iron	7	-0.173	-9.659	0.233	413.92	25.132	18.144	14.548	0.021
Copper	8	-0.115	-8.567	0.229	505.18	11.886	8.324	9.143	0.476
Tin	9	-0.130	-9.544	0.223	111.40	13.713	5.780	10.882	0.087
Lead	9	-0.105	-7.982	0.167	538.24	10.573	7.489	7.846	0.892
Zinc	9	-0.136	-10.508	0.266	369.81	11.059	5.219	11.059	0.026
Gold	9	-0.093	-8.298	0.264	2.23	13.047	1.417	10.260	0.146
Silver	4	-0.006	-0.530	0.194	498.74	15.339	6.763	8.512	0.011
Oil	9	-0.219	-11.531	0.238	750.32	18.897	12.149	16.103	0.002
Coal	9	-0.269	-12.313	0.330	65.66	17.273	8.804	16.246	0.120
Freight	8	-0.223	-10.244	0.249	489.80	23.211	23.211	11.896	0.636
Food	4	-0.073	-6.604	0.150	194.23	19.150	12.644	10.893	0.212

Note: The column headed \hat{k} denotes the number of structural breaks included in the final model. The column headed $\hat{\rho}$ denotes the estimates of the lagged level term in the SM–AR model. The column titled $t_{\rho} = 0$ reports the heteroskedasticity robust t -ratio for a test of the null hypothesis that $\rho = 0$. The column headed $LM_{SC}(4)$ includes p -values for a heteroskedasticity robust Lagrange Multiplier test for remaining autocorrelation up to lag four.

Table 2: Selected Break Dates and Confidence Intervals for Bai–Perron Models.

Commodity	k	Lower	Date	Upper	Commodity	k	Lower	Date	Upper
Maize	6	2003:11	2006:08	2007:08	Rubber	5	1999:02	2001:12	2002:04
						6	2008:01	2008:12	2010:12
Soy	6	1997:06	2002:06	2003:06	Iron Ore	6	2004:08	2004:12	2005:01
	7	2006:06	2007:04	2008:05		7	2007:02	2007:12	2008:02
Wheat	7	2003:11	2006:01	2006:07	Copper	7	2003:06	2003:09	2003:11
	8	2004:03	2008:03	2012:07		8	2002:12	2005:09	2005:11
Sorghum	7	2003:07	2004:04	2007:01	Tin	7	1999:06	2000:01	2000:07
	8	2006:03	2006:08	2006:09		8	2002:06	2003:09	2003:12
	9	2005:07	2008:09	2010:07		9	2005:07	2006:06	2007:01
Palm Oil	9	2004:08	2006:06	2007:01	Lead	8	2002:11	2003:08	2003:10
						9	2003:08	2006:06	2007:01
Rice	6	2000:01	2000:02	2000:10	Zinc	7	1999:06	2000:09	2001:11
	7	2004:04	2004:07	2004:11		8	2005:03	2005:07	2005:09
	8	2007:03	2008:01	2008:02		9	2006:09	2007:07	2008:05
Cotton	5	1998:07	2000:11	2002:09	Gold	7	2000:09	2001:07	2003:04
	6	2004:01	2008:11	2009:09		8	2004:10	2005:10	2005:12
						9	2008:07	2008:11	2009:08
Coffee	8	2003:12	2004:08	2004:12	Silver	4	2006:11	2008:11	2011:08
	9	2007:09	2008:10	2009:08					
Cocoa	8	2000:02	2001:02	2001:03	Oil	9	2004:05	2004:12	2005:04
	9	2007:12	2008:11	2010:05					
Sugar	7	1981:01	1985:06	1992:09	Coal	9	1999:10	2001:10	2002:12
							2003:07	2003:10	2003:12
							2006:11	2007:05	2007:07
Beef	9	1998:09	2003:06	2008:02	Freight	8	2002:07	2003:02	2003:07
							2004:02	2008:08	2008:11
Logs	9	2003:07	2005:11	2008:08	Food	4	1980:05	1980:10	1981:08

Note: Columns titled Lower (Upper) denote the lower (upper) limits for a 90% confidence interval for the identified break date. Columns headed Date reports point estimate for identified break dates.

Table 3: Summary Results for SlowShift Estimates.

Commodity	\hat{k}	$\hat{\rho}$	$t_{\rho} = 0$	R^2	$\hat{\sigma}_{NL}$	$\hat{\sigma}_{NL}/\hat{\sigma}_L$	AIC	$LM_{SC}(4)$
Maize	6	-0.110	-5.906	0.148	0.049	0.965	250.75	0.418
Soy	5	-0.122	-4.307	0.170	0.052	0.964	315.06	0.381
Wheat	5	-0.107	-5.561	0.199	0.050	0.971	292.34	0.523
Sorghum	8	-0.136	-5.234	0.183	0.051	0.960	325.31	0.594
Palm Oil	1	-0.049	-3.812	0.162	0.066	0.990	590.68	0.968
Rice	6	-0.119	-4.760	0.219	0.056	0.956	410.29	0.942
Cotton	2	-0.038	-3.074	0.294	0.039	0.992	-27.43	0.076
Coffee	7	-0.083	-5.751	0.161	0.065	0.968	595.12	0.561
Cocoa	5	-0.072	-4.953	0.078	0.065	0.977	588.27	0.192
Sugar	5	-0.060	-4.827	0.161	0.099	0.975	1085.11	0.314
Beef	7	-0.184	-7.824	0.239	0.040	0.945	36.48	0.014
Logs	3	-0.078	-3.878	0.186	0.048	0.984	222.64	0.934
Rubber	2	-0.033	-3.251	0.080	0.058	0.991	436.63	0.786
Iron Ore	5	-0.124	-3.166	0.186	0.057	0.943	440.07	0.274
Copper	2	-0.038	-4.108	0.152	0.064	0.988	551.77	0.909
Tin	4	-0.060	-5.269	0.143	0.046	0.976	170.61	0.936
Lead	2	-0.042	-3.817	0.093	0.066	0.988	579.23	0.807
Zinc	0	-0.034	-2.819	0.140	0.058	1.000	434.23	0.878
Gold	5	-0.062	-5.700	0.205	0.041	0.969	36.06	0.539
Silver	5	-0.095	-4.813	0.170	0.075	0.969	505.27	0.871
Oil	7	-0.160	-4.752	0.150	0.079	0.950	825.49	0.079
Coal	9	-0.198	-5.551	0.251	0.049	0.933	125.63	0.704
Freight	1	-0.126	-4.625	0.145	0.072	0.975	505.22	0.656
Food	4	-0.072	-3.673	0.103	0.049	0.976	238.35	0.506

