

Discussion of:

**“A Policy-Sensible Benchmark
Core Inflation Measure”**

by Stefano Siviero and Giovanni Veronese

John C. Williams

Federal Reserve Bank of San Francisco

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Overview

- There is a large literature on how to measure “underlying” or “core” inflation, where the goal is to forecast future overall inflation
- This paper presents a novel approach to constructing a measure of “core” inflation based purely on its usefulness as an **indicator variable** for monetary policy.

Outline of Discussion

- Summary of paper
- Comments on key results
- Discussion
 - Time-series vs. cross-section measures of “core” inflation
 - Central bank communication
 - Welfare-theoretic inflation measure

Summary: Central Bank Problem

- The central bank chooses the parameters of its policy rule to minimize the expected loss:

$$L = 16 \text{VAR}(\pi) + \lambda \text{VAR}(y) + \nu \text{VAR}(\Delta i)$$

Aggregate inflation : $\pi_t \equiv \sum_{j=1}^4 \omega_j \pi_{j,t}, \quad \sum_{j=1}^4 \omega_j = 1.$

- The policy rule takes the form:

$$i_t = \sum_{j=1}^4 \gamma_{1,j} \pi_{j,t} + \gamma_2 y_t + \gamma_3 i_{t-1},$$

Summary: The Model

- The model is a generalized version of the backward-looking Rudebusch-Svensson model (1999), with reduced-form equations for each of the four inflation components (goods, services, food, energy).
- Two versions of model are estimated: one using U.S. data, and the other using Euro-area data.

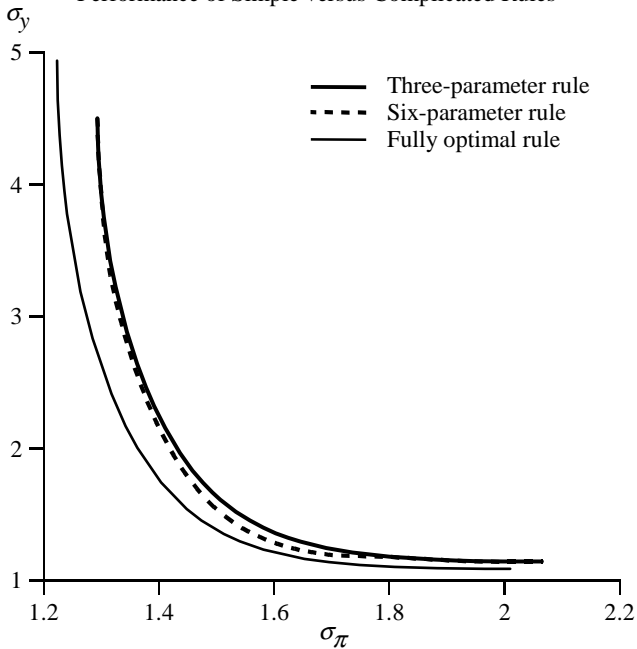
Summary: Main Results

- U.S. model: optimal policy down-weights food, energy, and (slightly) goods components, but reduces inflation SD by *at most* 0.1 pp (relative to rules that respond to aggregate or inflation ex. food and energy)
- Euro-area model, policy down-weights food and goods components, no response to energy, and typically yields 0.2 pp reduction in inflation SD.
- Weighting components by inverse of volatility yields poor performance.

Comments on Main Results

- Key result: It does not matter much if central bank responds to overall inflation, inflation excl. food and energy, or “optimal” core inflation.
- This is a general finding: Optimized simple rules that respond to all target variables yield close to first-best performance in a wide variety of models (Williams 2003, Levin and Williams 2003).
- In any LQ model, the optimal policy can be written in terms of leads and lags of the target variables alone (Giannoni and Woodford, 2005).
- Therefore, the only theoretical argument for responding to core inflation when the target is overall inflation is if core is a better proxy for the relevant leads and lags of overall inflation.

Figure 3
Performance of Simple versus Complicated Rules



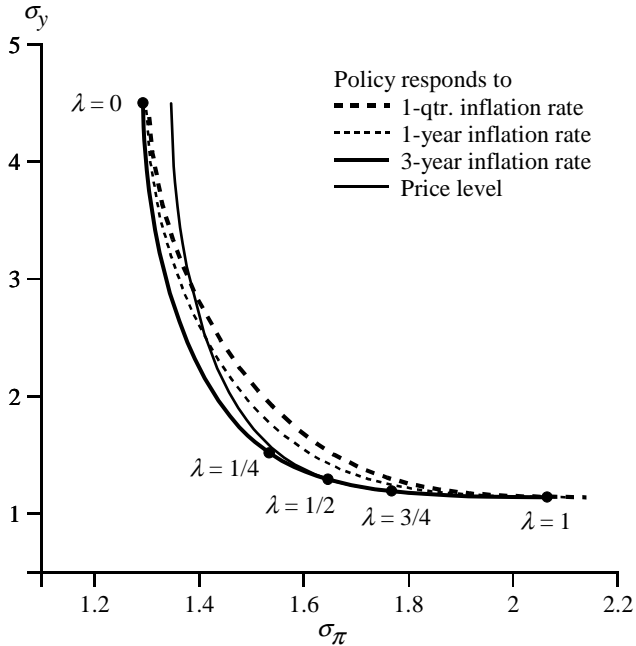
Source: Williams (2003)

Time-series vs. Cross-section Measures

- This paper uses only the cross-section of one-quarter inflation rates to measure “core” inflation.
- An alternative, or complementary, approach is to use time-series methods to filter noise and extract an estimate of “underlying inflation.”
- In many models, policies that respond to a multi-period moving average of inflation perform much better than those that respond to the one-quarter inflation rate (Levin, Wieland, Williams 1999, 2003)
- This is particularly true in the Board of Governor’s large-scale FRB/US model, which incorporates disaggregated prices (Williams 2003).

