

**Table 4: Unrestricted TAR(3) Estimates:
Monte Carlo Means and Standard Deviations
True Model: Continuous, symmetric threshold and symmetric adjustment
BAND-TVECM**

c	T	$c^{(1)}$	$c^{(2)}$	$\mu^{(1)}$	$\rho^{(1)}$	$\alpha^{(2)}$	$\rho^{(2)}$	$\mu^{(3)}$	$\rho^{(3)}$
3	100	-1.13 (1.77)	1.20 (1.71)	-1.88 (13.58)	0.51 (0.50)	0.30 (4.87)	0.33 (2.19)	2.88 (10.95)	0.45 (0.54)
	250	-1.53 (1.52)	1.53 (1.49)	-2.32 (8.19)	0.47 (0.34)	0.07 (2.10)	0.57 (0.85)	1.10 (29.64)	0.47 (0.35)
	500	-1.94 (1.13)	2.00 (1.10)	-2.44 (1.61)	0.47 (0.24)	0.01 (0.69)	0.84 (0.37)	2.46 (2.89)	0.46 (0.24)
5	100	-1.44 (3.02)	1.44 (2.98)	-2.95 (8.70)	0.54 (0.52)	-0.46 (7.56)	0.48 (2.01)	2.50 (15.47)	0.57 (0.52)
	250	-2.11 (2.62)	2.10 (2.65)	-3.76 (37.98)	0.58 (0.33)	0.06 (3.03)	0.68 (0.76)	4.48 (21.83)	0.55 (0.27)
	500	-2.77 (2.22)	2.80 (2.30)	-3.29 (7.84)	0.56 (0.27)	-0.05 (1.30)	0.86 (0.33)	2.91 (15.63)	0.55 (0.27)
10	100	-1.39 (5.97)	2.01 (5.97)	-0.67 (80.87)	0.66 (0.44)	0.27 (10.93)	0.58 (1.49)	9.10 (268.5)	0.62 (0.49)
	250	-2.48 (6.00)	2.51 (5.89)	-6.02 (64.06)	0.72 (0.31)	0.06 (5.56)	0.76 (0.72)	4.81 (13.68)	0.70 (0.32)
	500	-3.38 (5.87)	3.70 (5.78)	-9.60 (115.8)	0.73 (0.27)	0.00 (3.07)	0.85 (0.37)	5.68 (34.74)	0.71 (0.28)

Notes: Standard deviations are in parentheses. The estimated unrestricted model is (6). The true value of ρ 0.4. The regime specific means are computed as $\mu^{(j)} = \alpha^{(j)}/(1 - \rho^{(j)})$ for $j=1,3$. Number of simulations = 1000.

**Table 5: Unrestricted TVECM(3) Estimates: Monte Carlo Means and Standard Deviations
True Model: Continuous, symmetric threshold and symmetric adjustment BAND-TVECM**