Note: The column headed \hat{k} denotes the number of logistic function mean shifts included in the final model. The column headed $\hat{\rho}$ denotes the estimates of the lagged level term in the SM-AR model. The column titled $t_{\rho} = 0$ reports the heteroskedasticity robust t -ratio for a test of the null hypothesis that $\rho = 0$. The column headed $LM_{SC}(4)$ includes p -values for a heteroskedasticity robust Lagrange Multiplier test for remaining autocorrelation up to lag four.

Table 4: Selected Transitions and Shift Dates for SlowShift Models.

Commodity	$\hat{\gamma}$	\hat{c}	10%	Center	90%	Commodity	$\hat{\gamma}$	\hat{c}	10%	Center	90%
Maize	30	0.91	2005:08	2006:08	2007:09	Rubber	9.87	0.95	2005:04	2008:06	2011:09
Soy	30	0.92	2006:01	2007:02	2008:02	Iron Ore	1.99 7.23	0.76 0.93	1983:01 2003:03	1998:12 2007:07	2014:10 2011:12
Wheat	30	0.90	2005:02	2006:03	2007:03	Copper	30	0.85	2002:05	2003:06	2004:07
Sorghum	30 3.55	0.90 0.95	2005:02 1999:07	2006:03 2008:06	2007:03 2017:05	Tin	30	0.90	2005:02	2006:03	2007:03
Palm Oil	30	0.47	1983:05	1984:05	1985:06	Zinc	--	--	--	--	--
Rice	30	0.92	2006:01	2007:02	2008:02	Lead	30	0.85	2002:05	2003:06	2004:07
Cotton	2.97	0.55	1977:11	1988:06	1999:02	Gold	10.79	0.95	2005:07	2008:06	2011:05
Coffee	25.11	0.95	2007:03	2008:06	2009:09	Silver	8.26	0.95	2004:08	2008:06	2012:04
Cocoa	30	0.93	2006:06	2007:07	2008:08	Oil	30	0.86	2002:11	2003:12	2004:12
Sugar	30	0.40	1980:03	1981:03	1982:04	Coal	30 30	0.86 0.91	2002:11 2005:08	2003:12 2006:08	2004:12 2007:09
Beef	30	0.67	1993:05	1994:05	1995:06	Freight	3.40	0.28	1965:07	1974:11	1984:03
Logs	30	0.73	1996:07	1997:07	1998:08	Food	30	0.40	1980:03	1981:03	1982:04

Note: Columns titled 10% (90%) denote the dates for which the relevant logistic function is associated with a value of 0.10 (0.90). Likewise, columns headed Center denote dates for which $t^* = \hat{c}$ for the respective logistic function.

Table 5: Summary Results for Fourier Frequency Estimates.

Commodity	\hat{k}	Last	$\hat{\rho}$	$t_{\rho} = 0$	R^2	AIC	$LM_{SC}(4)$
Maize	9	2004:09	-0.138	-7.371	0.164	241.354	0.295
Soy	10	2005:10	-0.176	-8.278	0.201	304.388	0.653
Wheat	10	2005:03	-0.285	-7.787	0.262	255.040	0.101
Sorghum	10	2005:03	-0.239	-7.052	0.207	301.543	0.023
Palm Oil	3	2002:11	-0.072	-5.641	0.180	585.242	0.783
Rice	10	2001:11	-0.232	-8.034	0.261	383.423	0.210
Cotton	9	2007:10	-0.178	-8.104	0.373	-66.468	0.014
Coffee	9	2007:05	-0.126	-7.411	0.181	576.398	0.472
Cocoa	10	2005:09	-0.152	-7.250	0.140	558.821	0.021
Sugar	10	2008:01	-0.145	-7.577	0.209	1062.034	0.049
Beef	10	2007:06	-0.307	-9.634	0.275	7.791	0.001
Logs	8	2002:12	-0.126	-7.383	0.220	212.897	0.450
Rubber	9	2007:12	-0.094	-5.919	0.135	425.649	0.254
Iron	8	2001:07	-0.237	-7.364	0.194	437.757	0.135
Copper	6	2000:12	-0.092	-5.877	0.186	541.518	0.081
Tin	3	2001:04	-0.077	-5.921	0.152	153.993	0.787
Lead	6	2008:04	-0.093	-6.094	0.131	567.722	0.302
Zinc	9	2002:11	-0.114	-7.359	0.210	421.429	0.114
Gold	10	2001:01	-0.251	-8.522	0.286	-15.901	0.023
Silver	10	2008:09	-0.182	-5.966	0.221	501.828	0.121
Oil	10	2002:07	-0.214	-7.776	0.168	812.993	0.009
Coal	9	2001:11	-0.289	-9.531	0.274	98.536	0.826
Freight	10	2006:09	-0.306	-9.445	0.233	500.678	0.015
Food	10	1999:11	-0.163	-7.868	0.156	219.410	0.069

Note: The column headed \hat{k} denotes the number of Fourier frequencies included in the final model. The column titled Last indicates the date associated with the last change in direction in the unconditional mean. The column headed $\hat{\rho}$ denotes the estimates of the lagged level term. The column titled $t_{\rho} = 0$ records the heteroskedasticity robust t-ratio associated with the null hypothesis that $\rho = 0$.

Table 6: A Comparison of Recent Changes in Commodity Price Fundamentals.