Figure 1

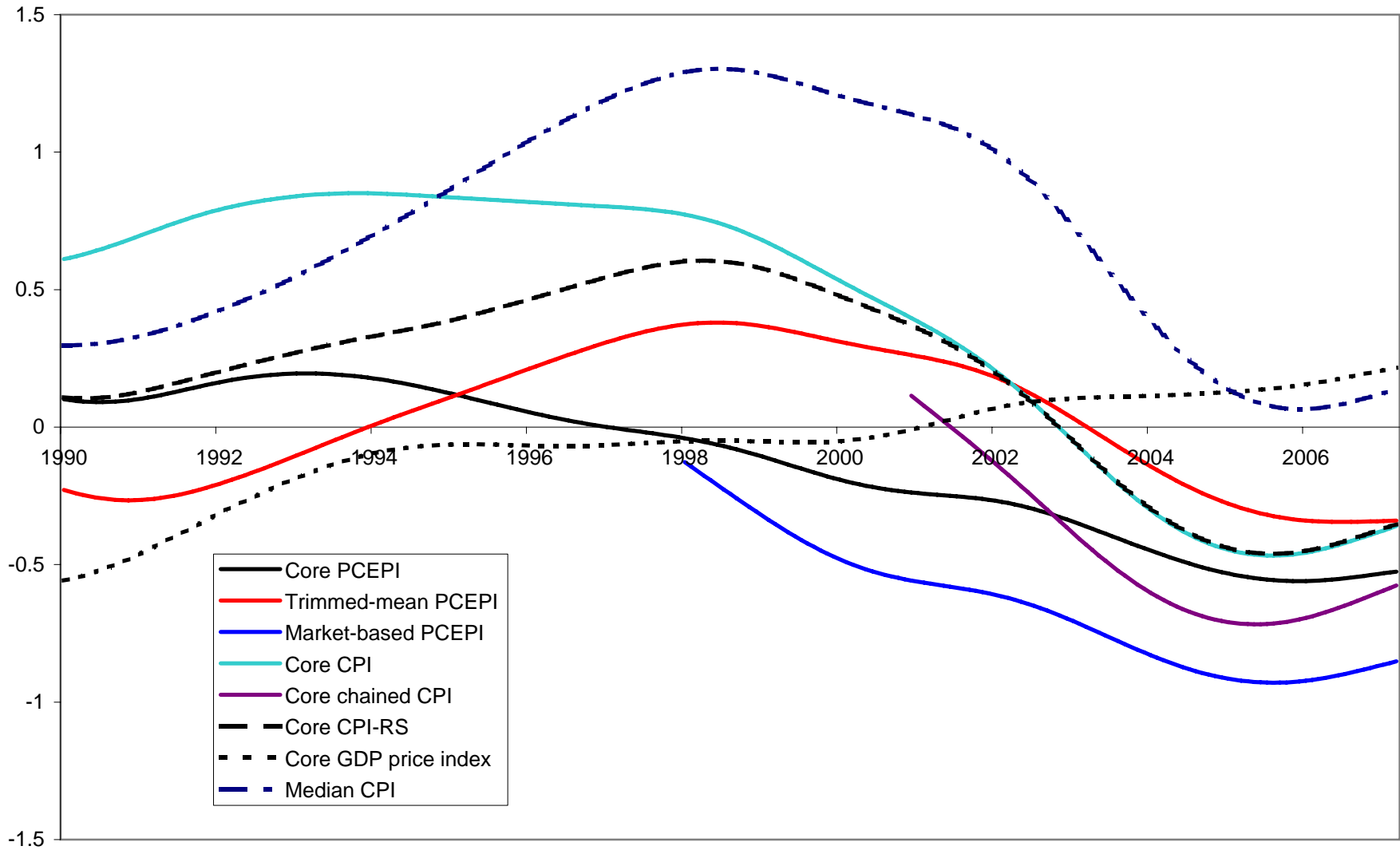
Policy Frontiers and the Measure of Inflation in the Policy Rule



