New weight structure being used in Producer Price Index

The universe of weights has been updated from 1972 to 1982; inclusion of interplant transfers led to increases in relative importance for several crude goods while declines for motor vehicles and other durable goods were due to the recession in 1982

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For the first time in more than 10 years, the universe of weights used to construct the Producer Price Index (PPI) has been comprehensively updated. Between January 1976 and December 1986, the values used to aggregate individual products into higher level groupings in the PPI were taken from 1972 shipment values. Since January 1987, the PPI has been constructed using 1982 shipment values for weighting purposes. This article explains how the weight change was accomplished and analyzes some of the major shifts in the relative importance of product groupings.

Among the most significant shifts:

- The weight accounted for by energy within the crude materials category increased from 23 percent on the 1972 basis to 41 percent on the 1982 basis. The largest gain was for crude petroleum, the importance of which soared 151 percent.
- Wheat registered a 37-percent drop in relative importance.
- Construction materials dropped 17.3 percent, because of the 1981–82 recession.
- Steel decreased 32.7 percent, also largely due to the 1981–82 recession.
- The relative importance of passenger cars declined 27 percent, with automobiles now representing 6.4 percent of the finished goods category, compared with 8.8 percent under the previous weight structure.

The new weight structure has not caused any revisions of historical indexes, or a break in continuity of the indexes. Thus, users may freely compare newly published indexes with indexes calculated before 1987.

The weight revision affects all PPI series derived from traditional commodity indexes, including stage-of-processing indexes, durability-of-product indexes, and special commodity groupings. The proportional allocations of commodities to the various stage-of-processing categories continue to be based on 1972 input-output data. The weight structure changes do not affect any of the industry-classified indexes in the PPI Revision system itself. These indexes continue to be based on 1977 net output weights; at the present time, however, relative importance data for industry-classified indexes from the PPI are not published.[1]

The PPI universe consists of the domestic goods-producing sectors of the economy, including goods intended for household consumption as well as capital equipment and a wide range of intermediate and crude materials purchased by businesses. Although the PPI universe includes goods destined for export or government purchase and a limited number of services, the weights for such sales are excluded from the stage-of-processing system.

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Derivation of indexes and weights

Chart 1 displays the sectoral composition of the PPI weight universe, following the weight revision, as of December 1986. The great majority of the value weights of commodities in the PPI was derived from the Bureau of the Census. The 1982 Census of Manufactures provided the data for approximately 84 percent of the weight of all commodities. Next in importance was the Census of Mineral Industries, which includes oil and gas production, and the Census of Agriculture. The other weight sources used were the Edison Electric Institute, the National Marine Fisheries Service, and the Census of Wholesale Trade, which compiles data on recycled scrap transactions.

To understand the causes of shifts in importance among components of the PPI, it is useful to examine the basic Laspeyres fixed-weight formula. Under this formula, the physical quantities of all individual items are held constant, regardless of price change.[2] Although this assumption is suitable for medium-term spans, the dynamic nature of the U.S. economy requires that periodic updates be made to the PPI weight structure to ensure its relevance. In practice, the PPI is computed using total values of shipments as weights, rather than physical (or unit) quantities. An implicit fixed quantity is associated with each specific commodity in the PPI (bushels, tons, gallons, and so on), but it is never computed.[3]

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

The formulas below describe the conceptual basis for the PPI weight update procedure, followed by the definitions of the notations and an explanation.

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

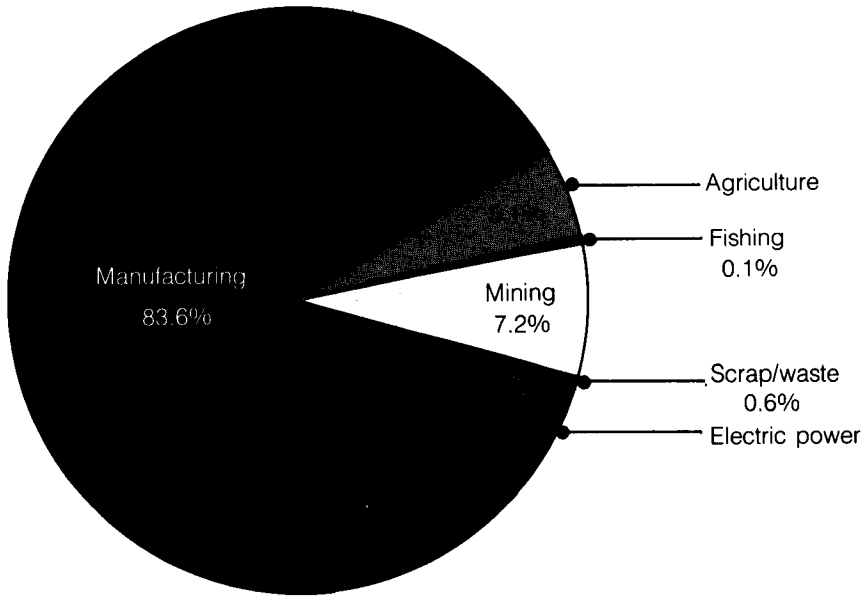
(4)
$$R_{i,86\,(82)} = \frac{V_{i,82}\left(P_{i,86}/P_{i,82}\right)}{V_{A,82}\left(P_{A,86}/P_{A,82}\right)}$$
$$= \frac{P_{i,82}\, Q_{i,82}\left(P_{i,86}/P_{i,82}\right)}{\sum_{i=1}^{N} P_{i,82}\, Q_{i,82}\left(\sum_{i=1}^{N} P_{i,86}\, Q_{i,82} \Big/ \sum_{i=1}^{N} P_{i,82}\, Q_{i,82}\right)}$$
$$= \frac{P_{i,86}\, Q_{i,82}}{\sum_{i=1}^{N} P_{i,86}\, Q_{i,82}}$$