Commodity	Bai-Perron	Commodity	SlowShift	Commodity	Fourier
Commodities with Early Shifts					
Gold	2001:07	Copper	2002:05	Copper	2000:12
Rubber	2001:12	Lead	2002:05	Gold	2001:01
Soy	2007:04	Oil	2002:11	Tin	2001:04
Freight	2003:02	Coal	2002:11	Iron	2001:07
Beef	2003:06	Iron Ore	2003:03	Silver	2001:09
Lead	2003:08	Silver	2004:08	Rice	2001:11
Copper	2003:09			Coal	2001:11
Tin	2003:09			Rubber	2001:12
Coal	2003:10				
Commodities with Intermediate Shifts					
Rice	2004:07	Wheat	2005:02	Oil	2002:07
Coffee	2004:08	Sorghum	2005:02	Palmoil	2002:11
Iron	2004:12	Tin	2005:02	Zinc	2002:11
Oil	2004:12	Rubber	2005:04	Logs	2002:12
		Gold	2005:07	Lead	2003:08
		Maize	2005:08		
Commodities with Late or Non Applicable Shifts					
Zinc	2005:07	Soy	2006:01	Maize	2004:09
Logs	2005:11	Rice	2006:01	Wheat	2005:03
Wheat	2006:01	Cocoa	2006:06	Sorghum	2005:03
Palmoil	2006:06	Coffee	2007:03	Cocoa	2005:09
Maize	2006:08	Palm Oil	NA	Soy	2005:10
Sorghum	2006:08	Cotton	NA	Freight	2006:09
Cotton	2008:11	Sugar	NA	Coffee	2007:05
Cocoa	2008:11	Beef	NA	Beef	2007:06
Silver	2008:11	Logs	NA	Cotton	2007:10
Sugar	NA	Zinc	NA	Sugar	2008:01
Food	NA	Freight	NA		
		Food	NA		

Note: The notes.

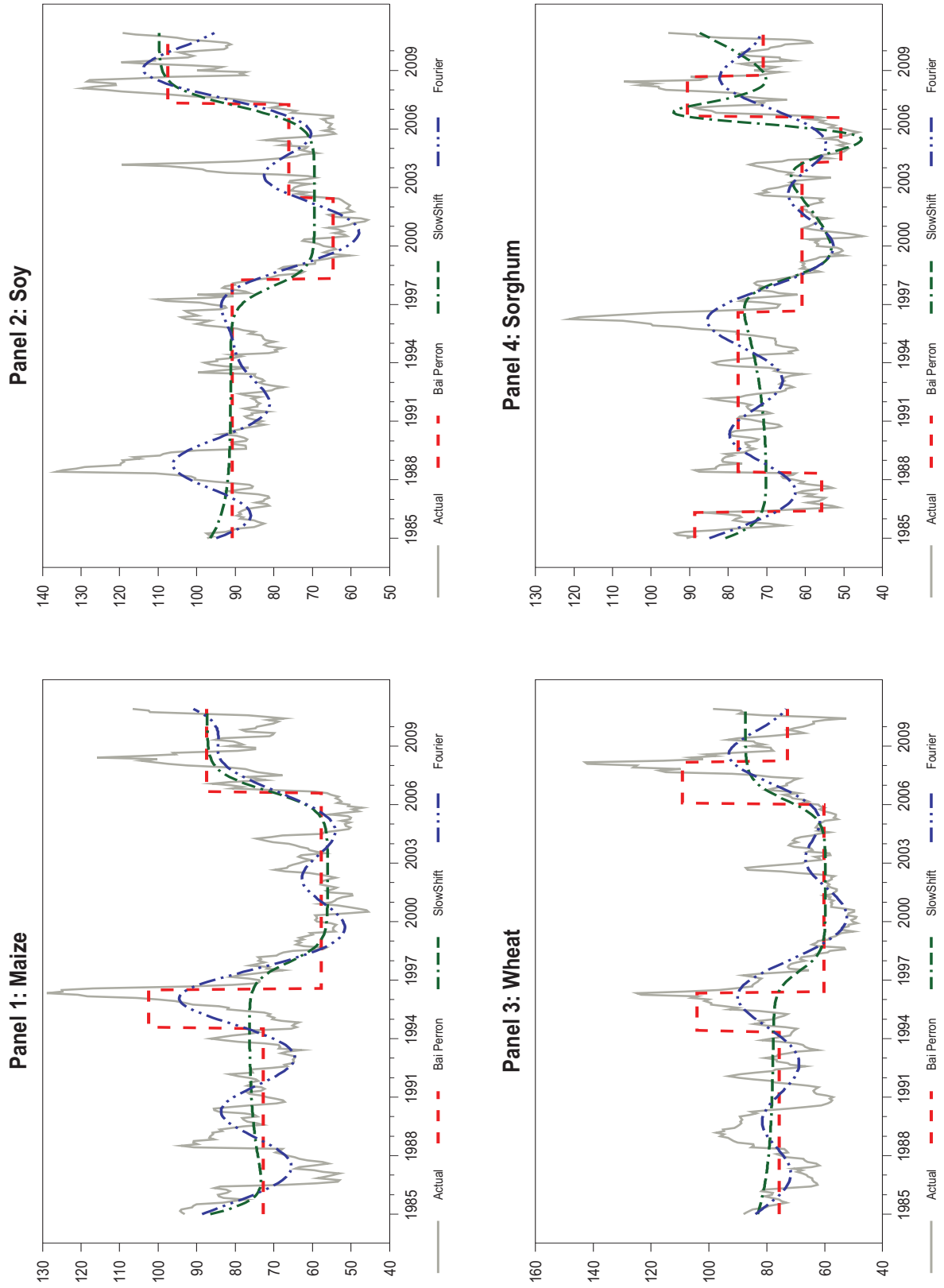


Figure 1: Commodity Prices, Actual Values and Shifting Means Obtained by Various Methods, 1985–2010.