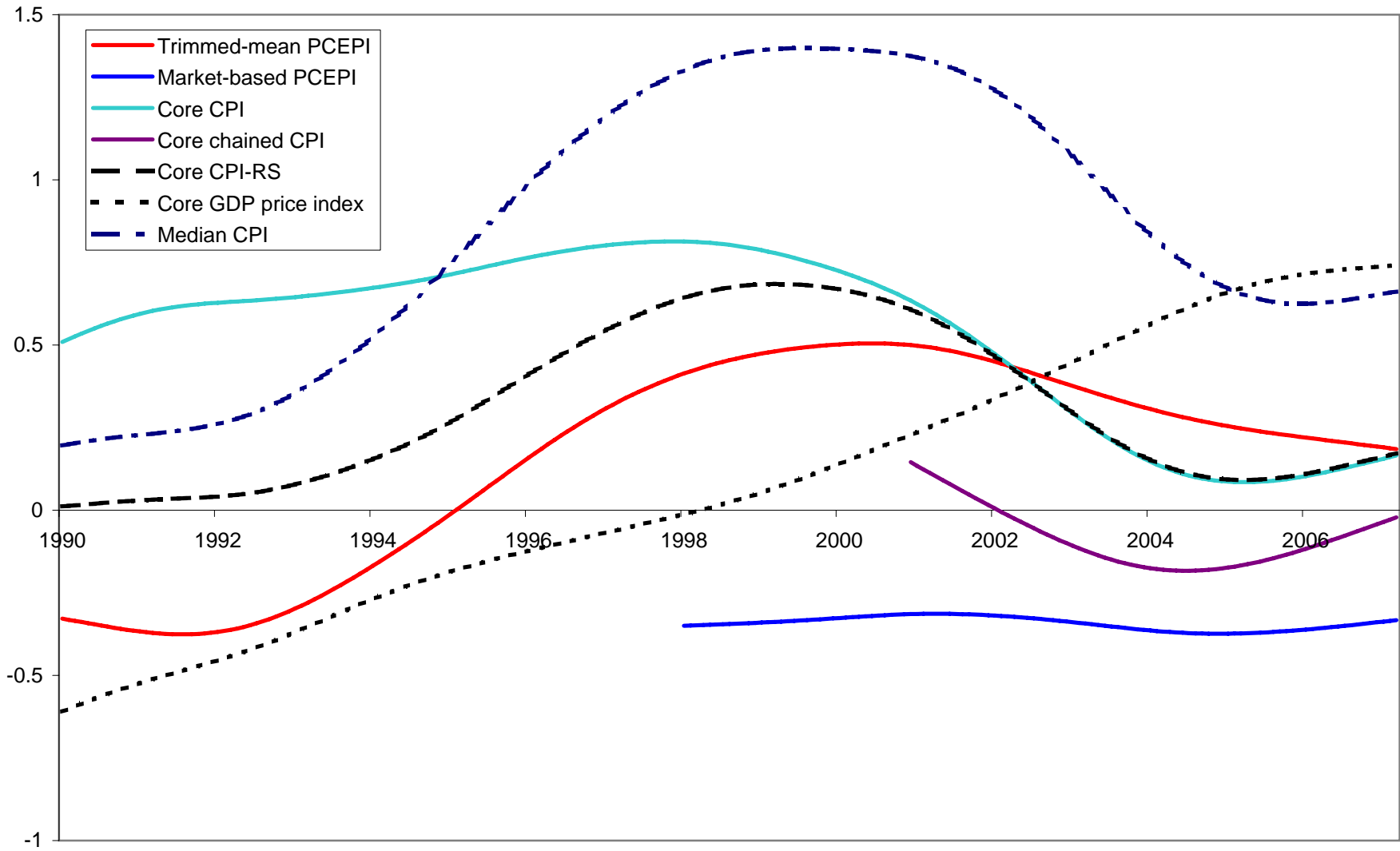
Time-series vs. Cross-section Measures

- Cross-section methods are prone to time-varying bias if the rate of change of *relative* prices or the mix in the consumption bundle varies significantly over time.
- For example, if the relative price of computers falls more rapidly than in the past, then trimmed mean measures of inflation will be biased upward relative to history.
- This is a significant real-world problem for cross-section methods relative to time-series methods.

Trends in Relative Inflation Rates (Relative to Overall PCE Price Inflation)



Trends in Relative Inflation Rates
(Relative to Core PCE Price Inflation)



Central Bank Communication

- Core measures of inflation are potentially useful for communicating the reasoning for policy decisions and the economic outlook.
- Macroeconomic theory emphasizes the role of expectations of future policy in affecting aggregate outcomes. Public confusion about the policy regime can be detrimental to macroeconomic performance (Orphanides and Williams 2003, Rudebusch and Williams 2006, Eusepi and Preston 2007).
- Simple, transparent, easy-to-communicate measures of “core” inflation may have advantages over more sophisticated measures if they help the public understand the policy regime.

Welfare-theoretic Measures

- Economic theory tells us that a welfare-maximizing central bank should aim to minimize fluctuations in “sticky” prices and ignore flexible prices, providing a justification for focusing on core inflation as a *target variable*.
- In an economy with heterogeneous degrees of price stickiness across goods and services, the central bank should weight the inflation components based on the relative degree of stickiness.
- Diewert measure is related to the welfare-theoretic measure, but variance of prices reflects both variance of idiosyncratic shocks and degree of price stickiness.

TABLE 2
MONTHLY FREQUENCY OF PRICE CHANGES FOR SELECTED CATEGORIES

	Price Quotes with Price Changes (%) (1)	Price Quotes with Price Changes, Excluding Observations with Item Substitutions (%) (2)
All goods and services	26.1 (1.0)	23.6 (1.0)
Durable goods	29.8 (2.5)	23.6 (2.5)
Nondurable goods	29.9 (1.5)	27.5 (1.5)
Services	20.7 (1.5)	19.3 (1.6)
Food	25.3 (1.8)	24.1 (1.9)
Home furnishings	26.4 (1.8)	24.2 (1.8)
Apparel	29.2 (3.0)	22.7 (3.1)
Transportation	39.4 (1.8)	35.8 (1.9)
Medical care	9.4 (3.2)	8.3 (3.3)
Entertainment	11.3 (3.5)	8.5 (3.6)
Other	11.0 (3.3)	10.0 (3.3)
Raw goods	54.3 (1.9)	53.7 (1.7)
Processed goods	20.5 (.8)	17.6 (.7)

SOURCE.—U.S. Department of Labor (1997).

NOTE.—Frequencies are weighted means of category components. Standard errors are in parentheses. Durables, nondurables, and services coincide with U.S. NIPA classifications. Housing (reduced to home furnishings in our data), apparel, transportation, medical care, entertainment, and other are BLS major groups for the CPI.

TABLE A1
FREQUENCY OF PRICE CHANGES BY CATEGORY

Category Name	ELI	Freq	Months	Subs	NSub	Weight	CDF
Weighted statistics:							
Median		20.9	4.3	1.7	.8		
Mean		26.1	3.3	3.4	1.6		
Coin-operated apparel laundry and dry cleaning	44012	1.2	79.9	.53	.17	.148	.21
Vehicle inspection	52014	1.4	69.9	.00	.00	.033	.26
Driver's license	52013	1.8	56.3	1.04	.39	.023	.30
Coin-operated household laun- dry and dry cleaning	34045	2.1	46.4	.00	.00	.014	.32
Intracity mass transit	53031	2.5	40.2	.66	.14	.223	.64
Local automobile registration	52012	2.8	34.8	3.26	.66	.019	.67
Legal fees	68011	2.9	34.3	.48	.37	.289	1.09
Vehicle tolls	52054	3.2	31.2	.70	.00	.059	1.17
Safe deposit box rental	68021	3.3	30.2	.70	.70	.019	1.20
Newspapers	59011	3.3	29.9	.56	.31	.245	1.56
Alterations and repairs	44013	3.3	29.4	.36	.25	.022	1.59
Automobile towing charges	52055	3.4	28.7	.56	.00	.017	1.61
Parking fees	52053	3.7	26.8	.38	.10	.096	1.75
Haircuts and other barbershop services for males	65021	3.9	25.5	.19	.11	.162	1.99
Beauty parlor services for females	65011	4.3	22.9	.42	.23	.338	2.48
State automobile registration	52011	4.3	22.7	1.00	.22	.278	2.88
Services by other medical professionals	56041	4.5	22.0	.83	.62	.217	3.19
Hearing aids	55034	4.7	20.8	1.19	.93	.024	3.23
Shoe repair and other shoe services	44011	4.8	20.4	.63	.57	.009	3.24
Garbage and trash collection	27041	4.9	20.0	.89	.44	.249	3.60
Pet services	62053	4.9	19.7	.13	.07	.064	3.70
Taxi fares	53032	5.0	19.7	.33	.04	.045	3.76
Care of invalids, elderly, and convalescents in the home	34071	5.1	19.1	1.53	.75	.125	3.94