where:

V = Value (of shipments); or P times Q;
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);
R = Relative importance (the ratio of the aggregate value of an item or mid-level grouping to the total, for example, 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 (for example, all commodities);
N = Number of commodities within the aggregate

The pure Laspeyres formula is shown in equation 1. However, a number of complicating factors necessitate modifications of the pure fixed-base-weight Laspeyres formula. The most simple is that the arithmetic base year has generally been different than the weight base period in the PPI. Also, as mentioned previously, in practice the aggregate values of commodities (rather than their physical quantities) are used to calculate commodity grouping indexes. Aggregate values are the prices multiplied by quantities summed for each

Chart 1. Revised PPI weight distribution by sector, December 1986



commodity in the grouping, updated for price change from the weight base year to the index calculation month (that is, the current price times the base quantity). The modified Laspeyres formula, which approximates the calculation of the PPI, is shown in equation 2.

A more significant qualification is that for the last several years there have been a number of sample expansions and reclassifications every 6 months resulting from the PPI Revision system, 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. To facilitate the explanation of the weight revision procedures, we will make two simplifying abstractions: that no sample changes have occurred (and hence all indexes are calculated on the same reference base), and that the PPI base year price measurements coincide perfectly with the real market.

Equations 3 and 4 show how the relative importances are derived for each individual item, taking base year quantities and adjusting them by PPI movements between the weight base year (1972 or 1982) and December 1986. 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 interval than did the price level of the aggregate category to which it is being compared. For example, petroleum products show a much lower relative importance than they would have if their prices had not fallen between 1982 and 1986.

Because both the old and revised relative importances have been adjusted for price change through December 1986, any shifts observed must derive from changes in quantities. The following section discusses the major reasons why weight shifts among indexes occur.

Causes of shifts in weights

The relative importance figures cited throughout this article represent the revised and former weight structures as of December 1986. This was the "link month," the month for which aggregate index values were recalculated under 1982 weights after first having been calculated under the 1972 weights. Table 1 displays the relative importances of commodity groupings to the respective stage-of-processing category, under the revised and former weight structures. For example, the farm products index shows a decline of 28 percent in importance relative to crude materials. The differences between those two columns reflect primarily the 1972 to 1982 weight update and, to a much smaller extent, the routine sample changes that went into effect when the January 1987 indexes were calculated.

The new weight universe of the commodity-oriented PPI was changed to conform to the scope of the industry-oriented PPI in that military sales and shipments among establishments of the same company are now included. The inclusion of "interplant" transfers did not have a significant

effect on most categories of manufactured goods; however, there was a decisive impact on some extractive industries, particularly energy and metal ores.

Interplant transfers were previously excluded because the traditional PPI was a measure of price changes in primary markets, at the first commercial transaction for each commodity. For example, a steel manufacturer might own a coal mine that supplies 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, the universe of transactions includes all shipments outside the industry where a product originates. In the above example, the coal mine and the blast furnace are classified 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 universe.

Aside from changes in the definition of the weight universe, shifts in relative index weights reflect cyclical and trend series components. (We assume that the annual value of shipments totals will not contain measurable irregularity or seasonality.) This article focuses on a comparison of 1982 and 1972, the years from which the revised and former index weights were taken. The unique business cycle aspects and macroeconomic context of those 2 years must therefore be considered.