C	T	$c^{(1)}$	$c^{(2)}$	$\mu^{(1)}$	$\gamma_1^{(1)}$	$\gamma_2^{(1)}$	$\gamma_1^{(2)}$	$\gamma_2^{(2)}$	$\mu^{(3)}$	$\gamma_1^{(3)}$	$\gamma_2^{(3)}$
3	100	-1.07 (1.83)	1.07 (1.80)	-2.24 (38.2)	-1.54 (1.87)	-0.53 (0.73)	-2.23 (7.98)	-0.88 (3.14)	5.54 (99.2)	-1.60 (2.10)	-0.55 (0.83)
3	250	-1.37 (1.60)	1.45 (1.56)	14.06 (523)	-1.51 (1.17)	-0.52 (0.44)	-1.66 (3.22)	-0.64 (1.25)	3.92 (18.9)	-1.58 (1.27)	-0.55 (0.48)
3	500	-1.78 (1.32)	1.81 (1.27)	-3.78 (34.9)	-1.60 (0.90)	-0.55 (0.33)	-0.90 (1.71)	-0.35 (0.66)	3.34 (27.9)	-1.63 (0.90)	-0.56 (0.33)
5	100	-1.34 (3.01)	1.42 (3.00)	-4.48 (159)	-1.29 (1.75)	-0.45 (0.67)	-1.36 (6.84)	-0.52 (2.69)	5.09 (84.5)	1.47 (2.01)	-0.52 (0.79)
5	250	-1.91 (2.67)	1.92 (2.70)	-4.03 (18.8)	-1.27 (1.17)	-0.44 (0.43)	-1.31 (2.71)	-0.50 (1.04)	23.82 (628)	-1.27 (1.13)	-0.44 (0.42)
5	500	-2.38 (2.38)	2.50 (2.36)	-4.80 (14.4)	-1.25 (0.90)	-0.44 (0.32)	-0.70 (1.44)	-0.27 (0.56)	5.52 (12.4)	-1.28 (0.91)	-0.44 (0.33)
10	100	-1.27 (6.22)	1.84 (6.12)	6.55 (346)	-1.02 (1.71)	-0.36 (0.66)	-1.82 (6.41)	-0.70 (2.49)	7.59 (187)	-1.12 (1.84)	-0.40 (0.72)
10	250	-2.17 (5.99)	2.58 (5.93)	-0.03 (485)	-0.85 (1.04)	-0.30 (0.38)	-0.99 (2.74)	-0.37 (1.07)	4.21 (185)	-0.93 (1.12)	-0.33 (0.42)
10	500	-3.52 (5.67)	3.20 (5.67)	-7.35 (112)	-0.84 (0.86)	-0.29 (0.31)	-0.43 (1.37)	-0.17 (0.53)	6.19 (54.5)	-0.78 (0.83)	-0.27 (0.30)

Notes: Standard deviations are in parentheses. The estimated unrestricted model is (10). The true values of γ_1 and γ_2 are -1.8 and -0.6 , respectively. The regime specific mean is computed as $\mu^{(j)} = \beta' \alpha^{(j)} / \beta' \gamma^{(j)}$ for $j=1,3$. Number of simulations = 1000.

**Table 6: Restricted TAR(3) Estimates:
Monte Carlo Means, Standard Deviations and Specification Tests
True Model: Continuous, symmetric threshold and symmetric adjustment BAND-
TVECM**

		TAR			TVECM			
C	T	c	ρ	LR	C	γ_1	γ_2	LR
3	100	2.82 (0.87)	0.25 (0.43)					
3	250	2.97 (0.50)	0.32 (0.27)					
3	500	2.98 (0.34)	0.37 (0.17)					
5	100	4.36 (1.41)	0.31 (0.42)					
5	250	4.73 (0.97)	0.35 (0.28)					
5	500	4.89 (0.52)	0.38 (0.19)					
10	100	7.54 (3.04)	0.47 (0.45)					
10	250	8.36 (2.57)	0.54 (0.29)					
10	500	9.05 (1.91)	0.51 (0.23)					

Notes: For c and ρ , the Monte Carlo standard deviations are in parentheses; for LR the empirical rejection frequency of a 5% test is in parenthesis. The estimated restricted TAR(3) model is (1). LR denotes the likelihood ratio statistic for testing the restricted BAND-TAR model (1) against the unrestricted TAR model (5). The true value of ρ is 0.4. Number of simulations = 1000.