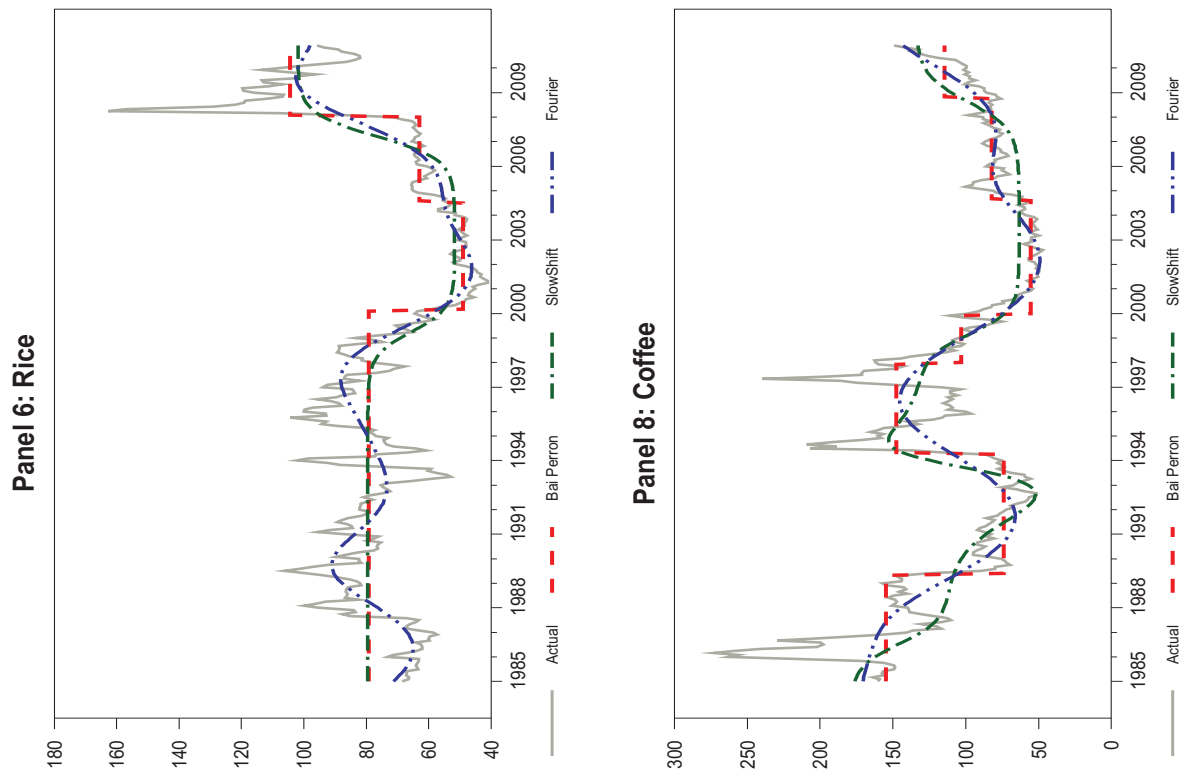


Figure 1: Commodity Prices, Actual Values and Shifting Means Obtained by Various Methods, 1985–2010 (Continued).

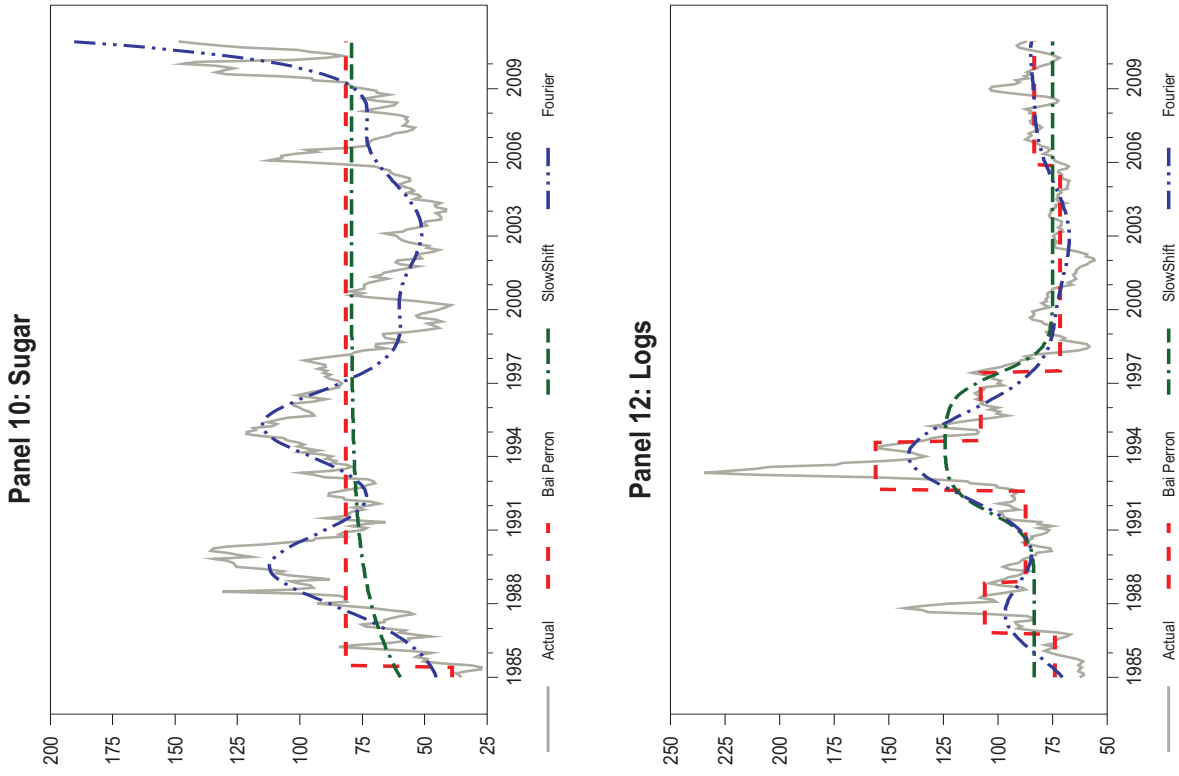
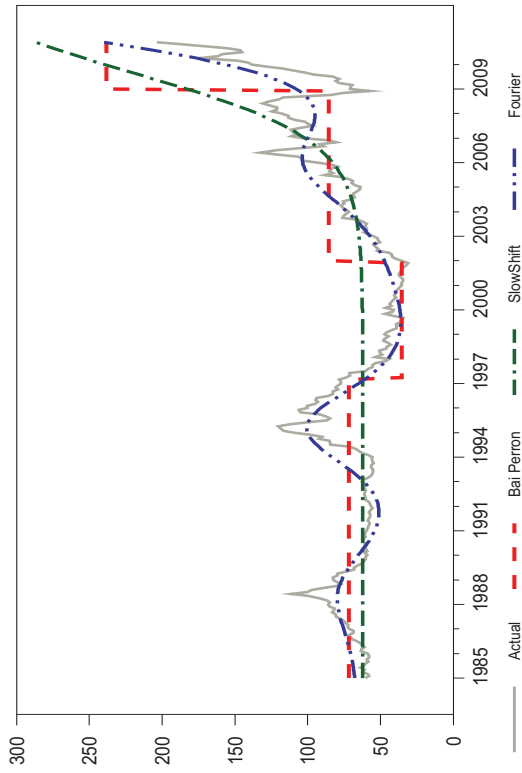
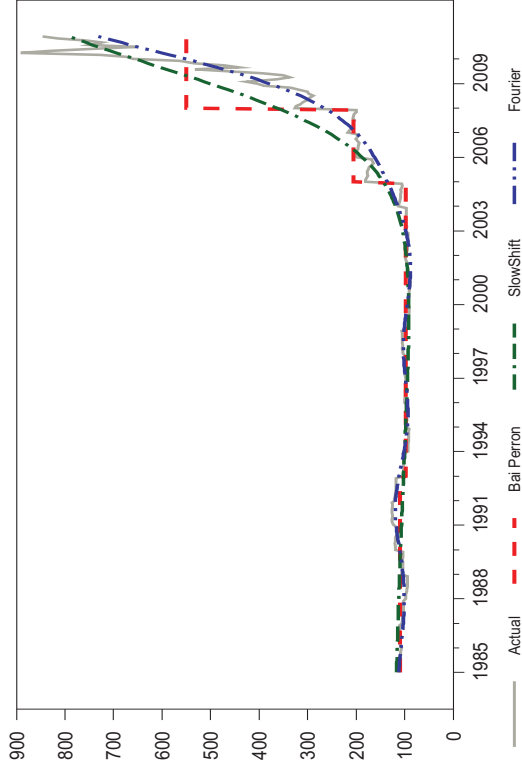


