New Weight Structure for Producer Price Index

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For the first time in over 10 years, the universe of weights used to construct the Producer Price Index (PPI) has been comprehensively updated. The dynamic nature of the American economy requires that periodic revisions be made to the PPI weight structure to ensure its relevance. The revision affects all PPI series derived from traditional commodity indexes, including stage-of-processing indexes, durability-of-product indexes, and special commodity groupings. Historical indexes are not affected, and there is no break in continuity of the PPI.

Weights are used to aggregate price changes for individual commodities to higher level groupings. They represent the total net selling value of commodities priced in the PPI, which comprises a wide range of crude and intermediate materials and finished goods, including both capital equipment and goods intended for household consumption.

Between January 1976 and December 1986, the data used to derive the weights were taken from the 1972 values of shipments. Since January 1987, 1982 values have been used for weighting purposes. This article describes the procedures for updating the weights, presents the revised and former relative importance values, and discusses some of the causes of major shifts in weights that resulted from the revision.

Derivation of indexes and weights

Most of the basic data on selling values of commodities in the PPI are taken from the economic censuses of the Bureau of the Census. The 1982 Census of Manufactures provided the data for about 84 percent of the total value; the 1982 Census of Mineral Industries (which includes oil and gas production) accounted for about 7 percent, and the 1982 Census of Wholesale Trade (covering scrap materials) for 0.6 percent. Other sources were the Department of Agriculture (5.1 percent), the Edison Electric Institute (3.4 percent), and the National Marine Fisheries Service (0.1 percent).

The formula by which the PPI is calculated is a modification of the Laspeyres fixed-base-weight formula. In the pure Laspeyres formula, the physical quantities of all individual items are held constant, regardless of price change.[1] Although this assumption is suitable for medium-term time spans, structural shifts among industries necessitate occasional weight revisions. In practice, however, the PPI is computed using total values of shipments rather than physical (or unit) quantities, which are not available on a consistent and comprehensive basis, as are values of shipments. There is an implicit fixed quantity associated with each specific commodity (bushels, tons, gallons, etc.), but it is never computed.[2]

The alternative to the Laspeyres formula would be the Paasche formula, which uses current-quantity weights instead of base-quantity weights. However, this method has its own drawbacks and, in any case, is impractical for an index combining price movements for thousands of items every month.

The equations on page 5 describing the weight-update procedure are followed by an explanation of their use. (Because published index and relative importance values have a reference base of 100, each of the formulas is multiplied by 100.)

In the following equations:

P = price (dollars per unit for commodities; can only be defined for groupings as the ratio of the total values between two time periods)
Q = quantity (number of physical units)
V = value (of shipments); or P times Q
R = relative importance (the ratio of the aggregate value of an item or mid-level grouping to the total, e.g., all commodities, value)
I = index
67 = total or average for the year 1967
72 = total or average for the year 1972
82 = total or average for the year 1982
86 = December 1986 (the weight-link month)
b = base year (in general)
t = current month (in general)
i = individual commodity
A = aggregate-level index (e.g., all commodities)
N = number of commodities within the aggregate

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[1] The assumption of fixed quantities imparts to the Laspeyres formula a tendency to overstate the importance of items whose prices have risen sharply since the weight base-period, and to understate the importance of items that have declined in price. See, for example, William Mendenhall and James E. Reinmuth, *Statistics for Management and Economics*, Duxbury Press 1974, p. 421.

[2] Base-year quantities could be computed if base-year prices were known. However, the Bureau of Labor Statistics does not maintain files of prices on a historical basis.

(1)
$$I_{A,t} = \frac{\sum_{i=1}^{N} P_{i,t}\, Q_{i,b}}{\sum_{i=1}^{N} P_{i,b}\, Q_{i,b}}$$

(2)
$$I_{A,t} = \frac{\sum_{i=1}^{N} \left(P_{i,t} / P_{i,67}\right)\left(P_{i,67}\, Q_{i,82}\right)}{\sum_{i=1}^{N} P_{i,67}\, Q_{i,82}}$$

(3)
$$R_{i,86\,(72)} = \frac{V_{i,72}\left(P_{i,86} / P_{i,72}\right)}{V_{A,72}\left(P_{A,86} / P_{A,72}\right)}$$

$$= \frac{P_{i,72}\, Q_{i,72}\left(P_{i,86} / P_{i,72}\right)}{\sum_{i=1}^{N} P_{i,72}\, Q_{i,72}\left(\sum_{i=1}^{N} P_{i,86}\, Q_{i,72} / \sum_{i=1}^{N} P_{i,72}\, Q_{i,72}\right)}$$

$$= \frac{P_{i,86}\, Q_{i,72}}{\sum_{i=1}^{N} P_{i,86}\, Q_{i,72}}$$

(4)
$$R_{i,86\,(82)} = \frac{V_{i,82}\left(P_{i,86} / P_{i,82}\right)}{V_{A,82}\left(P_{A,86} / P_{A,82}\right)}$$