The economy of 1972 was strongly bolstered by stimulative monetary policies, while prices for most goods were frozen by Administration order. Construction activity and durable goods consumption reached new highs, foreshadowing mounting shortages of numerous commodities. The next year witnessed the sharpest acceleration of inflation in modern U.S. history, as external events such as the Arab oil embargo caused the system of price controls to collapse. Inflation remained a problem throughout the 1970's, eventually leading to monetary policy restraints that brought on a period of severe recession during the early 1980's.

As a result, during 1982, when the most recent economic censuses were taken, the economy displayed unusual weakness in many sectors, 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.

We will now analyze the more significant weighting shifts that occurred. In most cases, the figures cited are shown in table 1, which exhibits the relative importances of commodity groupings to the respective stage-of-processing category before and after the weight revision. Commodity groupings are displayed within each major stage-of-processing category in code number sequence.

Crude materials

The change in the scope of transactions included in the PPI universe was felt most dramatically within the Crude Materials for Further Processing Index. The proportion of the total weight accounted for by energy rose from 23 percent on the 1972 basis to 41 percent on the revised 1982 basis. (See chart 2.) All three types of crude energy materials rose sharply in importance because of the inclusion of interplant transfers. The largest gain was for crude petroleum, whose importance rose 151 percent. This increase represented the output of crude oil wells owned by vertically integrated petroleum refining companies. The relative weight of coal jumped 78 percent, while natural gas rose about 24 percent.

This unusually sharp increase for energy commodities lessened 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 phenomenon enhanced the significance of the few increases that did occur for nonenergy items within the crude materials category.

Among crude foodstuffs and feedstuffs, the largest decline in relative weight was for manufacturing-grade raw milk, which fell 59 percent. (Raw milk eligible for fluid use declined about 30 percent, in comparison.) Raw cane sugar's share of the total weight of the crude materials category dropped 55 percent. 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. New artificial sweeteners and increased popularity of diet beverages thereby further cut into sugar's traditional markets.

Wheat registered a 37-percent drop in relative importance, mainly due to the large decrease in export demand in the wake of the appreciation of the dollar during the early 1980's. Soybeans showed a smaller decline, as this crop is less dependent on export markets. The relative 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 nonfood materials other than energy, 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, mainly 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. Wastepaper's importance more than doubled, as environmental and economic considerations encouraged paperboard manufacturers to make greater use of recycling as an alternative to reliance on woodpulp.