TABLE A1
(Continued)

Category Name	ELI	Freq	Months	Subs	NSub	Weight	CDF
Household laundry and dry cleaning, excluding coin-operated	34044	5.1	19.0	.61	.54	.039	4.00
Watch and jewelry repair	44015	5.2	18.5	.27	.13	.018	4.02
Photographic and darkroom supplies	61022	5.3	18.4	2.41	1.71	.005	4.03
Physicians' services	56011	5.3	18.3	.71	.54	1.366	6.01
Film processing	62052	5.3	18.2	1.17	.87	.101	6.16
Wine away from home	20052	5.5	17.6	2.63	1.26	.078	6.27
Postage	34011	5.6	17.5	.00	.00	.214	6.58
Water softening service	34042	5.7	17.2	.91	.91	.009	6.60
Apparel laundry and dry cleaning, excluding coin-operated	44021	5.7	17.0	.21	.17	.269	6.99
Plumbing supplies and equipment	24015	6.0	16.2	1.51	.51	.003	6.99
Repair of television, radio, and sound equipment	34061	6.1	16.0	.39	.16	.026	7.03
Dental services	56021	6.1	15.8	.28	.17	.750	8.12
Other entertainment services	62055	6.2	15.7	.90	.53	.260	8.49
Beer, ale, other alcoholic malt beverages away from home	20051	6.4	15.2	1.69	.98	.125	8.68
Checking accounts and special check services	68022	6.4	15.2	1.27	.56	.088	8.80
Intrastate telephone services	27061	6.4	15.2	.16	.04	.460	9.47
Veterinarian services	62054	6.5	14.9	.66	.59	.182	9.74
Domestic services	34031	6.5	14.9	.82	.60	.310	10.19
Club membership dues and fees	62011	6.7	14.5	1.23	.85	.340	10.68
Elementary and high school books and supplies	66021	6.8	14.2	1.63	.95	.031	10.72
Fees for lessons or instructions	62041	6.9	14.0	2.53	2.19	.211	11.03
Miscellaneous supplies and equipment	24041	7.1	13.7	2.26	.93	.044	11.09
Cemetery lots and crypts	68032	7.2	13.5	.78	.53	.044	11.16
Day care and nursery school	67031	7.2	13.5	.90	.50	.539	11.94
Encyclopedias and other sets of reference books	66022	7.5	12.9	3.70	.09	.005	11.95
Technical and business school tuition and fixed fees	67041	7.7	12.4	1.37	.77	.050	12.02
Residential water and sewer service	27021	7.9	12.1	.86	.41	.663	12.98
Distilled spirits away from home	20053	7.9	12.1	1.10	.58	.114	13.15
Tax return preparation and other accounting fees	68023	8.3	11.6	.76	.61	.147	13.36
Breakfast or brunch	19032	8.4	11.4	1.01	.59	.378	13.91
Magazines	59021	8.6	11.2	1.27	.74	.122	14.09
Housing at school, excluding board	21031	8.7	11.0	.83	.45	.197	14.37
Admission to movies, theaters, and concerts	62031	8.8	10.9	1.79	.56	.416	14.98
Eyeglasses and eyecare	56031	8.9	10.8	2.05	.97	.333	15.46
Lunch	19011	9.0	10.7	1.48	.87	1.762	18.02
Dinner	19021	9.0	10.6	1.74	1.05	2.515	21.67

TABLE A1
(Continued)

Category Name	ELI	Freq	Months	Subs	NSub	Weight	CDF
Nonelectric articles for the hair	64012	9.1	10.5	4.42	3.03	.016	21.69
Other information-processing equipment	69015	9.1	10.5	4.17	.00	.015	21.71
Photographer fees	62051	9.1	10.5	2.68	1.86	.067	21.81
Nursing and convalescent home care	57022	9.2	10.4	1.12	.72	.024	21.85
Elementary and high school tuition and fixed fees	67021	9.3	10.2	.50	.17	.312	22.30
Moving, storage, freight expense	34043	9.4	10.2	.74	.29	.106	22.45
Tenants' insurance	35011	9.5	10.1	1.19	.11	.026	22.49
Snacks and nonalcoholic beverages	19031	9.5	10.0	1.87	1.25	.414	23.09
Tools and equipment for painting	24012	9.7	9.8	4.55	1.81	.001	23.09
Inside home maintenance and repair services	23011	9.8	9.7	.96	.60	.085	23.21
Supportive and convalescent medical equipment	55033	9.8	9.7	3.14	1.58	.013	23.23
Medical equipment for general use	55032	9.8	9.7	3.01	2.77	.009	23.25
Clothing rental	44014	10.0	9.5	1.67	1.38	.011	23.26
College tuition and fixed fees	67011	10.1	9.4	.82	.18	.951	24.64
Intercity train fare	53022	10.2	9.3	.07	.05	.068	24.74
Plastic dinnerware	32031	10.2	9.3	4.17	1.76	.005	24.75
College textbooks	66011	10.2	9.3	2.68	1.55	.128	24.93
Electrical supplies, heating and cooling equipment	24016	10.5	9.0	3.20	.81	.002	24.93
Fees for participant sports	62021	10.6	9.0	1.00	.44	.339	25.43
Reupholstery of furniture	34063	10.7	8.9	1.30	.66	.040	25.49
Interstate telephone services	27051	10.8	8.8	.11	.10	.768	26.60
Power tools	32042	10.8	8.8	2.16	.68	.051	26.67
Other hardware	32043	10.8	8.7	2.81	1.30	.052	26.75
Nonpowered hand tools	32044	10.9	8.6	2.84	1.70	.030	26.79
Cosmetics, bath/nail/makeup preparations, and implements	64031	11.1	8.5	2.65	1.47	.362	27.32
Kitchen and dining room linens	28013	11.2	8.4	4.56	2.17	.035	27.37
Blacktop and masonry materials	24014	11.2	8.4	1.36	.00	.001	27.37
Stationery, stationery supplies, giftwrap	33032	11.4	8.2	6.30	2.54	.219	27.69
Records and tapes, prerecorded and blank	31033	11.4	8.2	4.95	1.03	.179	27.95
Hospital services	57041	11.4	8.2	1.63	1.25	1.426	30.01
Gardening and lawn care services	34041	11.5	8.2	1.84	1.15	.241	30.36
Automotive maintenance and servicing	49031	11.6	8.1	9.36	.46	.550	31.16
Film	61021	11.8	8.0	2.33	.63	.041	31.22
Purchase of pets, pet supplies, and accessories	61032	11.8	8.0	3.49	1.49	.188	31.50
Sewing notions and patterns	42012	12.0	7.8	2.71	.51	.007	31.51