Figure 1: Commodity Prices, Actual Values and Shifting Means Obtained by Various Methods, 1985–2010 (Continued).

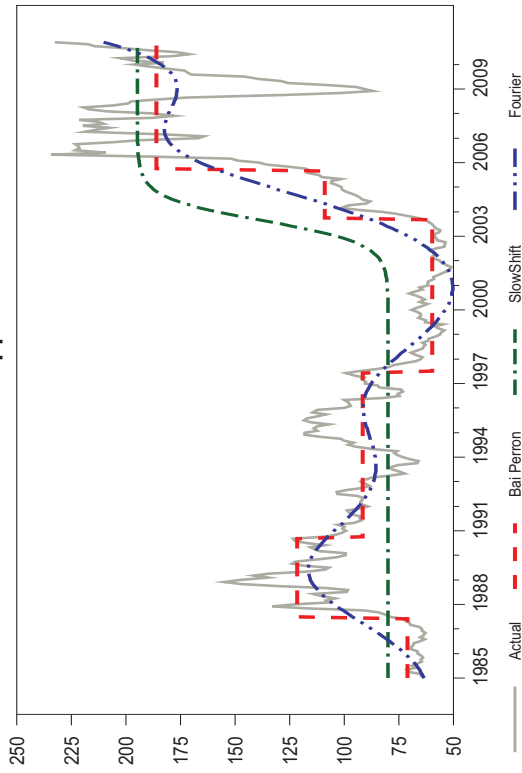
Panel 13: Rubber



Panel 14: Iron Ore



Panel 15: Copper



Panel 16: Tin

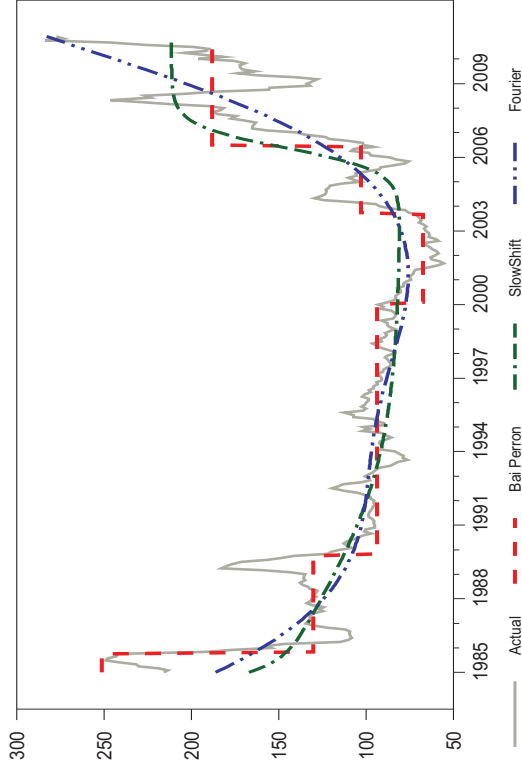
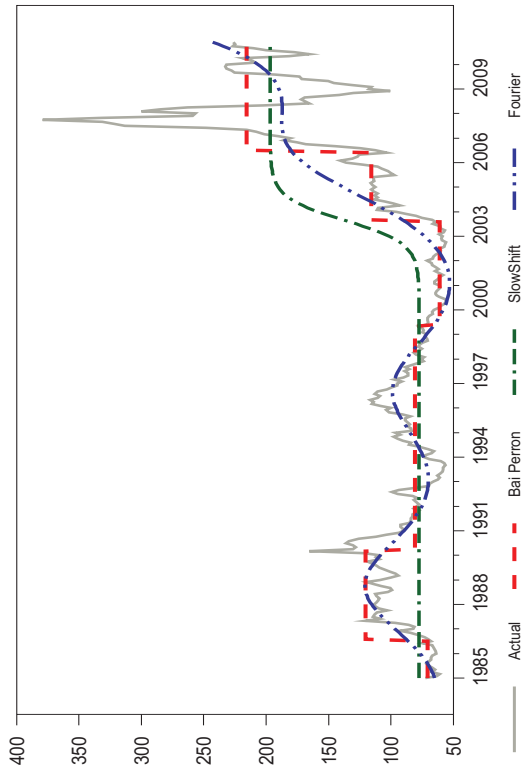
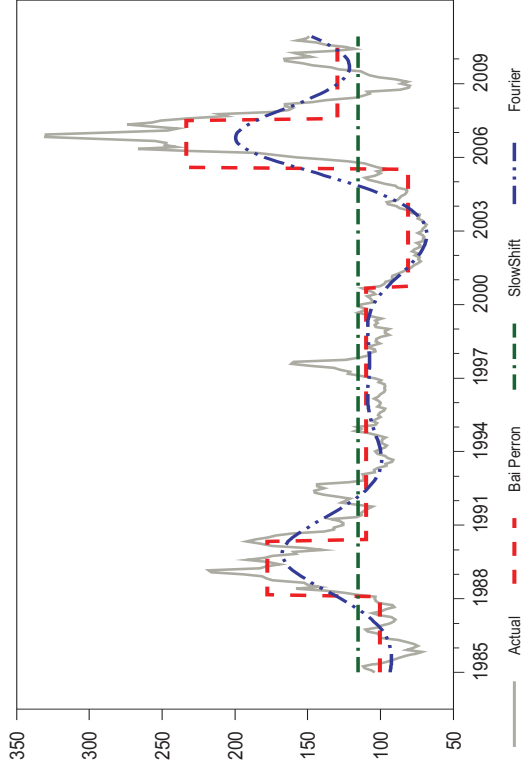