$$= \frac{P_{i,82}\, Q_{i,82}\left(P_{i,86} / P_{i,82}\right)}{\sum_{i=1}^{N} P_{i,82}\, Q_{i,82}\left(\sum_{i=1}^{N} P_{i,86}\, Q_{i,82} / \sum_{i=1}^{N} P_{i,82}\, Q_{i,82}\right)}$$

$$= \frac{P_{i,86}\, Q_{i,82}}{\sum_{i=1}^{N} P_{i,86}\, Q_{i,82}}$$

A number of complicating factors necessitate modifications of the pure fixed-base-weight Laspeyres formula shown in equation (1). First, the arithmetic reference base year has generally differed from the weight base period in the PPI. Also, as noted above, it is the aggregate values of commodities, rather than their physical quantities, that are used to calculate commodity grouping indexes. Aggregate (i.e., the absolute weights) values are the prices multiplied by quantities summed for each commodity in the grouping, and updated for price change from the weight base year to the index calculation month. The modified Laspeyres formula which approximates the calculation of the PPI is shown in equation (2).

More significantly, for the last several years there have been a number of sample expansions as well as semiannual reclassifications which have required minor adjustments to the weight structure. Relatively minor changes will continue as industry samples are "recycled" to account for structural changes in the U.S. economy. However, to facilitate the explanation of the weight revision procedures, it is assumed that the PPI base-year price measurements coincide perfectly with the real market, and that no sample changes have occurred.

Equations (3) and (4) show how the relative importance of each individual item is derived, taking base-year quantities and adjusting them by PPI price movements between the weight base year (1972 or 1982) and December 1986.[3] The relative importance of an item will be higher (or lower) than its share of the actual census total value of shipments if its price rose more (or less) during that time interval than did the price level of the aggregate category to which it is being compared. For example, petroleum products have a much lower weight than they would have if their prices had not fallen between 1982 and 1986.

Since both the old and revised weights have been adjusted for price change through December 1986, any shifts observed must derive from changes in quantities.

Causes of shifts in weights

Table C shows the relative importance of commodity groupings in each stage-of-processing (SOP) category in December 1986 (the month in which the new and old weights were linked) under the 1982 and 1972 weight structures. The difference between the two columns reflects primarily the shift in value weights. To a small extent, it also reflects the routine sample changes that went into effect in January 1987.

One cause of the shifts in weights was a change in the definition of the PPI universe; the PPI now includes military sales and also shipments between establishments of the same company (interplant transfers). Interplant transfers are now included because, under the industry-oriented concept of the PPI revision, the universe of transactions includes all shipments outside the industry where a product originates,

[3] The weight of an item or grouping is the absolute dollar value adjusted for price change. The relative importance is that weight divided by the total index weight and multiplied by 100.

Table C. Changes in relative importance of Producer Price Index commodity groupings by stage of processing, resulting from update of weight base from 1972 to 1982

Commodity code	Index	Relative importance December 1986 1/		Ratio 2/
		Revised (1982)	Former (1972)	(1982/1972)
	CRUDE MATERIALS FOR FURTHER PROCESSING	100.000	100.000	1.00000
01	Farm products	43.602	60.519	0.72047
011	Fresh and dried fruits and vegetables	1.488	2.020	0.73663
012	Grains	5.531	6.799	0.81350
013	Livestock	19.492	28.708	0.67897
014	Live poultry	3.602	3.327	1.08266
015	Plant and animal fibers	0.894	1.344	0.66518
016	Fluid milk	7.267	11.349	0.64032
017	Eggs	0.286	0.400	0.71500
018	Hay, hayseeds, and oilseeds	3.743	4.528	0.82663
019	Other farm products	1.299	2.044	0.63552
02	Processed foods and feeds	0.833	1.406	0.59246
022301	Unprocessed fin fish	0.333	0.298	1.11745
025	Sugar and confectionery	0.500	1.108	0.45126
04	Hides, skins, leather, and related products	0.613	0.853	0.71864
041	Hides and skins	0.613	0.853	0.71864
05	Fuels and related products and power	40.859	22.952	1.78019
051	Coal	10.733	6.018	1.78348
0531	Natural gas	12.096	9.743	1.24151
056	Crude petroleum (domestic production)	18.030	7.191	2.50730
06	Chemicals and allied products	0.322	0.396	0.81313
062	Paints and allied products	0.056	0.102	0.54902
065202	Phosphates	0.266	0.294	0.90476
07	Rubber and plastic products	0.027	0.072	0.37500
071103	Reclaimed rubber	0.027	0.072	0.37500
08	Lumber and wood products	2.899	2.425	1.19546
085	Logs, bolts, timber and pulpwood	2.899	2.425	1.19546
09	Pulp, paper, and allied products	1.148	0.496	2.31452
0912	Wastepaper	1.148	0.496	2.31452
10	Metals and metal products	6.853	5.830	1.17547
101	Iron and steel	3.382	3.071	1.10127
1011	Iron ore	0.589	0.145	4.06207
1012	Iron and steel scrap	2.793	2.926	0.95455
102	Nonferrous metals	3.471	2.759	1.25806
1021	Nonferrous metal ores	1.444	0.493	2.92901
1023	Nonferrous scrap	2.027	2.266	0.89453
13	Nonmetallic mineral products	2.847	5.051	0.56365
1321	Construction sand, gravel, and crushed stone	2.216	3.822	0.57980
139	Other nonmetallic minerals	0.631	1.229	0.51343
	INTERMEDIATE MATERIALS, SUPPLIES, AND COMPONENTS	100.000	100.000	1.00000
02	Processed foods and feeds	5.139	5.091	1.00943
021	Cereal and bakery products	0.371	0.366	1.01366
022	Meats, poultry, and fish	0.978	1.060	0.92264
023	Dairy products	0.513	0.465	1.10323
024	Processed fruits and vegetables	0.113	0.116	0.97414
025	Sugar and confectionery	0.644	0.899	0.71635
0253	Refined sugar	0.338	0.677	0.49926
0254	Confectionery materials	0.256	0.172	1.48837
026	Beverages and beverage materials	0.307	0.274	1.12044
027	Fats and oils	0.385	0.335	1.14925
028	Miscellaneous processed foods	0.239	0.196	1.21939
029	Prepared animal feeds	1.589	1.380	1.15145
03	Textile products and apparel	4.700	5.042	0.93217
031	Synthetic fibers	0.650	0.750	0.86667
032	Processed yarns and threads	0.989	0.980	1.00918
033	Gray fabrics	0.975	0.945	1.03175
034	Finished fabrics	1.284	1.594	0.80552
038	Apparel and other fabricated textile products	0.653	0.675	0.96741
039	Textile fibers, yarns and fabrics, n.e.c.	0.149	0.098	1.52041
04	Hides, skins, leather, and related products	0.275	0.352	0.78125
042	Leather	0.213	0.254	0.83858
043	Footwear	0.004	0.007	0.57143
044	Other leather and related products	0.058	0.091	0.63736
05	Fuels and related products and power	12.128	11.450	1.05921