Table 7: Summary of a Simple AR(1) Estimation on Price Differences

Goods	Mean	Median	Std. Dev.	Min	City	Max	City	Half-life
Used Cars	1.00	1.00	0.01	0.97	AN	1.03	BO	NA
Household Maintenance & Repairs	0.97	0.97	0.02	0.89	TA	0.99	NY	21.46
Personal & Educational Expenses	0.95	0.97	0.0557	0.7275	MS	1.0041	HO	16.30
Other Apparel Commodities	0.95	0.95	0.021	0.8694	MS	0.9799	MI	14.27
Automobile Maintenance & Repairs	0.95	0.95	0.0383	0.8518	AN	1.0578	MI	13.86
Alcoholic Beverages	0.94	0.94	0.0169	0.9108	PO	0.9856	AN	12.54
Processed Fruits and Vegetables	0.93	0.95	0.0514	0.7527	DA	0.9782	CL	10.86
Residential Rent	0.93	0.95	0.0483	0.7652	MI	0.9892	KC	10.59
Tobacco & Smoking Products	0.93	0.95	0.0693	0.6584	MA	0.9865	TA	10.13
Infants' and Toddlers' Apparel	0.93	0.94	0.0396	0.7704	CI	0.9666	BO	9.97
Public Transportation	0.93	0.94	0.0379	0.8013	AT	0.9653	SD	9.76
Housekeeping Services	0.93	0.94	0.0586	0.6891	AT	0.9979	HO	9.58
Apparel Services	0.92	0.93	0.0477	0.7705	CH	0.9852	MA	8.82
Homeowners' Costs	0.92	0.94	0.06	0.7065	DA	0.9728	SD	8.63
Food Away from Home	0.92	0.97	0.0534	0.7836	MI	0.9753	KC	8.41
Medical Care Commodities	0.91	0.92	0.0483	0.7812	PH	0.968	DN	7.64
Personal Care	0.91	0.92	0.0753	0.7108	MS	1.012	PI	7.46
Professional Medical Services	0.90	0.91	0.0422	0.8209	HO	0.972	BO	7.12
Other Renter's Costs	0.90	0.93	0.0832	0.5778	CI	0.9701	AT	6.68
Entertainment Commodities	0.89	0.91	0.053	0.7787	PO	0.9598	NO	6.29
Hospital & Related Services	0.88	0.89	0.0595	0.7273	SF	0.9927	SD	5.59
Appliances, incl. electronic equipment	0.87	0.89	0.0712	0.7109	NO	0.9711	SD	5.27
Housekeeping Supplies	0.87	0.88	0.0679	0.7313	MS	0.9747	SL	4.98
Cereals and Bakery Products	0.86	0.89	0.0883	0.6571	SL	0.956	NY	4.69
Other Furnishings	0.85	0.86	0.0553	0.7291	MA	0.9451	NO	4.47
Textile Housefurnishings	0.83	0.82	0.0632	0.7078	HS	0.9492	DA	3.85
Women's and Girl's Apparel	0.83	0.84	0.0501	0.6848	PI	0.8882	BA	3.71
Men's and Boy's Apparel	0.82	0.82	0.0672	0.6527	MI	0.9083	NO	3.51
Motor Fuel	0.82	0.84	0.0924	0.6124	CL	0.9695	TA	3.51
New Vehicles	0.81	0.82	0.0934	0.5604	KC	0.9197	MA	3.30
Furniture & Bedding	0.80	0.83	0.1166	0.526	HO	0.9603	BO	3.12
Meats	0.79	0.80	0.082	0.5741	TA	0.9413	CI	2.97
Footwear	0.78	0.80	0.0694	0.6126	DC	0.872	DT	2.80
Other Utilities & Public	0.76	0.80	0.1839	0.2377	SL	0.9827	BO	2.61

Services								
Other Food at Home	0.75	0.75	0.0995	0.5634	KC	0.9274	HS	2.4
Fresh Fruits and Vegetables	0.74	0.76	0.1063	0.4091	AT	0.8645	DC	2.30
Eggs	0.73	0.74	0.1377	0.3008	DT	0.957	SF	2.29
Entertainment Services	0.72	0.73	0.1262	0.4609	HS	0.9295	PO	2.15
Fuels	0.66	0.67	0.1692	0.1763	KC	0.8922	MA	1.71
Fish & Seafood	0.66	0.67	0.1084	0.4126	CI	0.8551	HS	1.71
Poultry	0.62	0.64	0.1751	0.2519	DA	0.9208	CI	1.48
Dairy Products	--	--	--	--	--	--	--	--
Other Private Transportation	--	--	--	--	--	--	--	--
Average	0.85	0.87	0.0737	0.6558		0.9146		6.72

Note: The mean, the median and the standard deviation among the 28 data series in each category are reported in columns 1-3. The minimum and the maximum value of the AR(1) coefficients (and the corresponding city pair) are reported in columns 4-7. Half-life is computed by the formula $\ln p / \ln(0.5)$ where p is the estimated coefficient of the model.