Figure 1: Commodity Prices, Actual Values and Shifting Means Obtained by Various Methods, 1985–2010 (Continued).

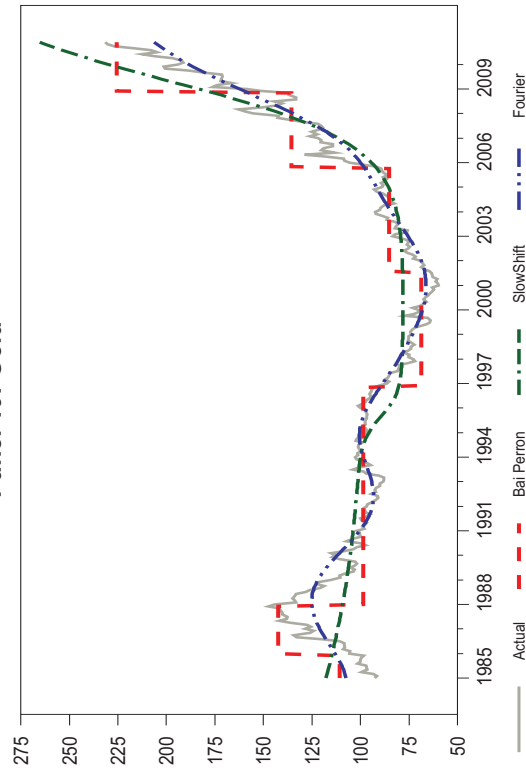
Panel 17: Lead



Panel 18: Zinc



Panel 19: Gold



Panel 20: Silver

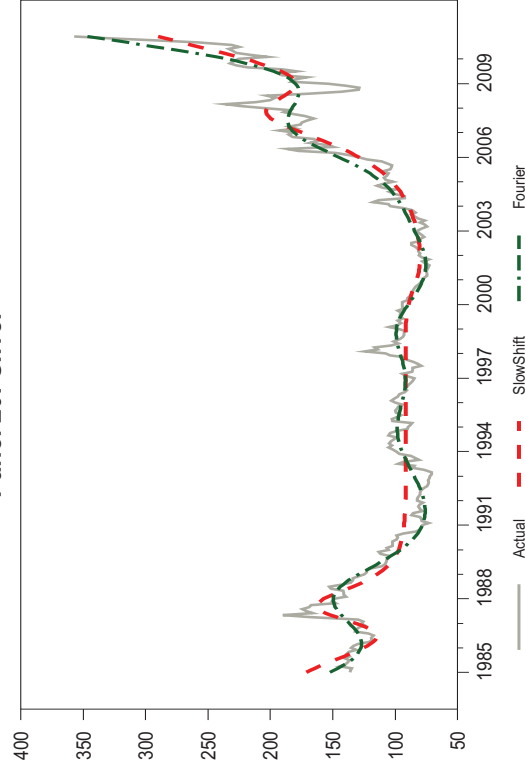
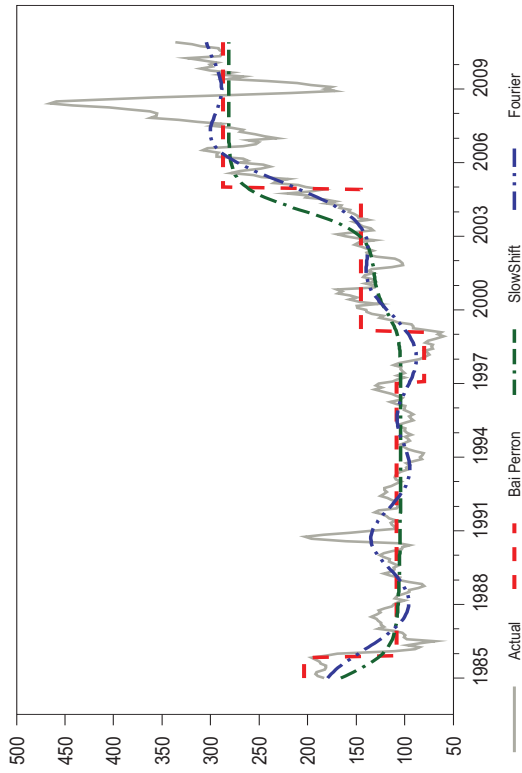
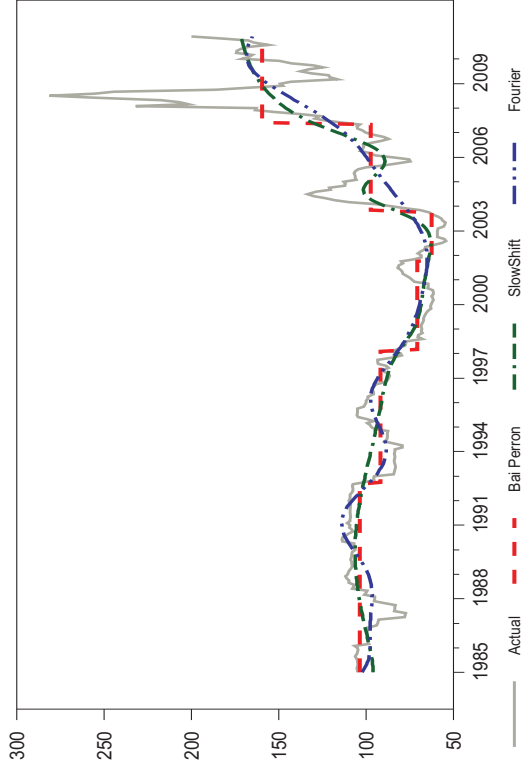