See footnotes at end of table.

Table C. Changes in relative importance of Producer Price Index commodity groupings by stage of processing, resulting from update of weight base year from 1972 to 1982—Continued

Commodity code	Index	Relative importance December 1986 1/		Ratio 2/
		Revised (1982)	Former (1972)	(1982/1972)
052	Coke oven products	0.117	0.095	1.23158
0532	Liquefied petroleum gas	0.366	0.317	1.15457
054	Electric power	7.205	6.294	1.14474
057	Petroleum products, refined	4.319	4.604	0.93810
058	Petroleum and coal products, n.e.c.	0.121	0.140	0.86429
06	Chemicals and allied products	11.149	9.721	1.14690
061	Industrial chemicals	4.115	3.261	1.26188
062	Paints and allied products	1.279	1.401	0.91292
063	Drugs and pharmaceuticals	0.934	0.624	1.49679
064	Fats and oils, inedible	0.075	0.121	0.61983
065	Agricultural chemicals and chemical product	1.176	1.293	0.90951
066	Plastic resins and materials	1.839	1.373	1.33940
067	Other chemicals and allied products	1.731	1.648	1.05036
07	Rubber and plastic products	4.472	4.026	1.11078
071	Rubber and rubber products	1.441	1.820	0.79176
072	Plastic products	3.031	2.206	1.37398
08	Lumber and wood products	2.929	3.794	0.77201
081	Lumber	0.958	1.467	0.65303
0811	Softwood lumber	0.605	1.133	0.53398
0812	Hardwood lumber	0.353	0.334	1.05689
082	Millwork	0.933	1.086	0.85912
083	Plywood	0.404	0.564	0.71631
084	Other wood products	0.349	0.328	1.06402
086	Prefabricated wood buildings and components	0.144	0.252	0.57143
087	Treated wood and contract wood preserving	0.141	0.097	1.45361
09	Pulp, paper, and allied products	11.669	11.279	1.03458
091	Pulp, paper, and products, ex. building paper	7.010	6.227	1.12574
0913	Paper	2.316	1.642	1.41048
0914	Paperboard	1.011	0.787	1.28463
0915	Converted paper and paperboard products	3.188	3.367	0.94684
092	Building paper and building board mill products	0.182	0.258	0.70543
093	Publications, printed matter, and printing mat.	4.477	4.794	0.93388
10	Metals and metal products	19.179	23.212	0.82625
101	Iron and steel	5.473	8.209	0.66671
102	Nonferrous metals	4.298	4.347	0.98873
103	Metal containers	1.247	1.268	0.98344
104	Hardware	0.733	0.981	0.74720
105	Plumbing fixtures and brass fittings	0.252	0.370	0.68108
106	Heating equipment	0.323	0.434	0.74424
107	Fabricated structural metal products	3.231	3.573	0.90428
108	Miscellaneous metal products	3.622	4.030	0.89876
11	Machinery and equipment	15.779	12.415	1.27096
111	Agricultural machinery and equipment	0.285	0.249	1.14458
112	Construction machinery and equipment	0.239	0.223	1.07175
113	Metalworking machinery and equipment	1.150	1.286	0.89425
114	General purpose machinery and equipment	3.558	3.504	1.01541
1143	Fluid power equipment	0.414	0.257	1.61089
1148	Air conditioning and refrigeration equipment	0.877	1.107	0.79223
116	Special industry machinery and equipment	0.337	0.313	1.07668
117	Electrical machinery and equipment	6.802	4.339	1.56764
1178	Electronic components and accessories	2.812	1.266	2.22117
118	Miscellaneous instruments	0.616	0.421	1.46318
119	Miscellaneous machinery	2.792	2.080	1.34231
12	Furniture and household durables	0.897	0.978	0.91718
121	Household furniture	0.053	0.069	0.76812
122	Commercial furniture	0.149	0.159	0.93711
123	Floor coverings	0.268	0.246	1.08943
124	Household appliances	0.204	0.243	0.83951
125	Home electronic equipment	0.061	0.039	1.56410
126	Other household durable goods	0.162	0.222	0.72973
13	Nonmetallic mineral products	4.301	5.897	0.72935
131	Glass	0.457	0.496	0.92137
1322	Cement	0.349	0.527	0.66224
133	Concrete products	1.313	1.854	0.70820
134	Clay construction products except refractories	0.132	0.226	0.58407
135	Refractories	0.133	0.202	0.65842
136	Asphalt felts and coatings	0.242	0.290	0.83448
137	Gypsum products	0.160	0.192	0.83333
138	Glass containers	0.568	0.716	0.79330
139	Other nonmetallic minerals	0.947	1.394	0.67934
14	Transportation equipment	5.450	4.947	1.10168
141	Motor vehicles and equipment	3.714	3.734	0.99464
142	Aircraft and aircraft equipment	1.479	0.822	1.79927
143	Ships and boats	0.135	0.082	1.64634