TABLE A1
(Continued)

Category Name	ELI	Freq	Months	Subs	NSub	Weight	CDF
Tableware and nonelectric kitchenware	32038	12.0	7.8	5.82	3.02	.064	31.60
Laundry and cleaning equipment	32014	12.3	7.6	5.55	2.44	.042	31.66
Books not purchased through book clubs	59023	12.4	7.5	8.20	2.07	.167	31.90
Electric personal care appliances	64017	12.6	7.4	6.26	3.39	.014	31.92
Calculators, adding machines, and typewriters	69014	12.8	7.3	7.78	6.20	.018	31.95
Women's hosiery	38043	12.9	7.2	2.78	.77	.082	32.07
Clocks	32021	13.0	7.2	5.92	2.74	.012	32.08
Videocassettes and discs, blank and prerecorded	31022	13.0	7.2	6.66	1.68	.084	32.21
Deodorant/suntan preparations, sanitary/foot care products	64016	13.2	7.1	2.39	1.04	.090	32.34
Coolant, brake fluid, transmission fluid, and additives	47022	13.3	7.0	2.01	.51	.015	32.36
Paint, wallpaper, and supplies	24011	13.3	7.0	1.81	.61	.011	32.37
Hard surface floor covering	24042	13.5	6.9	1.62	1.00	.015	32.39
Unpowered boats and trailers	60012	13.5	6.9	4.70	.44	.055	32.47
Telephone services, local charges	27011	13.6	6.8	.72	.23	1.221	34.25
Internal and respiratory over-the-counter drugs	55021	13.7	6.8	1.82	1.35	.257	34.62
Dental products, nonelectric dental articles	64014	13.8	6.7	2.30	1.24	.078	34.73
Toys, games, and hobbies	61011	13.9	6.7	6.58	2.67	.403	35.32
Infants' and toddlers' underwear	41013	14.0	6.6	4.00	1.57	.158	35.55
Topicals and dressings	55031	14.2	6.6	2.40	1.65	.071	35.65
Slipcovers and decorative pillows	28015	14.2	6.5	7.69	2.28	.015	35.67
Distilled spirits at home (excluding whiskey)	20022	14.2	6.5	.61	.27	.056	35.75
Replacement of installed wall-to-wall carpet	23013	14.3	6.5	5.61	4.48	.024	35.79
Floor coverings	32011	14.4	6.4	4.19	2.17	.057	35.87
Funeral expenses	68031	14.5	6.4	2.56	1.47	.261	36.25
Landscaping items	24043	14.9	6.2	2.47	1.53	.005	36.26
Shaving products, nonelectric shaving articles	64015	15.0	6.1	2.76	1.52	.041	36.32
Products for the hair	64011	15.0	6.1	1.94	1.13	.131	36.51
Whiskey at home	20021	15.3	6.0	.54	.25	.050	36.58
Automobile insurance	50011	15.5	5.9	1.51	.12	2.460	40.15
Lawn and garden supplies	33052	15.5	5.9	3.54	1.68	.200	40.44
Vehicle parts and equipment other than tires	48021	15.8	5.8	3.84	1.02	.260	40.82
Other laundry and cleaning products	33012	15.9	5.8	1.81	.99	.145	41.03
Infants' equipment	32013	15.9	5.8	5.32	2.48	.013	41.04
Nonelectric cooking ware	32037	16.1	5.7	5.28	2.30	.034	41.09

TABLE A1
(Continued)

Category Name	ELI	Freq	Months	Subs	NSub	Weight	CDF
Music instruments and accessories	61013	16.2	5.7	3.06	1.12	.064	41.19
Photographic equipment	61023	16.4	5.6	4.47	1.58	.042	41.25
Candy and chewing gum	15011	16.4	5.6	2.10	1.03	.237	41.59
Computer software and accessories	69012	16.5	5.5	5.53	2.57	.067	41.69
Household decorative items	32023	16.6	5.5	8.12	4.24	.213	42.00
Indoor, warm weather, and winter sports equipment	60021	16.6	5.5	5.01	2.12	.255	42.37
Tobacco products other than cigarettes	63012	16.7	5.5	.96	.75	.063	42.46
Prescription drugs and medical supplies	54011	16.8	5.4	1.22	.62	.648	43.40
Miscellaneous household products	33051	16.8	5.4	2.21	1.01	.272	43.80
Repair of household appliances	34062	16.9	5.4	.60	.29	.014	43.82
Fabric for making clothes	42011	17.0	5.4	3.96	.86	.018	43.84
Boys' underwear, night wear, and hosiery	37014	17.1	5.3	3.20	.42	.034	43.89
Hunting, fishing, and camping equipment	60022	17.1	5.3	4.27	1.66	.064	43.98
Boys' accessories	37015	17.2	5.3	5.33	1.54	.020	44.01
Infants' furniture	29042	17.5	5.2	4.76	1.60	.025	44.05
Pet food	61031	17.5	5.2	2.13	.80	.251	44.41
Men's underwear and hosiery	36031	17.6	5.2	2.31	.40	.114	44.58
Salt and other seasonings and spices	18041	17.6	5.2	1.41	.64	.070	44.68
Sewing materials for household items	28016	17.7	5.1	2.45	.71	.036	44.73
Men's night wear	36032	17.8	5.1	5.37	.70	.013	44.75
Telephone, peripheral equipment, and accessories	69013	17.8	5.1	4.79	3.24	.065	44.84
Books purchased through book clubs	59022	17.9	5.1	7.56	3.12	.031	44.89
Indoor plants and fresh-cut flowers	32061	18.0	5.0	4.88	3.07	.164	45.13
Flatware	32033	18.3	4.9	3.91	1.93	.014	45.15
Glassware	32034	18.4	4.9	5.12	2.44	.014	45.17
Automotive brake work	49022	18.5	4.9	9.94	1.25	.141	45.37
Automotive drivetrain repair	49021	18.5	4.9	9.65	1.13	.178	45.63
Men's accessories	36033	18.7	4.8	4.62	.78	.130	45.82
Watches	43011	18.8	4.8	5.08	1.32	.069	45.92
Living room tables	29032	18.8	4.8	4.13	2.55	.063	46.01
Portable cool/heat equipment, small electric kitchen appliances	32052	19.0	4.8	5.15	2.02	.078	46.13
Soaps and detergents	33011	19.2	4.7	3.16	2.05	.214	46.44
Wine at home	20031	19.3	4.7	3.24	.84	.187	46.71
Lamps and lighting fixtures	32022	19.4	4.6	6.26	2.61	.035	46.76
Repair to steering, front end, cooling systems, and air conditioners	49023	19.5	4.6	10.18	1.26	.154	46.98