Table 1. 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

Commodity code	Grouping	Relative importance December 1986[1]		Percent change (1982/1972)
		Revised (1982)	Former (1972)	
	Crude materials for further processing	100.000	100.000	—
01	Farm products	43.602	60.519	−28.0
011	Fresh and dried fruits and vegetables	1.488	2.020	−26.3
012	Grains	5.531	6.799	−18.6
013	Livestock	19.492	28.708	−32.1
014	Live poultry	3.602	3.327	8.3
015	Plant and animal fibers	0.894	1.344	−33.5
016	Fluid milk	7.267	11.349	−36.0
017	Eggs	0.286	0.400	−28.5
018	Hay, hayseeds, and oilseeds	3.743	4.528	−17.3
019	Other farm products	1.299	2.044	−36.4
02	Processed foods and feeds	0.833	1.406	−40.8
022301	Unprocessed fin fish	0.333	0.298	11.7
025	Sugar and confectionery	0.500	1.108	−54.9
04	Hides, skins, leather, and related products	0.613	0.853	−28.1
041	Hides and skins	0.613	0.853	−28.1
05	Fuels and related products and power	40.859	22.952	78.0
051	Coal	10.733	6.018	78.3
0531	Natural gas	12.096	9.743	24.2
056	Crude petroleum (domestic production)	18.030	7.191	150.7
06	Chemicals and allied products	0.322	0.396	−18.7
062	Paints and allied products	0.056	0.102	−45.1
065202	Phosphates	0.266	0.294	−9.5
07	Rubber and plastic products	0.027	0.072	−62.5
071103	Reclaimed rubber	0.027	0.072	−62.5
08	Lumber and wood products	2.899	2.425	19.5
085	Logs, bolts, timber, and pulpwood	2.899	2.425	19.5
09	Pulp, paper, and allied products	1.148	0.496	131.5
0912	Wastepaper	1.148	0.496	131.5
10	Metals and metal products	6.853	5.830	17.5
101	Iron and steel	3.382	3.071	10.1
1011	Iron ore	0.589	0.145	306.2
1012	Iron and steel scrap	2.793	2.926	−4.5
102	Nonferrous metals	3.471	2.759	25.8
1021	Nonferrous metal ores	1.444	0.493	192.9
1023	Nonferrous scrap	2.027	2.266	−10.5
13	Nonmetallic mineral products	2.847	5.051	−43.6
1321	Construction sand, gravel, and crushed stone	2.216	3.822	−42.0
139	Other nonmetallic minerals	0.631	1.229	−48.7
	Intermediate materials, supplies, and components	100.000	100.000	—
02	Processed foods and feeds	5.139	5.091	0.9
021	Cereal and bakery products	0.371	0.366	1.4
022	Meats, poultry, and fish	0.978	1.060	−7.7
023	Dairy products	0.513	0.465	10.3
024	Processed fruits and vegetables	0.113	0.116	−2.6
025	Sugar and confectionery	0.644	0.899	−28.4
0253	Refined sugar	0.338	0.677	−50.1
0254	Confectionery materials	0.256	0.172	48.8
026	Beverages and beverage materials	0.307	0.274	12.0
027	Fats and oils	0.385	0.335	14.9
028	Miscellaneous processed foods	0.239	0.196	21.9
029	Prepared animal feeds	1.589	1.380	15.1
03	Textile products and apparel	4.700	5.042	−6.8
031	Synthetic fibers	0.650	0.750	−13.3
032	Processed yarns and threads	0.989	0.980	0.9
033	Gray fabrics	0.975	0.945	3.2
034	Finished fabrics	1.284	1.594	−19.4
038	Apparel and other fabricated textile products	0.653	0.675	−3.3
039	Textile fibers, yarns, and fabrics, n.e.c.	0.149	0.098	52.0
04	Hides, skins, leather, and related products	0.275	0.352	−21.9
042	Leather	0.213	0.254	−16.1
043	Footwear	0.004	0.007	−42.9
044	Other leather and related products	0.058	0.091	−36.3
05	Fuels and related products and power	12.128	11.450	5.9
052	Coke oven products	0.117	0.095	23.2
0532	Liquified petroleum gas	0.366	0.317	15.5
054	Electric power	7.205	6.294	14.5
057	Petroleum products, refined	4.319	4.604	−6.2
058	Petroleum and coal products, n.e.c.	0.121	0.140	−13.6
06	Chemicals and allied products	11.149	9.721	14.7
061	Industrial chemicals	4.115	3.261	26.2
062	Paints and allied products	1.279	1.401	−8.7
063	Drugs and pharmaceuticals	0.934	0.624	49.7
064	Fats and oils, inedible	0.075	0.121	−38.0
065	Agricultural chemicals and chemical products	1.176	1.293	−9.0
066	Plastic resins and materials	1.839	1.373	33.9
067	Other chemicals and allied products	1.731	1.648	5.0
07	Rubber and plastic products	4.472	4.026	11.1
071	Rubber and rubber products	1.441	1.820	−20.8
072	Plastic products	3.031	2.206	37.4
08	Lumber and wood products	2.929	3.794	−22.8
081	Lumber	0.958	1.467	−34.7
0811	Softwood lumber	0.605	1.133	−46.6
0812	Hardwood lumber	0.353	0.334	5.7
082	Millwork	0.933	1.086	−14.1
083	Plywood	0.404	0.564	−28.4
084	Other wood products	0.349	0.328	6.4
086	Prefabricated wood buildings and components	0.144	0.252	−42.9
087	Treated wood and contract wood preserving	0.141	0.097	45.4
09	Pulp, paper, and allied products	11.669	11.279	3.5
091	Pulp, paper, and products, except building paper	7.010	6.227	12.6
0913	Paper	2.316	1.642	41.0
0914	Paperboard	1.011	0.787	28.5
0915	Converted paper and paperboard products	3.188	3.367	−5.3
092	Building paper and bulding board mill products	0.182	0.258	−29.5
093	Publications, printed matter, and printing materials	4.477	4.794	−6.6
10	Metals and metal products	19.179	23.212	−17.4
101	Iron and steel	5.473	8.209	−33.3
102	Nonferrous metals	4.298	4.347	−1.1
103	Metal containers	1.247	1.268	−1.7
104	Hardware	0.733	0.981	−25.3
105	Plumbing fixtures and brass fittings	0.252	0.370	−31.9
106	Heating equipment	0.323	0.434	−25.6
107	Fabricated structural metal products	3.231	3.573	−9.6
108	Miscellaneous metal products	3.622	4.030	−10.1
11	Machinery and equipment	15.779	12.415	27.1
111	Agricultural machinery and equipment	0.285	0.249	14.5
112	Construction machinery and equipment	0.239	0.223	7.2
113	Metalworking machinery and equipment	1.150	1.286	−10.6
114	General purpose machinery and equipment	3.558	3.504	1.5
1143	Fluid power equipment	0.414	0.257	61.1
1148	Air conditioning and refrigeration equipment	0.877	1.107	−20.8
116	Special industry machinery and equipment	0.337	0.313	7.7
117	Electrical machinery and equipment	6.802	4.339	56.8

See footnote at end of table.