See footnotes at end of table.

Table C. Changes in relative importance of Producer Price Index commodity groupings by stage of processing, resulting from update of weight base year from 1972 to 1982—Continued

Commodity code	Index	Relative importance December 1986 1/		Ratio 2/
		Revised (1982)	Former (1972)	(1982/1972)
144	Railroad equipment	0.099	0.260	0.38077
149	Transportation equipment, n.e.c.	0.023	0.049	0.46939
15	Miscellaneous products	1.911	1.797	1.06344
151	Toys, sporting goods, small arms, etc.	0.080	0.073	1.09589
152	Tobacco products, including stemmed and redried	0.246	0.100	2.46000
153	Notions	0.061	0.155	0.39355
154	Photographic equipment and supplies	0.302	0.314	0.96178
156	Medical, surgical, and personal aid devices	0.529	0.258	2.05039
157	Industrial safety equipment	0.095	0.063	1.50794
159	Other miscellaneous products	0.598	0.834	0.71703
	FINISHED GOODS	100.000	100.000	1.00000
01	Farm products	1.725	1.814	0.95094
011	Fresh and dried fruits and vegetables	1.226	1.290	0.95039
016	Fluid milk	0.074	0.081	0.91358
017	Eggs	0.392	0.425	0.92235
019	Other farm products	0.033	0.018	1.83333
02	Processed foods and feeds	27.574	26.472	1.04163
021	Cereal and bakery products	3.333	3.724	0.89501
022	Meats, poultry, and fish	7.046	7.149	0.98559
0221	Meats	4.827	5.418	0.89092
0222	Processed poultry	1.240	0.769	1.61248
0223	Unprocessed and packaged fish	0.979	0.962	1.01767
023	Dairy products	3.770	3.634	1.03742
024	Processed fruits and vegetables	1.742	1.774	0.98196
025	Sugar and confectionery	1.445	1.249	1.15693
026	Beverages and beverage materials	5.674	5.113	1.10972
027	Fats and oils	0.514	0.426	1.20657
028	Miscellaneous processed foods	3.388	2.952	1.14770
029	Prepared animal feeds	0.662	0.451	1.46785
03	Textile products and apparel	7.500	6.890	1.08853
032	Processed yarns and threads	0.035	0.038	0.92105
033	Gray fabrics	0.053	0.053	1.00000
034	Finished fabrics	0.129	0.142	0.90845
038	Apparel and other fabricated textile products	7.283	6.657	1.09404
038101	Women's apparel	3.389	2.431	1.39408
038102	Men's and boys' apparel	2.387	2.611	0.91421
038103	Girls', children's, and infants' apparel	0.544	0.468	1.16239
0382	Textile housefurnishings	0.691	0.850	0.81294
04	Hides, skins, leather, and related products	0.990	1.363	0.72634
043	Footwear	0.690	0.985	0.70051
044	Other leather and related products	0.300	0.378	0.79365
05	Fuels and related products and power	8.631	7.470	1.15542
051	Coal	0.002	0.002	1.00000
053	Gas fuels	3.777	2.464	1.53287
057	Petroleum products, refined	4.718	4.850	0.97278
0571	Gasoline	3.586	3.577	1.00252
057302	Fuel oil #2	0.580	0.632	0.91772
058	Petroleum and coal products, n.e.c.	0.134	0.154	0.87013
06	Chemicals and allied products	4.816	4.533	1.06243
061	Industrial chemicals	0.023	0.013	1.76923
062	Paints and allied products	0.032	0.034	0.94118
063	Drugs and pharmaceuticals	1.917	1.733	1.10617
0635	Ethical preparations (prescription)	1.430	1.213	1.17890
0636	Proprietary preparations (over-counter)	0.423	0.478	0.88494
065	Agricultural chemicals and chemical product	0.106	0.124	0.85484
067	Other chemicals and allied products	2.738	2.629	1.04146
07	Rubber and plastic products	1.462	1.396	1.04728
071	Rubber and rubber products	0.556	0.816	0.68137
072	Plastic products	0.906	0.580	1.56207
08	Lumber and wood products	0.101	0.116	0.87069
081	Lumber	0.024	0.035	0.68571
082	Millwork	0.067	0.068	0.98529
083	Plywood	0.010	0.013	0.76923
09	Pulp, paper, and allied products	3.561	3.561	1.00000
091	Pulp, paper, and products, ex. building paper	1.355	1.127	1.20231
092	Building paper and building board mill products	0.021	0.012	1.75000
093	Publications, printed matter, and printing mat.	2.185	2.422	0.90215
10	Metals and metal products	1.036	1.182	0.87648
101	Iron and steel	0.002	0.003	0.66667