Figure 1: Commodity Prices, Actual Values and Shifting Means Obtained by Various Methods, 1985–2010 (Continued).

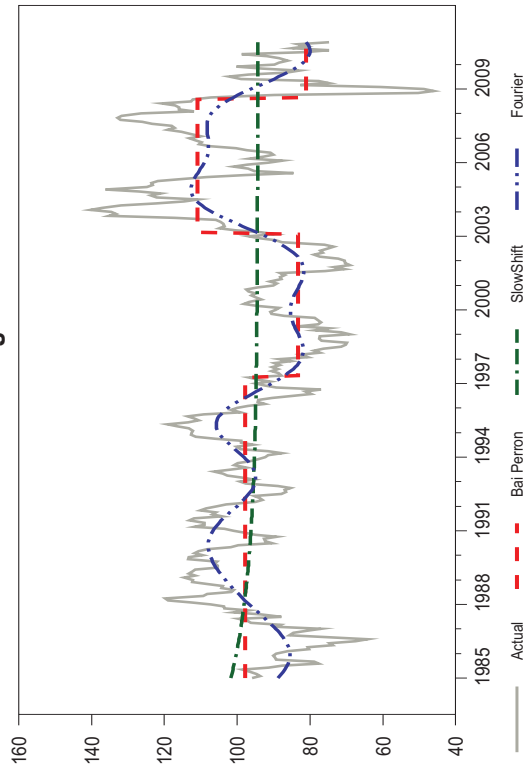
Panel 21: Oil



Panel 22: Coal



Panel 23: Freight



Panel 24: Food

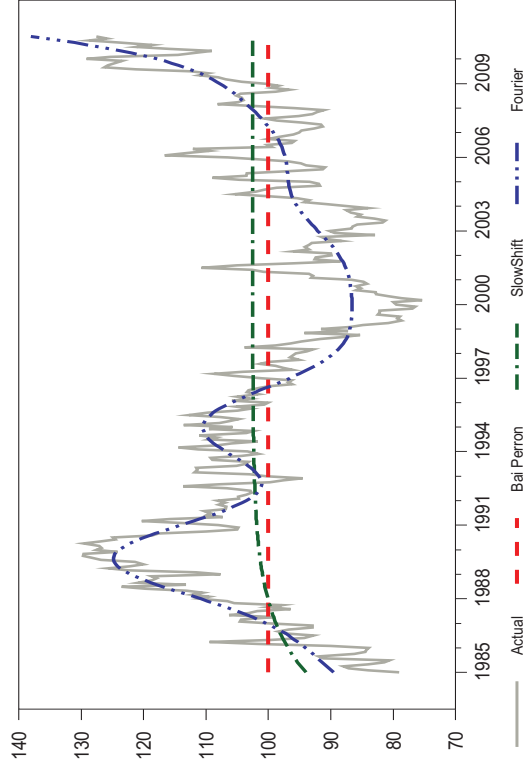


Figure 1: Commodity Prices, Actual Values and Shifting Means Obtained by Various Methods, 1985–2010 (Continued).

Data Description Appendix:

Table A1: Description of Monthly Commodity Price Data.

Commodity	Period	Units	Source	Description
1. Maize	1960:01-2010:12	dollars/mt	World Bank	U.S., No. 2 yellow, f.o.b., Gulf ports
2. Soy	1960:01-2010:12	dollars/mt	World Bank	U.S., c.i.f., Rotterdam
3. Wheat	1960:01-2010:12	dollars/mt	World Bank	U.S., No. 1, hard red winter, ordinary protein, export price delivered at the US Gulf port for prompt or 30 days shipment
4. Sorghum	1960:01-2010:12	dollars/mt	World Bank	U.S., no. 2 milo yellow, f.o.b. Gulf ports
5. Palm Oil	1960:01-2010:12	dollars/mt	World Bank	Malaysia, 5% bulk, c.i.f. North West Europe
6. Rice	1960:01-2010:12	dollars/mt	World Bank	Thailand, 5% broken, white rice (WR), milled, indicative price based on weekly surveys of export transactions, government standard, f.o.b. Bangkok
7. Cotton	1960:01-2010:12	cents/kg	World Bank	Cotton Outlook "CotlookA index", middling 1-3/32 inch, traded in Far East, C/F beginning 2006; previously Northern Europe, c.i.f.
8. Coffee	1960:01-2010:12	cents/kg	World Bank	International Coffee Organization indicator price, other mild Arabicas, average New York and Bremen/Hamburg markets, ex-dock
9. Cocoa	1960:01-2010:12	cents/kg	World Bank	International Cocoa Organization daily price, average of the first three positions on the terminal markets of New York and London, nearest three future trading months.
10. Sugar	1960:01-2010:12	cents/kg	World Bank	International Sugar Agreement (ISA) daily price, raw, f.o.b. and stowed at greater Caribbean ports
11. Beef	1960:01-2010:12	cents/kg	World Bank	Australia/New Zealand, chucks and cow forequarters, frozen boneless, 85% chemical lean, c.i.f. U.S. port (East Coast), ex-dock, beginning November 2002; previously cow forequarters
12. Logs	1960:01-2010:12	dollars/cm	World Bank	Malaysia, meranti, Sarawak, sale price charged by importers, Tokyo beginning February 1993; previously average of Sabah and Sarawak weighted by Japanese import volumes
13. Rubber	1960:01-2010:12	cents/kg	World Bank	Asia, RSS3 grade, Singapore Commodity Exchange Ltd (SICOM) nearby contract beginning 2004; during 2000 to 2003, Singapore RSS1; previously Malaysia RSS1