Table 1.—Continued 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

Commodity code	Grouping	Relative importance December 1986[1]		Percent change (1982/1972)
		Revised (1982)	Former (1972)	
	Intermediate materials, Con't.			
1178	Electronic components and accessories	2.812	1.266	122.1
118	Miscellaneous instruments	0.616	0.421	46.3
119	Miscellaneous machinery	2.792	2.080	34.2
12	Furniture and household durables	0.897	0.978	-8.3
121	Household furniture	0.053	0.069	-23.2
122	Commercial furniture	0.149	0.159	-6.3
123	Floor coverings	0.268	0.246	8.9
124	Household appliances	0.204	0.243	-16.0
125	Home electronic equipment	0.061	0.039	56.4
126	Other household durable goods	0.162	0.222	-27.0
13	Nonmetallic mineral products	4.301	5.897	-27.1
131	Glass	0.457	0.496	-7.9
1322	Cement	0.349	0.527	-33.8
133	Concrete products	1.313	1.854	-29.2
134	Clay construction products except refractories	0.132	0.226	-41.6
135	Refractories	0.133	0.202	-34.2
136	Asphalt felts and coatings	0.242	0.290	-16.6
137	Gypsum products	0.160	0.192	-16.7
138	Glass containers	0.568	0.716	-20.7
139	Other nonmetallic minerals	0.947	1.394	-32.1
14	Transportation equipment	5.450	4.947	10.2
141	Motor vehicles and equipment	3.714	3.734	-0.5
142	Aircraft and aircraft equipment	1.479	0.822	79.9
143	Ships and boats	0.135	0.082	64.6
144	Railroad equipment	0.099	0.260	-61.9
149	Transportation equipment, n.e.c.	0.023	0.049	-53.1
15	Miscellaneous products	1.911	1.797	6.3
151	Toys, sporting goods, small arms	0.080	0.073	9.6
152	Tobacco products, including stemmed and redried	0.246	0.100	146.0
153	Notions	0.061	0.155	-60.6
154	Photographic equipment and supplies	0.302	0.314	-3.8
156	Medical, surgical, and personal aid devices	0.529	0.258	105.0
157	Industrial safety equipment	0.095	0.063	50.8
159	Other miscellaneous products	0.598	0.834	-28.3
	Finished goods	100.000	100.000	—
01	Farm products	1.725	1.814	-4.9
011	Fresh and dried fruits and vegetables	1.226	1.290	-5.0
016	Fluid milk	0.074	0.081	-8.6
017	Eggs	0.392	0.425	-7.8
019	Other farm products	0.033	0.018	83.3
02	Processed foods and feeds	27.574	26.472	4.2
021	Cereal and bakery products	3.333	3.724	-10.5
022	Meats, poultry, and fish	7.046	7.149	-1.4
0221	Meats	4.827	5.418	-10.9
0222	Processed poultry	1.240	0.769	61.2
0223	Unprocessed and packaged fish	0.979	0.962	1.8
023	Dairy products	3.770	3.634	3.7
024	Processed fruits and vegetables	1.742	1.774	-1.8
025	Sugar and confectionery	1.445	1.249	15.7
026	Beverages and beverage materials	5.674	5.113	11.0
027	Fats and oils	0.514	0.426	20.7
028	Miscellaneous processed foods	3.388	2.952	14.8
029	Prepared animal feeds	0.662	0.451	46.8
03	Textile products and apparel	7.500	6.890	8.9
032	Processed yarns and threads	0.035	0.038	-7.9
033	Gray fabrics	0.053	0.053	0.0
034	Finished fabrics	0.129	0.142	-9.2
038	Apparel and other fabricated textile products	7.283	6.657	9.4
038101	Women's apparel	3.389	2.431	39.4
038102	Men's and boys' apparel	2.387	2.611	-8.6
038103	Girls', children's, and infants' apparel	0.544	0.468	16.2
0382	Textile housefurnishings	0.691	0.850	-18.7
04	Hides, skins, leather, and related products	0.990	1.363	-27.4
043	Footwear	0.690	0.985	-29.9
044	Other leather and related products	0.300	0.378	-20.6
05	Fuels and related products and power	8.631	7.470	15.5
051	Coal	0.002	0.002	0.0
053	Gas fuels	3.777	2.464	53.3
057	Petroleum products, refined	4.718	4.850	-2.7
0571	Gasoline	3.586	3.577	0.3
057302	Fuel oil #2	0.580	0.632	-8.2
058	Petroleum and coal products, n.e.c.	0.134	0.154	-13.0
06	Chemicals and allied products	4.816	4.533	6.2
061	Industrial chemicals	0.023	0.013	76.9
062	Paints and allied products	0.032	0.034	-5.9
063	Drugs and pharmaceuticals	1.917	1.733	10.6
0635	Ethical preparations (prescription)	1.430	1.213	17.9
0636	Proprietary preparations (over-counter)	0.423	0.478	-11.5
065	Agricultural chemicals and chemical products	0.106	0.124	-14.5
067	Other chemicals and allied products	2.738	2.629	4.1
07	Rubber and plastic products	1.462	1.396	4.7
071	Rubber and rubber products	0.556	0.816	-31.9
072	Plastic products	0.906	0.580	56.2
08	Lumber and wood products	0.101	0.116	-12.9
081	Lumber	0.024	0.035	-31.4
082	Millwork	0.067	0.068	-1.5
083	Plywood	0.010	0.013	-23.1
09	Pulp, paper, and allied products	3.561	3.561	0.0
091	Pulp, paper, and products, except building paper	1.355	1.127	20.2
092	Building paper and building board mill products	0.021	0.012	75.0
093	Publications, printed matter, and printing materials	2.185	2.422	-9.8
10	Metals and metal products	1.036	1.182	-12.4
101	Iron and steel	0.002	0.003	-33.3
102	Nonferrous metals	0.019	0.020	-5.0
103	Metal containers	0.004	0.006	-33.3
104	Hardware	0.139	0.176	-21.0
106	Heating equipment	0.049	0.052	-5.8
107	Fabricated structural metal products	0.468	0.557	-16.0
108	Miscellaneous metal products	0.355	0.368	-3.5
11	Machinery and equipment	15.332	14.006	9.5
111	Agricultural machinery and equipment	1.195	1.361	-12.2
112	Construction machinery and equipment	0.893	1.510	-40.9
113	Metalworking machinery and equipment	1.759	1.837	-4.2
1137	Metal cutting machine tools	0.441	0.414	6.5
1138	Metal forming machine tools	0.139	0.223	-37.7
1139	Tools, dies, jigs, fixtures, and industrial molds	0.552	0.653	-15.5
114	General purpose machinery and equipment	1.959	1.827	7.2
116	Special industry machinery and equipment	1.894	2.209	-14.3
1161	Food products machinery	0.178	0.110	61.8
1162	Textile machinery and equipment	0.084	0.146	-42.5
1165	Printing trades machinery and equipment	0.289	0.217	33.2
1167	Packing and packaging machinery	0.106	0.185	-42.7
117	Electrical machinery and equipment	5.001	2.349	112.9