See footnotes at end of table.

Table C. Changes in relative importance of Producer Price Index commodity groupings by stage of processing, resulting from update of weight base from 1972 to 1982—Continued

Commodity code	Index	Relative importance December 1986 1/		Ratio 2/
		Revised (1982)	Former (1972)	(1982/1972)
102	Nonferrous metals	0.019	0.020	0.95000
103	Metal containers	0.004	0.006	0.66667
104	Hardware	0.139	0.176	0.78977
106	Heating equipment	0.049	0.052	0.94231
107	Fabricated structural metal products	0.468	0.557	0.84022
108	Miscellaneous metal products	0.355	0.368	0.96467
11	Machinery and equipment	15.332	14.006	1.09467
111	Agricultural machinery and equipment	1.195	1.361	0.87803
112	Construction machinery and equipment	0.893	1.510	0.59139
113	Metalworking machinery and equipment	1.759	1.837	0.95754
1137	Metal cutting machine tools	0.441	0.414	1.06522
1138	Metal forming machine tools	0.139	0.223	0.62332
1139	Tools, dies, jigs, fixtures, and indust. molds	0.552	0.653	0.84533
114	General purpose machinery and equipment	1.959	1.827	1.07225
116	Special industry machinery and equipment	1.894	2.209	0.85740
1161	Food products machinery	0.178	0.110	1.61818
1162	Textile machinery and equipment	0.084	0.146	0.57534
1165	Printing trades machinery and equipment	0.289	0.217	1.33180
1167	Packing and packaging machinery	0.106	0.185	0.57297
117	Electrical machinery and equipment	5.001	2.349	2.12899
1176	Communication and related equipment	2.246	0.409	5.49144
118	Miscellaneous instruments	0.937	0.515	1.81942
119	Miscellaneous machinery	1.694	2.398	0.70642
1191	Oil field and gas field machinery	0.451	0.176	2.56250
1193	Office and store machines and equipment	0.739	1.549	0.47708
12	Furniture and household durables	6.171	6.675	0.92449
121	Household furniture	1.689	2.157	0.78303
122	Commercial furniture	1.061	0.927	1.14455
123	Floor coverings	0.550	0.612	0.89869
124	Household appliances	1.407	1.636	0.86002
125	Home electronic equipment	0.544	0.373	1.45845
126	Other household durable goods	0.920	0.970	0.94845
13	Nonmetallic mineral products	0.113	0.170	0.66471
131	Glass	0.037	0.040	0.92500
133	Concrete products	0.026	0.021	1.23810
138	Glass containers	0.008	0.009	0.88889
139	Other nonmetallic minerals	0.042	0.100	0.42000
14	Transportation equipment	13.944	16.639	0.83803
141	Motor vehicles and equipment	10.261	13.588	0.75515
141101	Passenger cars	6.440	8.811	0.73090
141105	Light trucks	2.221	2.099	1.05812
141106	Heavy trucks	0.308	1.195	0.25774
142	Aircraft and aircraft equipment	1.798	1.329	1.35290
143	Ships and boats	1.570	1.004	1.56375
144	Railroad equipment	0.218	0.518	0.42085
149	Transportation equipment, n.e.c.	0.097	0.200	0.48500
15	Miscellaneous products	7.045	7.707	0.91410
151	Toys, sporting goods, small arms, etc.	1.139	1.146	0.99389
152	Tobacco products, including stemmed and redried	2.333	2.482	0.93997
153	Notions	0.019	0.050	0.38000
154	Photographic equipment and supplies	1.122	0.723	1.55187
155	Mobile homes	0.484	0.987	0.49037
156	Medical, surgical, and personal aid devices	0.601	0.349	1.72206
157	Industrial safety equipment	0.009	0.008	1.12500
159	Other miscellaneous products	1.338	1.962	0.68196

1/ Relative importance data for commodity groupings include only those subproduct classes allocated to the respective stage-of-processing (SOP) grouping. The revised weight structure (based on 1982 shipment values) includes the effects of sample changes in January 1987, while the old weight structure does not include these sample changes. Because these figures are based on unrevised December 1986 index levels, they are subject to revision; final relative importance data will be published in the annual supplement to Producer Price Indexes later this year.