TABLE A1
(Continued)

Category Name	ELI	Freq	Months	Subs	NSub	Weight	CDF
Community antenna or cable television	27031	19.6	4.6	1.91	.20	.784	48.12
Bicycles	60013	19.6	4.6	6.94	1.10	.047	48.19
Automotive body work	49011	19.7	4.6	10.11	1.45	.098	48.33
Window coverings	32012	19.9	4.5	2.13	.71	.038	48.39
Other condiments (excluding olives, pickles, relishes)	18044	20.1	4.5	.95	.51	.054	48.46
Rolls, biscuits, muffins (excluding frozen)	2022	20.1	4.5	2.48	1.35	.135	48.66
Intercity bus fare	53021	20.3	4.4	1.31	.09	.051	48.73
China and other dinnerware	32032	20.4	4.4	5.19	2.34	.042	48.79
Outboard motors and powered sports vehicles	60011	20.5	4.3	6.98	.96	.176	49.05
Sweet rolls, coffee cake, and doughnuts (excluding frozen)	2063	20.6	4.3	4.06	2.68	.073	49.16
Canned ham	4032	20.7	4.3	3.45	2.06	.007	49.17
Bedroom furniture other than mattress and springs	29012	20.8	4.3	4.35	2.30	.193	49.45
Occasional furniture	29044	20.9	4.3	4.92	3.25	.125	49.63
Beer, ale, and other alcoholic malt	20011	20.9	4.3	1.03	.36	.308	50.07
Baby food	18062	20.9	4.3	1.03	.33	.088	50.20
Cakes and cupcakes (excluding frozen)	2041	21.0	4.3	3.49	2.12	.119	50.37
Nondairy cream substitutes	16013	21.0	4.2	1.11	.57	.024	50.41
Tea	17052	21.0	4.2	1.09	.53	.057	50.49
Automotive power plant repair	49041	21.1	4.2	10.09	1.75	.404	51.08
Other noncarbonated drinks	17053	21.1	4.2	2.21	.88	.069	51.18
Lumber, paneling, wall and ceiling tile, awnings, glass	24013	21.6	4.1	1.68	.67	.006	51.19
Nuts	18032	21.6	4.1	2.28	1.23	.062	51.28
Cigarettes	63011	21.6	4.1	.35	.22	.801	52.44
Mattress and springs	29011	21.9	4.1	5.44	2.36	.146	52.65
Smoking accessories	63013	21.9	4.0	3.83	.00	.004	52.66
Women's underwear	38042	22.1	4.0	3.28	.77	.108	52.81
Men's footwear	40011	22.2	4.0	4.84	.79	.348	53.32
Other sweets (excluding candy and gum)	15012	22.5	3.9	1.95	1.16	.075	53.43
Admission to sporting events	62032	22.6	3.9	4.80	3.64	.155	53.65
Bathroom linens	28011	22.6	3.9	3.40	1.10	.055	53.73
Serving pieces other than silver or glass	32036	22.9	3.9	5.30	3.98	.005	53.74
Sugar and artificial sweeteners	15021	22.9	3.8	1.30	.70	.073	53.84
Girls' hosiery and accessories	39017	23.0	3.8	7.01	2.17	.030	53.89
Lawn and garden equipment	32041	23.1	3.8	5.92	1.02	.131	54.08
Video game hardware, software, and accessories	31023	23.4	3.8	10.15	5.65	.051	54.15
Jewelry	43021	23.4	3.7	4.86	1.76	.401	54.73
Curtains and drapes	28014	24.0	3.6	3.25	1.08	.057	54.81
Kitchen and dining room furniture	29041	24.1	3.6	5.47	3.40	.163	55.05

TABLE A1
(Continued)