See footnote at end of table.

Table 1.—Continued 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

Commodity code	Grouping	Relative importance December 1986[1]		Percent change (1982/1972)
		Revised (1982)	Former (1972)	
	Finished goods, Con't.			
1176	Communication and related equipment	2.246	0.409	449.1
118	Miscellaneous instruments	0.937	0.515	81.9
119	Miscellaneous machinery	1.694	2.398	-29.4
1191	Oil field and gas field machinery	0.451	0.176	156.3
1193	Office and store machines and equipment	0.739	1.549	-52.3
12	Furniture and household durables	6.171	6.675	-7.6
121	Household furniture	1.689	2.157	-21.7
122	Commercial furniture	1.061	0.927	14.5
123	Floor coverings	0.550	0.612	-10.1
124	Household appliances	1.407	1.636	-14.0
125	Home electronic equipment	0.544	0.373	45.8
126	Other household durable goods	0.920	0.970	-5.2
13	Nonmetallic mineral products	0.113	0.170	-33.5
131	Glass	0.037	0.040	-7.5
133	Concrete products	0.026	0.021	23.8
138	Glass containers	0.008	0.009	-11.1
139	Other nonmetallic minerals	0.042	0.100	-58.0
14	Transportation equipment	13.944	16.639	-16.2
141	Motor vehicles and equipment	10.261	13.588	-24.5
141101	Passenger cars	6.440	8.811	-26.9
141105	Light trucks	2.221	2.099	5.8
141106	Heavy trucks	0.308	1.195	-74.2
142	Aircraft and aircraft equipment	1.798	1.329	35.3
143	Ships and boats	1.570	1.004	56.4
144	Railroad equipment	0.218	0.518	-57.9
149	Transportation equipment, n.e.c.	0.097	0.200	-51.5
15	Miscellaneous products	7.045	7.707	-8.6
151	Toys, sporting goods, small arms	1.139	1.146	-0.6
152	Tobacco products, including stemmed and redried	2.333	2.482	-6.0
153	Notions	0.019	0.050	-62.0
154	Photographic equipment and supplies	1.122	0.723	55.2
155	Mobile homes	0.484	0.987	-51.0
156	Medical, surgical, and personal aid devices	0.601	0.349	72.2
157	Industrial safety equipment	0.009	0.008	12.5
159	Other miscellaneous products	1.338	1.962	-31.8

[1] Relative importance data for commodity groupings include only those subproduct classes allocated to the respective stage-of-processing 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*.

n.e.c. = not elsewhere classified.