2/ A ratio above 1.0 indicates an increase in relative importance; for example, a ratio of 1.25000 indicates a 25-percent increase, a ratio of 3.10000 indicates a 210-percent increase, and a ratio of 0.67000 indicates a 33-percent decrease.

regardless of ownership of the producing establishment.[4] The inclusion of military sales has had a minimal impact on stage-of-processing relative importance values because such sales do not fit into any of the SOP categories.

Interplant transfers were previously excluded because the traditional PPI was a measure of price change in primary markets, i.e., at the first commercial transaction for each commodity. For example, a steel manufacturer might own a coal mine supplying a blast furnace it operates at a different location. The shipment of coal from the mine to the blast furnace would not be a market transaction because the respective establishments are part of the same corporate enterprise. Under the industry-oriented concept of the revised PPI methodology, all shipments outside the industry where a product originates are included. In this example, the coal mine and the blast furnace are classified as being in different industries even though they are owned by the same enterprise. Thus, transactions between such commonly-owned establishments are included in the new PPI.

Of greater significance than changes in the definition of the universe were changes reflecting cyclical and long-term trends in the economy. The economy of 1972 was strongly bolstered by stimulative monetary policies, while prices for most goods were frozen by Administration order. However, the Arab oil embargo of 1973 caused an oubreak of inflation that did not abate until after economic stabilization measures were taken that brought on a period of severe recession during the early 1980's.

As a result, the economy displayed unusual weakness in many sectors during 1982, when most recent economic censuses were taken, particularly in such industries as housing and motor vehicles. Because of the sharp business cycle contrast between 1972 and 1982, a number of categories in the PPI related to these sectors showed substantial declines in relative importance, unrelated to any long-term structural change in the economy.

The more significant weighting shifts that occurred are discussed in the following paragraphs and shown in table C, which presents the relative importance values of commodity groupings for each respective stage-of-processing category before and after the weight revision.[5] Commodity groupings are listed in code-number sequence within each SOP group, similar to table 2 of the monthly report, *Producer Price Indexes*.

Crude materials

The change in the scope of transactions included in the PPI universe was most pronounced within the crude materials category. All three types of crude energy materials—coal, natural gas, and crude petroleum—rose sharply because of the inclusion of interplant transfers. The largest gain was for crude petroleum, which rose 151 percent. This increase represented the inclusion of the output of oil wells owned by vertically integrated petroleum refining companies. The relative importance of coal climbed by 78 percent while natural gas rose about 24 percent. As a result, the total weight of energy in the crude materials category nearly doubled, from 23 percent on the 1972 basis to 41 percent on the 1982 basis.

This unusually sharp increase for energy commodities resulted in a displacement of the importance of most other goods; nonenergy crude goods overall showed a 23.2-percent drop in relative importance. Thus, many items showed large apparent decreases in market size when in fact there were no major corresponding structural changes in the market. At the same time, this displacement phenomenon enhances the significance of the few increases which did occur for nonenergy items within the crude materials category, for example, wastepaper, logs, and metal ores.

Among crude agricultural products, the largest decline in weight was for manufacturing grade raw milk (in the fluid milk group), which fell 59 percent. Raw cane sugar declined 45 percent in relative importance. The worldwide shortage of cane sugar that led to an explosion in prices during 1980 prompted many confectionery and beverage producers to seek alternative ingredients such as artificial sweeteners. The increased popularity of diet beverages cut further into sugar's traditional markets.

Wheat registered a 37-percent drop in relative importance, due mostly to the large decrease in export demand in the wake of the strengthening U.S. dollar during the early 1980's. Corn and soybeans showed much smaller declines, as these crops are less dependent on export markets. The weights of both cattle and hogs fell 32 percent, reflecting decreased consumer preference for red meats in favor of poultry and fish; these latter categories showed moderate increases.

Among crude materials other than energy and agricultural products, the weak construction market in 1982 resulted in sizable drops for construction sand, gravel, and crushed stone and for miscellaneous nonmetallic minerals such as clay and mica. However, logs and timber showed a 20-percent increase because of the inclusion of the values of shipments of timber to sawmills owned by the same company; this was paradoxical because, as noted below, 1982 was a bad year for construction-related industries such as logging and sawmills. The relative importance of wastepaper more than doubled as environmental and economic considerations encouraged paperboard manufacturers to make greater use of recycling as an alternative to reliance on woodpulp.