Category Name	ELI	Freq	Months	Subs	NSub	Weight	CDF
Cleansing and toilet tissue, pa- per towels, napkins	33031	24.2	3.6	3.37	2.25	.208	55.35
Girls' footwear	40022	24.2	3.6	7.43	1.27	.119	55.52
Sofas	29021	24.2	3.6	6.73	3.50	.277	55.93
New motorcycles	45031	24.3	3.6	9.30	1.31	.082	56.04
Instant and freeze-dried coffee	17032	24.3	3.6	1.17	.67	.056	56.13
Girls' underwear and night wear	39016	24.4	3.6	6.80	1.77	.026	56.16
Other processed vegetables	14023	24.6	3.5	2.04	.40	.113	56.33
Other fuels	25023	24.8	3.5	.71	.29	.014	56.35
Canned and dried fruits	13031	24.9	3.5	2.10	.68	.068	56.45
Noncarbonated fruit-flavored drinks	17051	25.0	3.5	2.20	.92	.088	56.58
Other fats and oils	16012	25.3	3.4	1.16	.46	.172	56.83
Outdoor equipment	32015	25.3	3.4	8.33	6.19	.014	56.85
Macaroni and cornmeal	1032	25.5	3.4	1.22	.65	.094	56.98
Cereal	1021	25.5	3.4	1.69	.87	.333	57.47
Radio, phonographs, and tape recorders/players	31031	25.5	3.4	7.80	4.96	.030	57.51
Pies, tarts, turnovers (excluding frozen)	2065	25.6	3.4	5.47	2.05	.044	57.57
White bread	2011	25.7	3.4	1.48	.83	.124	57.75
Truck rental	52052	25.7	3.4	1.60	.25	.287	58.17
Canned beans other than lima beans	14021	25.8	3.3	1.79	.37	.037	58.22
Boys' suits, sport coats, and pants	37016	25.9	3.3	4.82	1.22	.119	58.40
Men's suits	36011	26.0	3.3	3.27	1.03	.126	58.58
Canned and packaged soup	18011	26.3	3.3	1.48	.69	.108	58.73
Lamb, organ meats, and game	5014	26.4	3.3	1.88	.82	.044	58.80
Men's pants and shorts	36051	26.4	3.3	3.39	.84	.242	59.15
Women's accessories	38044	26.4	3.3	11.10	2.02	.057	59.23
Rice	1031	26.5	3.2	1.10	.58	.073	59.34
Canned or packaged salads and desserts	18061	26.6	3.2	2.12	1.05	.079	59.45
Living room chairs	29031	26.7	3.2	7.05	3.17	.136	59.65
Infants' and toddlers' sleepwear	41014	26.9	3.2	7.37	1.42	.014	59.67
Other dairy products	10012	26.9	3.2	1.48	.58	.077	59.78
Bedroom linens	28012	27.0	3.2	5.02	1.60	.170	60.03
Prepared flour mixes	1012	27.1	3.2	2.14	.85	.043	60.09
Other frozen fruits and fruit juices	13012	27.1	3.2	1.28	.55	.025	60.13
Canned fish or seafood	7011	27.4	3.1	1.80	.75	.058	60.21
Sauces and gravies	18043	27.6	3.1	1.01	.55	.134	60.41
Margarine	16011	27.9	3.1	1.48	.39	.043	60.47
Bologna, liverwurst, salami	5012	28.0	3.0	2.02	1.22	.085	60.59
Ship fares	53023	28.0	3.0	4.78	1.10	.101	60.74
Women's footwear	40031	28.0	3.0	6.80	1.62	.424	61.35
Other canned or packaged foods	18063	28.1	3.0	1.80	.76	.223	61.68
Olives, pickles, relishes	18042	28.1	3.0	1.50	.71	.035	61.73
Dryers	30022	28.5	3.0	5.43	.21	.042	61.79
Automobile finance charges	51011	28.6	3.0	1.84	.04	.493	62.50

TABLE A1
(Continued)

Category Name	ELI	Freq	Months	Subs	NSub	Weight	CDF
Lunch meats	5013	28.7	3.0	2.79	1.08	.150	62.72
Microwave ovens	30032	29.0	2.9	8.16	1.39	.030	62.77
Potato chips and other snacks	18031	29.1	2.9	2.62	1.57	.212	63.07
Boys' footwear	40021	29.7	2.8	9.51	1.26	.094	63.21
Bread other than white	2021	29.7	2.8	2.07	1.27	.137	63.41
Outdoor furniture	29043	29.8	2.8	9.88	4.63	.040	63.47
Window air conditioners	30034	29.9	2.8	7.22	2.00	.039	63.52
Men's sport coats and tailored jackets	36012	30.1	2.8	4.47	1.39	.030	63.57
Frozen bakery products	2064	30.3	2.8	2.68	1.22	.076	63.68
Tires	48011	30.5	2.7	2.72	.58	.290	64.10
Men's coats and jackets	36013	30.9	2.7	8.28	2.51	.116	64.27
Frozen vegetables	14011	31.0	2.7	1.95	.79	.099	64.41
Peanut butter	16014	31.0	2.7	1.10	.48	.040	64.47
Televisions	31011	31.0	2.7	9.03	3.61	.269	64.86
Floor covering equipment and sewing machines	32051	31.1	2.7	7.45	1.56	.060	64.94
Videocassette recorders, disc players, cameras	31021	31.2	2.7	10.70	4.09	.095	65.08
Portable dishwashers	30033	31.2	2.7	3.65	2.50	.002	65.08
Ice cream and related products	10041	31.4	2.7	1.96	.96	.178	65.34
Bread and cracker products	2062	31.5	2.6	1.99	1.99	.014	65.36
Women's pants and shorts	38033	31.5	2.6	7.71	2.44	.345	65.86
Other fresh milk and cream	9021	31.6	2.6	1.08	.22	.222	66.19
Flour	1011	31.7	2.6	.75	.38	.029	66.23
Bottled or tank gas	25021	31.7	2.6	.69	.38	.055	66.31
Canned cut corn	14022	31.9	2.6	.91	.29	.023	66.34
Luggage	42013	31.9	2.6	6.21	2.62	.034	66.39
Carbonated drinks other than cola	17012	32.4	2.6	1.99	.91	.146	66.60
Motor oil	47021	32.7	2.5	1.00	.33	.045	66.67
Men's shirts	36041	32.7	2.5	6.20	1.55	.270	67.06
Cheese	10021	32.9	2.5	1.82	.85	.307	67.50
Stoves and ovens excluding microwave ovens	30031	33.0	2.5	7.45	1.09	.037	67.56
Girls' skirts and pants	39014	33.2	2.5	10.10	3.28	.076	67.67
Refrigerators and home freezers	30011	33.5	2.5	7.14	.85	.106	67.82
Cookies	2042	33.7	2.4	2.27	1.51	.157	68.05
Fresh, canned, or bottled fruit juices	13013	33.7	2.4	2.28	1.03	.210	68.35
Playground equipment	61012	33.8	2.4	12.07	8.25	.007	68.36
Components and other sound equipment	31032	34.1	2.4	9.25	5.42	.132	68.56
Frozen orange juice	13011	34.4	2.4	.95	.43	.030	68.60
Fresh whole milk	9011	34.4	2.4	.79	.12	.201	68.89
Washers	30021	35.4	2.3	6.80	.65	.057	68.97
Other poultry	6031	36.0	2.2	5.38	.96	.129	69.16
Frankfurters	5011	36.1	2.2	2.22	.92	.077	69.27
Boys' shirts	37013	36.2	2.2	10.17	3.24	.063	69.36
Infants' and toddlers' play and dress wear	41012	36.3	2.2	14.68	4.60	.049	69.43
Other beef	3043	36.4	2.2	.94	.75	.053	69.51

TABLE A1
(Continued)