Metal ores rose very sharply, largely reflecting the inclusion of interplant transfers in the PPI weight universe. A majority of metal mines in the United States is owned by the firms that 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 Materials, Supplies, and Components Index appear consistent with the widespread perception that the structure of American industry has gained in the high technology and chemical-related sectors and retrenched in basic heavy industries. However, the significant declines that occurred in the relative importances 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 category showed much change in the weight revision. (See chart 2.)

The outstanding increase in relative importance among the intermediate goods category was for electronic components and accessories, which more than doubled, from 1.3 percent to 2.8 percent. The biggest jumps were for integrated circuits, of which some types registered 10- or 20-fold gains between 1972 and 1982. Demand for some kinds of these semiconductor "chips" was boosted enormously by the microcomputer boom that began in the late 1970's; the household sound and video equipment and commercial communication equipment sectors also stimulated rapid growth in semiconductors. Nonetheless, the American semiconductor industry faced a growing threat from Japanese firms, which have excelled in producing on a massive scale at low cost the standardized memory chips used in computers. Many U.S. firms have responded in recent years by establishing "offshore" production facilities to reduce costs and avoid further erosion of their market share.

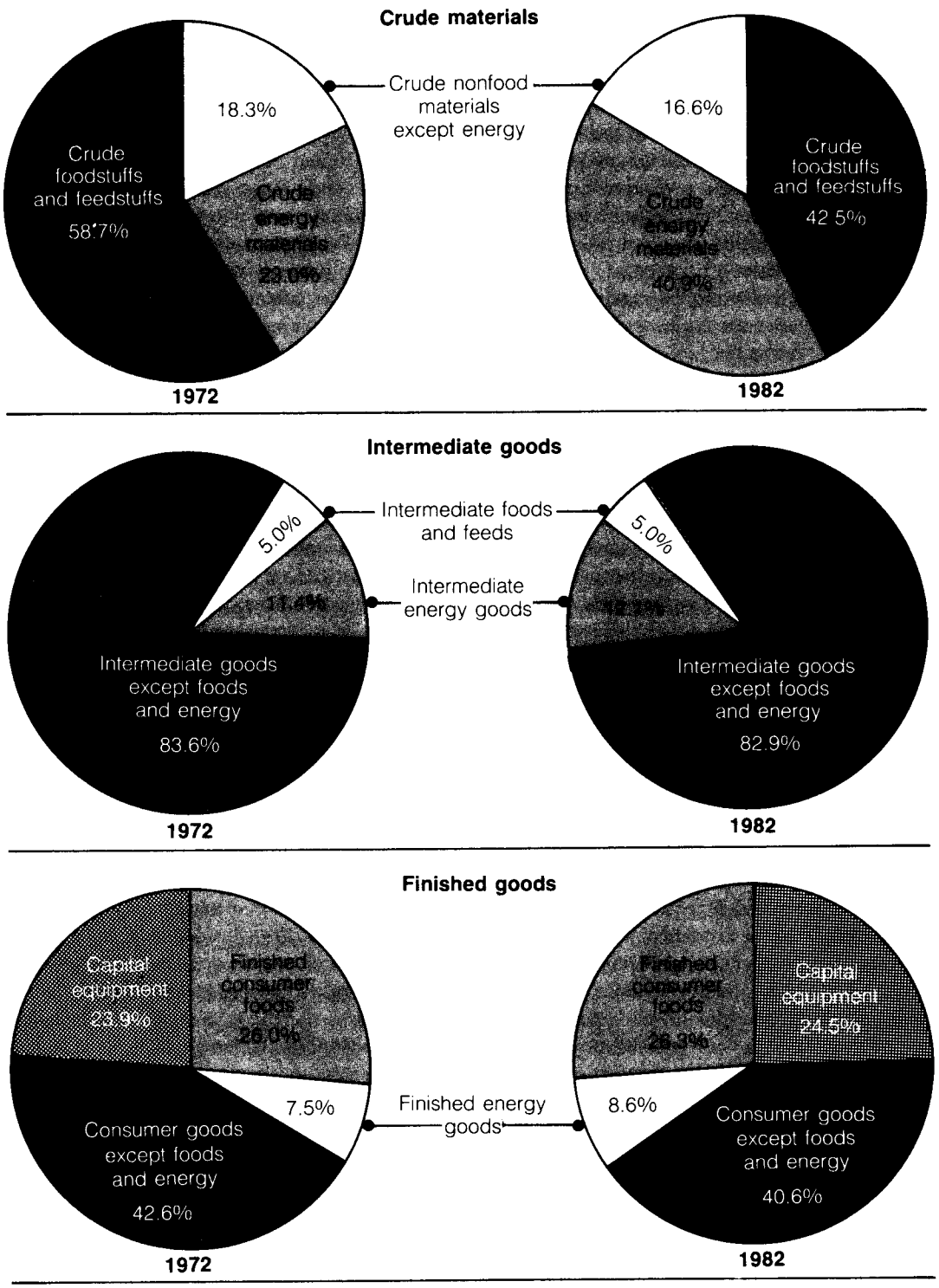
Growth in the aerospace industry was also reflected in the PPI weight revision, although part of the increase stemmed from the inclusion of military sales in the weight universe. The relative importance of aircraft engines and engine parts nearly tripled, while aircraft parts and auxiliary equipment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