Metal ores rose very sharply, largely reflecting the inclusion of interplant transfers in the PPI weight universe. A majority of metal mines in the U.S. are owned by the firms

[4] The PPI Revision (PPIR) program began in 1978 and was completed in 1986. Virtually all 493 mining and manufacturing industries are now covered. However, the PPIR industry-classified indexes were not affected by the weight revision; they continue to be calculated using 1977 net output weights.

[5] Most of the data used in the analysis of long-term trends was taken from the 1984 *U.S. Industrial Outlook*, published by the U.S. Department of Commerce. This issue contained output data for many industries for both 1972 and 1982.

which smelt or refine the ores themselves. Consequently, the weight of nonferrous ores nearly tripled, and the weight of iron ore more than quadrupled.

Intermediate goods

The weight shifts within the intermediate goods category appear consistent with the widespread perception that American industry has expanded in the high-technology and chemical-related sectors and declined in basic heavy industries. However, the significant declines which occurred in the relative importance of construction materials, such as lumber and nonmetallic minerals, were not due to such a fundamental structural change in the economy, but rather to the cyclical weakness of the construction sector in 1982. Neither the energy nor the food materials categories within the intermediate goods index showed much change in the weight revision.

The outstanding increase in relative importance among intermediate goods was for electronic components and accessories, which more than doubled, from 1.3 percent to 2.8 percent. The biggest gains were for integrated circuits, of which some types increased tenfold or twentyfold in relative importance between 1972 and 1982. Demand for some of these semiconductor chips was boosted enormously by the microcomputer boom that began in the late 1970's; the increase in household sound and video equipment and commercial communication equipment sectors also stimulated rapid growth in semiconductors.

Growth in the aerospace industry also was reflected in the PPI weight revision, although part of the increase stemmed from the inclusion of military sales in the weight universe. The relative importance of aircraft engines and engine parts nearly tripled, while aircraft parts and auxiliary equipment rose 44 percent.

Medical and surgical instruments and appliances also showed substantial increases in their weights, as shipments grew in tandem with the increased proportion of medical expenses in household and public budgets. Growth was also evident among pharmaceuticals. Biological products more than doubled their relative importance, and medicinal and botanical chemicals (from which drugs are derived) showed an 83-percent advance in importance.

The chemical industry was given a tremendous stimulus by growth in plastic product markets. During the 1970's and 1980's, new types of plastic materials came to be used more and more frequently in durable goods. Plastic products used by businesses recorded a 37-percent increase in relative importance, while plastic resins and materials rose 34 percent. Because of demand derived from the plastics sector and the rapid rate of price increase since 1972, the relative importance of industrial chemicals moved up from 3.3 percent to 4.1 percent of the total intermediate goods index, a 25-percent increase.

Another area of notable increases was the pulp and paper industry. The relative importance of paper rose 41 percent, while that of paperboard moved up 28 percent. Although faced with competition from plastics and other packaging materials, the paper industry managed to develop new types of containers made from corrugated paper.

An interesting substitution effect occurred in the processed foods and feeds category. Confectionery materials gained 49 percent in weight, reflecting increased use of corn sweeteners such as high-fructose corn syrup in candy and soft drinks. Corn sweeteners displaced refined sugar, which fell 50 percent and paralleled the drop in the relative importance of raw cane sugar within the crude materials index. In addition, crude vegetable oils rose 36 percent, while prepared animal feeds showed a more modest increase, 15 percent.

Among industrial goods exhibiting major declines in relative importance were asbestos products, which fell 61 percent. Health concerns during the 1970's resulted in sharp restrictions on use of asbestos as an insulation material. Knit finished fabrics declined 53 percent, and narrow-woven fabrics moved down 44 percent.

Real total expenditures on residential construction in 1982 fell to their lowest level since the early 1960's. Consequently, the weights assigned to most construction materials within the intermediate goods category dropped substantially; for example, softwood lumber moved down from 1.1 percent to 0.6 percent. In addition, the weight of plywood fell nearly 30 percent, and millwork registered a decrease of about 14 percent. Clay bricks and tiles were down nearly 50 percent, and concrete products declined about 30 percent.

Basic metal industries also showed significant weight declines as domestic output of raw steel in 1982 dropped to the lowest level since 1958. Besides the reduced demand for steel resulting from the downsizing of automobiles and fewer purchases of heavy machinery by American industries, as much as 20 percent of the diminished steel market was taken by imported steel. Thus, the relative importance of both steel mill products and foundry and forge shop products fell roughly one-third following the weight revision.

There was no clear trend among nonferrous metals, which showed virtually no net change overall. Aluminum gained substantially in importance because of increased use in beverage containers and aerospace equipment. However, zinc fell by about two-thirds, and precious metals declined 18 percent.

Contrary to the pattern of petroleum-derived and pharmaceutical chemicals, certain chemical products moved down in importance. Inedible fats and oils, mixed fertilizers, and miscellaneous paint products all fell at least 30 percent. Various electrical equipment categories also fell (between 10 and 25 percent), including electric lamps and bulbs, air-conditioning and refrigeration equipment, motors and generators, and wiring devices.