Table 8: Number of Rejections No Cointegration at 10% Level

Category	ADF	HW	EG	BVD
Cereals and Bakery Products	3	12	15	26
Meats	7	26	26	28
Dairy Products	--	--	--	--
Fresh Fruits and Vegetables	20	27	28	28
Processed Fruits and Vegetables	0	3	3	26
Other Food at Home	8	23	27	28
Other Renter's Costs	5	8	8	19
Household Maintenance & Repairs	0	0	0	1
Fuels	20	24	24	25
Appliances, incl. electronic equipment	5	10	12	12
Men's and Boy's Apparel	25	21	23	28
Women's and Girl's Apparel	14	22	26	23
Other Apparel Commodities	0	0	1	5
Other Private Transportation	--	--	--	--
Medical Care Commodities	3	11	6	13
Entertainment Commodities	5	10	11	16
Personal Care	3	7	9	11
Personal & Educational Expenses	1	2	3	7
Poultry	6	26	27	28
Fish & Seafood	15	28	28	28
Eggs	7	24	26	28
Food Away from Home	4	6	6	6
Alcoholic Beverages	0	2	1	2
Residential Rent	13	4	4	25
Homeowners' Costs	10	5	5	27
Other Utilities & Public Services	7	21	22	21
Textile Housefurnishings	6	21	23	28
Furniture & Bedding	8	20	24	26
Other Furnishings	9	18	21	13
Housekeeping Supplies	10	12	16	12
Housekeeping Services	1	4	3	10
Footwear	15	26	28	24
Infants' and toddlers' Apparel	3	2	3	4
Apparel Services	7	7	8	10
New Vehicles	14	21	25	18
Used Cars	1	6	6	26
Motor Fuel	22	23	21	27
Automobile Maintenance & Repairs	2	3	4	1
Public Transportation	2	3	3	9
Professional Medical Services	4	11	8	7
Hospital & Related Services	10	16	12	15
Entertainment Services	9	16	27	24
Tobacco & Smoking Products	3	7	4	8

Note: AIC is used to search for the most appropriate number of lags for the ADF and the BVD tests. Given that the sample size is small, the maximum possible lags considered is six. We adopt the recommendation of Enders and Granger (1998) and use a nonlinear version of AIC for the EG test, which utilizes the variance from the TAR model. For Horvath-Watson test, we restrict it to a VAR(0) model so as to maintain a reasonable degree of freedom given the small sample size in a bivariate framework.

Table 9: Asymmetric Adjustment of Prices between New York and New Orleans

Category	g_{NY}	g_{NO}	$ g_{NO} $ $- g_{NY} $	HW stat
Meats	0.2951	-0.0165	0.2786	20.4732
Fresh Fruits and Vegetables	0.2006	0.0094	0.1912	12.1468
Fuels	0.2659	-0.0469	0.2190	22.1979
Appliance, incl. Electronic equipment	0.1015	-0.0605	0.0410	9.9600
Women's & Girl's Apparel	0.1624	0.0091	0.1533	10.0989
Medical Care Commodities	0.0898	0.0143	0.0755	8.4475
Poultry	0.2579	-0.0932	0.1647	23.9801
Fish & Seafood	0.4328	-0.0197	0.4131	35.6801
Eggs	0.1228	-0.0278	0.0950	12.4674
Alcoholic Beverages	0.0377	-0.0202	0.0175	10.4786
Homeowners' Costs	0.0230	-0.0243	-0.0013	11.4070
Other Utilities & Public Services	0.1137	-0.0396	0.0741	13.4433
Textile House furnishings	0.1252	-0.0270	0.0982	9.2462
Footwear	0.2810	-0.0391	0.2419	23.2207
Apparel Services	0.0333	-0.0524	-0.0191	20.8390
New Vehicles	0.1970	0.0172	0.1798	13.9002
Motor Fuels	0.1870	-0.0294	0.1576	15.6482
Professional Medical Services	0.0373	-0.0325	0.0048	10.4430
Hospital & Related Services	0.0380	-0.0618	-0.0238	9.1319
Entertainment Services	0.3013	-0.0300	0.2713	26.5697