Category Name	ELI	Freq	Months	Subs	NSub	Weight	CDF
Frozen prepared foods other than meals	18022	36.5	2.2	2.24	1.15	.158	69.74
Shellfish (excluding canned)	7021	37.0	2.2	2.39	1.22	.124	69.92
Roasted coffee	17031	37.1	2.2	1.36	.68	.103	70.07
Frozen prepared meals	18021	37.4	2.1	3.53	1.72	.072	70.17
New trucks	45021	37.7	2.1	10.80	9.04	1.953	73.01
Men's active sportswear	36035	37.8	2.1	10.80	2.14	.061	73.10
Pork sausage	4042	37.9	2.1	1.40	.63	.077	73.21
Lodging while out of town	21021	38.1	2.1	1.80	.52	1.571	75.49
Personal computers and peripheral equipment	69011	38.4	2.1	16.12	7.79	.488	76.19
Infants' and toddlers' outerwear	41011	38.6	2.1	19.32	7.70	.011	76.21
Cola drinks	17011	38.8	2.0	.91	.42	.306	76.66
New cars	45011	39.1	2.0	10.26	8.11	2.747	80.64
Women's coats and jackets	38011	39.2	2.0	14.86	6.93	.155	80.87
Fresh whole chicken	6011	39.4	2.0	2.12	.14	.088	80.99
Women's night wear	38041	40.6	1.9	15.50	3.04	.088	81.12
Fresh or frozen chicken parts	6021	40.7	1.9	1.39	.38	.273	81.52
Apples	11011	41.4	1.9	.18	.04	.102	81.67
Other roasts (excluding chuck and round)	3041	42.2	1.8	.93	.75	.050	81.74
Fish (excluding canned)	7022	42.4	1.8	2.55	1.42	.167	81.98
Crackers	2061	42.5	1.8	1.53	.91	.075	82.09
Girls' tops	39013	42.7	1.8	17.00	5.47	.070	82.19
Women's skirts	38032	42.9	1.8	16.69	7.81	.071	82.30
Bananas	11021	43.0	1.8	.07	.03	.106	82.45
Electricity	26011	43.4	1.8	.64	.08	2.884	86.63
Bacon	4011	43.5	1.7	1.51	.74	.071	86.74
Girls' active sportswear	39015	43.6	1.7	18.93	5.51	.033	86.78
Girls' coats and jackets	39011	43.8	1.7	19.43	6.02	.023	86.82
Women's active sportswear	38034	44.6	1.7	17.26	3.43	.092	86.95
Women's tops	38031	45.0	1.7	17.94	6.93	.471	87.63
Men's sweaters	36034	45.3	1.7	13.53	4.85	.046	87.70
Butter	10011	45.5	1.6	.90	.24	.042	87.76
Boys' coats and jackets	37011	45.7	1.6	15.27	5.81	.024	87.80
Ground beef	3011	46.1	1.6	.67	.32	.288	88.21
Boys' active sportswear	37017	46.6	1.6	19.12	3.96	.027	88.25
Pork roast, picnics, other pork	4041	46.8	1.6	1.44	.75	.131	88.44
Other steak (excluding round and sirloin)	3042	46.8	1.6	.72	.53	.156	88.67
Diesel	47017	47.2	1.6	.70	.03	.254	89.04
Potatoes	12011	47.3	1.6	.41	.13	.098	89.18
Women's suits	38051	47.3	1.6	19.45	8.45	.123	89.36
Pork chops	4021	47.9	1.5	.35	.19	.138	89.56
Round steak	3051	48.2	1.5	.62	.46	.060	89.65
Sirloin steak	3061	48.4	1.5	.65	.48	.084	89.77
Boys' sweaters	37012	48.4	1.5	17.18	5.47	.007	89.78
Women's dresses	38021	48.5	1.5	25.44	11.08	.296	90.21
Ham (excluding canned)	4031	50.4	1.4	4.00	2.03	.118	90.38
Fuel oil	25011	52.5	1.3	.40	.18	.169	90.63
Other fresh vegetables	12041	52.8	1.3	.17	.07	.250	90.99
Round roast	3031	53.1	1.3	.48	.40	.045	91.05

TABLE A1
(Continued)

Category Name	ELI	Freq	Months	Subs	NSub	Weight	CDF
Chuck roast	3021	54.3	1.3	.76	.65	.043	91.12
Oranges	11031	54.7	1.3	.45	.11	.057	91.20
Girls' dresses and suits	39012	55.1	1.2	28.49	12.80	.045	91.26
Automobile rental	52051	56.8	1.2	2.86	.40	.758	92.36
Other fresh fruits	11041	59.7	1.1	.24	.08	.247	92.72
Other motor fuel	47018	61.8	1.0	4.46	1.80	.032	92.77
Eggs	8011	61.8	1.0	.64	.26	.107	92.92
Lettuce	12021	62.4	1.0	.06	.05	.064	93.02
Utility natural gas service	26021	64.2	1.0	.34	.08	1.012	94.48
Airline fares	53011	69.1	.9	.45	.25	.829	95.69
Tomatoes	12031	71.0	.8	.22	.03	.078	95.80
Premium unleaded gasoline	47016	76.2	.7	2.81	.89	.998	97.25
Mid-grade unleaded gasoline	47015	77.5	.7	2.55	.82	.865	98.50
Regular unleaded gasoline	47014	78.9	.6	2.56	.83	1.031	100.00

SOURCE.—U.S. Department of Labor.

NOTE.—ELI is the entry-level item in the CPI (around four to five items priced each month in each geographic area). Freq is the estimated average monthly frequency of price changes over 1995–97 (λ in the text). Months is the mean duration between price changes implied by λ ($= -1/\ln[1 - \lambda]$). Subs is the average item substitution rate in the ELI over 1995–97. NSub is the average noncomparable item substitution rate in the ELI over 1995–97. Weight is the share of the ELI in the 1995 CEX (these sum to 68.9). CDF is the cumulative distribution function of frequency within the share of CPI covered.

Welfare-theoretic Measures

- Based on Bils and Klenow (2004) data, the central bank should overweight services and downweight energy components (which are close to fully flexible).
- Food price inflation is a mixed bag: raw food prices change very frequently, while prices of food away from home change infrequently.
- Standard core measure that excludes food and energy components may not be a bad approximation to welfare-theoretic measure.

Alternative Measures of Core Inflation

Percent change from 12 months earlier