The relative weight of the glass containers category decreased by about 20 percent as the increased popularity of aluminum, plastic, and paper containers (and stricter legislation on deposits for beverage containers in some States) displaced much of the market once held by the glass container industry.

Finished goods

Some of the sharpest changes in weights among finished goods took place in capital equipment. The weight of communication and related equipment nearly quintupled, reflecting the growing importance and increased applications of this technology. Among the most prominent examples of these are the entry into the market of new telephone service companies and new television enterprises, particularly cable TV. Oilfield and gasfield machinery almost tripled in importance, as deregulation of domestic oil and the partial decontrol of gas prices precipitated a high level of exploration and drilling activity and in turn sharp increases in demand for such machinery. Significant increases also occurred in the weights for photographic equipment, ships, and aircraft.

On the other hand, the relative importance of heavy trucks in the finished goods category dropped from 1.2 percent to only 0.3 percent, reflecting the poor state of demand for automotive products during the recession of 1981–82. In addition, the following types of capital goods declined in importance: Locomotive parts (79 percent); textile machinery and equipment (42 percent); and railroad cars and parts (40 percent). Because the Bureau now assigns the weight of the computer industry to the broad category of machinery and equipment, rather than to the more specific category of office and store machinery, the weight of the latter dropped substantially, 52 percent. In addition, the weights of metal-forming machine tools, truck trailers, plastics machinery, and automotive maintenance equipment also moved down.

Among consumer finished goods, one of the largest shifts was the 27-percent decline in relative importance for passenger cars, which now represent 6.4 percent of the finished goods index, compared to 8.8 percent under the previous weight structure. Sales of domestic cars fell to under 6 million in 1982, compared to over 9 million in 1972. During the same period, sales of imported cars climbed steadily. The growing consumer preference for light-duty pickup trucks was reflected in the 6-percent increase for light trucks. Given the nearly disastrous conditions in the motor vehicle market in 1982, the fact that the relative importance for light trucks increased at all is significant.

Several other durable consumer goods declined in importance from 1972 to 1982. The largest decline was for travel trailers and campers, which fell 65 percent, mostly in response to curtailed vacation driving following the gasoline price increases of the 1970's. Household furniture fell 22 percent, jewelry and jewelry products declined 52 percent, and mobile homes decreased 50 percent over the same period.

One of the largest gains among consumer goods was for home electronic equipment, where an increase of 93 percent was noted for high-fidelity components and speakers. Sharp increases were also registered for phonograph records and prerecorded tapes (62 percent) and television sets (46 percent).

Changing consumer tastes led to a sharp change in the consumer foods category. Consumption of beef and pork declined because of consumer reaction to the sharp price increases during the 1970's, and because of health concerns. Consequently, the relative importance of both the beef and veal and the pork categories fell by 10 percent; beef and veal together now account for under 2.2 percent of the weight of the total finished goods index, while pork accounts for about 1.5 percent.

Many Americans substituted poultry and fish for other meats in their diets. The increased consumption of poultry was partly due to its relatively low price compared to other meats. The poultry industry gained a greater share of the market by reducing costs through improved efficiency in production. Poultry presently accounts for 1.2 percent of the finished goods index, an increase of over 61 percent compared to the 1972 weight structure. The relative importance of fish showed only a small increase.

Weights for confectionery end products rose 27 percent, compared to the 1972 structure, partly as a result of increased costs for ingredients, particularly sugar, while soft drinks advanced 11 percent. Among other foods, the proportion accounted for by salad dressings rose significantly. Increases also occurred for spices, frozen packaged sandwiches, and snack foods, while bakery products were 17 percent below the 1972 weight.

Because prices for finished energy goods more than quadrupled from 1972 to 1982, declines were experienced in per capita consumption. The net effect was little change in energy's relative share of consumer expenditures. The growing prevalence of new cars with greater fuel efficiency, coupled with the implementation of a nationwide 55-mile-per-hour speed limit, reduced demand for motor vehicle fuels compared with the long-term growth trend. Gasoline still accounts for about 3.6 percent of the weight of the finished goods index, the same as under the previous weight structure. A substantial increase in home insulation efforts, and some switching to alternatives sources of energy, likewise reduced demand for home heating oil, which now represents 0.9 percent of the finished goods index, about the same as before. However, the relative importance of natural gas rose to 3.3 percent of the finished goods category, compared to 2.1 percent previously; this partly reflected the inclusion of interplant transfers in the PPI universe.

Among other consumer nondurables, athletic footwear rose 33 percent in importance, as more costly shoes were marketed to both fashion- and fitness-conscious consumers; alcoholic beverages increased 29 percent. Increases for plastic dinnerware and tableware reflected the growing importance and acceptance of these alternatives to chinaware and metal dining utensils. Women's and children's apparel also gained in importance, while men's apparel declined. Cosmetics and soaps both moved up about 9 percent in importance.