Table 10: Number of Rejections of Linearity at 10% Level

Category	TU	TM	HU	HM
Cereals and Bakery Products	18	6	10	3
Meats	15	14	17	12
Dairy Products	--	--	--	--
Fresh Fruits and Vegetables	2	4	5	5
Processed Fruits and Vegetables	12	15	15	7
Other Food at Home	16	20	13	9
Other Renter's Costs	11	25	13	15
Household Maintenance & Repairs	0	5	4	4
Fuels	12	5	5	5
Appliances, incl. electronic equipment	6	6	4	4
Men's and Boy's Apparel	5	4	4	6
Women's and Girl's Apparel	7	7	7	5
Other Apparel Commodities	4	12	3	5
Other Private Transportation	--	--	--	--
Medical Care Commodities	5	4	7	7
Entertainment Commodities	2	8	2	2
Personal Care	10	13	6	4
Personal & Educational Expenses	11	12	6	6
Poultry	12	18	7	9
Fish & Seafood	5	13	3	1
Eggs	20	18	14	8
Food Away from Home	2	3	3	3
Alcoholic Beverages	2	10	2	2
Residential Rent	17	19	7	8
Homeowners' Costs	21	14	12	12
Other Utilities & Public Services	15	15	5	16
Textile Housefurnishings	13	18	5	17
Furniture & Bedding	17	18	5	6
Other Furnishings	7	13	8	8
Housekeeping Supplies	4	3	4	4
Housekeeping Services	8	13	2	8
Footwear	6	13	2	4
Infants' and toddlers' Apparel	3	16	2	1
Apparel Services	2	15	1	4
New Vehicles	5	11	8	8
Used Cars	12	22	14	21
Motor Fuel	4	11	2	13
Automobile Maintenance & Repairs	3	5	1	3
Public Transportation	9	7	7	12
Professional Medical Services	4	5	1	4
Hospital & Related Services	4	5	3	3
Entertainment Services	16	22	4	11
Tobacco & Smoking Products	5	4	12	9

Note: Both univariate and multivariate Hansen's tests are restricted with one lag (at the level).

Appendix B
Details of the Data

Categories	Cities	Abbv.
1. Cereals and Bakery Products	1. Anchorage	AN
2. Meats	2. Atlanta	AT
3. Dairy Products	3. Baltimore	BT
4. Fresh Fruits and Vegetables	4. Boston	BO
5. Processed Fruits and Vegetables	5. Buffalo	BU
6. Other Food at Home	6. Chicago	CH
7. Other Renter's Costs	7. Cleveland	CL
8. Household Maintenance & Repairs	8. Cincinnati	CI
9. Fuels	9. Dallas	DA
10. Appliances, incl. electronic equipment	10. Detroit	DT
11. Men's and Boy's Apparel	11. Denver	DN
12. Women's and Girl's Apparel	12. Honolulu	HO
13. Other Apparel Commodities	13. Houston	HS
14. Other Private Transportation	14. Kansas City	KC
15. Medical Care Commodities	15. Los Angeles	LA
16. Entertainment Commodities	16. Miami	MA
17. Personal Care	17. Milwaukee	MI
18. Personal & Educational Expenses	18. Minneapolis	MS
19. Poultry	19. New Orleans	NO
20. Fish & Seafood	20. New York	NY
21. Eggs	21. Philadelphia	PH
22. Food Away from Home	22. Pittsburgh	PI
23. Alcoholic Beverages	23. Portland	PO
24. Residential Rent	24. San Diego	SD
25. Homeowners' Costs	25. San Francisco	SF
26. Other Utilities & Public Services	26. Seattle	SE
27. Textile Housefurnishings	27. St. Louis	SL
28. Furniture & Bedding	28. Tampa Bay	TA
29. Other Furnishings	29. Washington DC	DC
30. Housekeeping Supplies		
31. Housekeeping Services		
32. Footwear		
33. Infants' and toddlers' Apparel		
34. Apparel Services		
35. New Vehicles		
36. Used Cars		
37. Motor Fuel		
38. Automobile Maintenance & Repairs		
39. Public Transportation		
40. Professional Medical Services		
41. Hospital & Related Services		
42. Entertainment Services		
43. Tobacco & Smoking Products		