Table A1: Description of Monthly Commodity Price Data (continued).

Commodity	Period	Units	Source	Description
14. Iron Ore	1960:01-2010:12	cents/mt	IMF	67.55% iron content, fine, contract price to Europe, f.o.b. Ponta da Madeira
15. Copper	1960:01-2010:12	dollars/mt	World Bank	LME, grade A, minimum 99.9935% purity, cathodes and wire bar shapes, settlement price
16. Tin	1960:01-2010:12	cents/kg	World Bank	LME, refined, 99.85% purity, settlement price
17. Lead	1960:01-2010:12	cents/kg	World Bank	LME, refined, 99.97% purity, settlement price
18. Zinc	1960:01-2010:12	cents/kg	World Bank	LME, high grade, minimum 99.95% purity, settlement price beginning April 1990; previously special high grade, minimum 99.995%, cash prices
19. Gold	1960:01-2010:12	dollars/troy oz	Bundesbank	London Afternoon Fixing, last day of the month
20. Silver	1970:01-2010:12	cents/troy oz	IMF	New York
21. Oil	1960:01-2010:12	dollars/bbl		average spot price of Brent, Dubai and West Texas Intermediate, equally weighted
22. Coal	1970:01-2010:12	dollars/mt	World Bank	Australia, thermal, f.o.b. piers, Newcastle/Port Kembla, 6,300 kcal/kg (11,340 btu/lb), less than 0.8% sulfur, 13% ash beginning January 2002; previously 6,667 kcal/kg (12,000 btu/lb), less than 1.0% sulfur, 14% ash
23. Ocean Freight	1968:01-2010:12	index	Lutz Killian	Collected from <i>Drewrys Shipping Monthly</i> , various issues since 1970, 1966:01 = 1
24. Food	1960:01-2010:12	Index	Word Bank	Includes fats and oils, grains and other food items, 2000 = 100
25. PPI	1960:01-2010:12	Index		U.S. Producer Price Index, All Commodities, 1982 = 100

Note: mt denotes metric ton; kg kilogram; bbl barrel; and LME denotes the London Metal Exchange. All World Bank data were obtained from World Bank pink sheets, and may be obtained from <http://blogs.worldbank.org/prospects/category/tags/historical-data>. All IMF data were obtained from the International Monetary Fund's Financial Statistics database. Gold prices were obtained from the Deutsche Bundesbank, and may be obtained from <http://www.bundesbank.de>. Current and historical values for Lutz Killian's ocean freight rate index may be obtained from <http://www.umich.edu/~lkilian>.

Table A2: Summary Results for Linear Model Estimates.

Commodity	Lags	$\hat{\rho}$	$t_{\rho = 0}$	R^2	AIC	$LM_{SC}(4)$	RESET
Maize	1	-0.014	-2.370	0.075	264.06	0.897	0.000
Soy	2	-0.018	-1.635	0.100	334.17	0.641	0.002
Wheat	12	-0.018	-2.404	0.142	303.21	0.904	0.007
Sorghum	8	-0.012	-1.639	0.100	334.93	0.743	0.624
Palm Oil	4	-0.019	-2.634	0.144	597.37	0.971	0.114
Rice	11	-0.014	-2.808	0.137	433.94	0.910	0.000
Cotton	12	-0.009	-1.871	0.281	-22.31	0.048	0.000
Coffee	2	-0.017	-2.455	0.095	598.50	0.428	0.005
Cocoa	1	-0.012	-2.006	0.026	591.07	0.105	0.000
Sugar	3	-0.023	-2.267	0.109	1090.79	0.603	0.736
Beef	11	-0.013	-2.130	0.137	69.46	0.036	0.008
Logs	3	-0.028	-2.679	0.154	227.41	0.880	0.003
Rubber	1	-0.014	-2.069	0.060	437.65	0.698	0.101
Iron	12	-0.002	-0.400	0.076	485.46	0.248	0.001
Copper	2	-0.015	-1.937	0.129	556.27	0.870	0.528
Tin	2	-0.006	-1.598	0.094	179.97	0.909	0.027
Lead	1	-0.016	-2.065	0.067	584.28	0.867	0.000
Zinc	5	-0.034	-2.819	0.140	434.23	0.881	0.169
Gold	11	-0.005	-1.677	0.146	49.15	0.562	0.031
Silver	6	-0.012	-0.891	0.104	528.62	0.501	0.000
Oil	6	-0.005	-1.459	0.048	851.50	0.683	0.014
Coal	12	-0.024	-2.610	0.120	155.15	0.001	0.161
Freight	12	-0.047	-3.749	0.095	543.94	0.234	0.141
Food	1	-0.025	-1.732	0.051	247.90	0.384	0.015

Note: Lags denotes value of p in (1), selected by AIC. Column $\hat{\rho}$ reports estimates of the lagged level term and $t_{\rho = 0}$ reports the heteroskedasticity robust t -ratio for the null hypothesis that $\rho = 0$. The $LM_{SC}(4)$ column includes p -values for a heteroskedasticity robust Lagrange Multiplier test for remaining autocorrelation up to lag four. RESET denotes the p -value associated with a Ramesey RESET test where $h = 4$.