Medical and surgical instruments and appliances also showed substantial increases in their relative weights, as shipments grew in tandem with the increased proportion of medical expenses in household and public budgets. Growth in medical products 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 because of the weight revision, while plastic resins and materials rose 34 percent. Because of demand that was derived from the plastics sector, the PPI for industrial chemicals moved up from 3.3 percent to 4.1 percent of the total intermediate goods category, a 26-percent increase.

Another area of notable increases was the pulp and paper industry. Paper's relative importance rose 41 percent, while that of paperboard moved up 28 percent. Although faced

Chart 2. Changes in composition of PPI weight structure, by stage of processing, December 1986



with competition from plastics and other packaging materials, the paper industry managed to develop new types of containers made from corrugated paper. The long-term prospects for growth in the U.S. pulp and paper sector continued to be good, in spite of occasional trade disputes with the Canadian forestry sector.

An interesting substitution effect occurred in the intermediate foods and feeds category. Confectionery materials gained 49 percent in relative weight, reflecting increased use of corn sweeteners such as high-fructose corn syrup in candy and soft drinks. This resulted in less use of refined sugar, which fell 50 percent, and paralleled the previously mentioned drop in raw cane sugar's relative importance 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 that exhibited major declines in relative importance were asbestos products, which fell 61 percent. Health concerns during the 1970's resulted in sharp restrictions on the use of asbestos as an insulation material.

Construction materials suffered a sharp drop in importance, because of the 1981-82 recession. Real total expenditures on residential construction in 1982 fell to their lowest level since the early 1960's. Consequently, the weight assigned to softwood lumber within the intermediate goods category dropped by nearly half, from 1.1 percent to 0.6 percent. (However, the relative importance of hardwood lumber, which is mainly used in making furniture and other durable goods rather than in construction, increased about 6 percent.) In addition, the relative weight of plywood fell nearly 30 percent and millwork registered a decrease of about 14 percent.

Among other construction materials, structural clay products showed substantial declines in importance, especially clay bricks and tiles, down nearly 50 percent. Concrete products fell about 30 percent, with the sharpest decreases occurring for block and brick. Likewise, large declines were observed for plumbing fixtures and brass fittings and for heating equipment, down 32 and 26 percent.

Basic metal industries were also particularly hard hit by the recessionary period of the early 1980's. Domestic output of raw steel in 1982 fell to the lowest level since 1958, and the steel industry reported financial losses exceeding $3 billion. Besides having to deal with reduced demand for steel resulting from the downsizing of automobiles, use of other materials, and fewer purchases of heavy machinery by American industries, U.S. steel companies in the last decade have been confronted by technologically advanced low-cost foreign steel producers. As much as 20 percent of the diminished steel market was taken by imported steel as a consequence. Thus, the relative importance of both the PPI for steel mill products and for foundry and forge shop products fell roughly one-third following the weight revision; this was one case where not only cyclical but also long-term structural changes were evident.

No clear trend existed 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 electric-related equipment categories also declined (between 10 and 25 percent), including electric lamps and bulbs, air conditioning and refrigeration equipment, motors and generators, and wiring devices. Finally, 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 beverage container deposit legislation in some States) displaced much of the market once held by the glass container industry.

Finished goods

Some of the sharpest changes in relative weights among the Finished Goods Index took place in the capital equipment area. (See chart 2.) The relative weight of communication and related equipment more than 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 advances were also shown in the relative weights for photographic equipment, ships, and aircraft.

However, heavy trucks' share of 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: locomotives, 79 percent; textile machinery and equipment, 42 percent; and railroad cars, 40 percent. Because of the change in imputation of computer prices to a higher level category, machinery and equipment, a substantial drop was also observed for office and store machines and equipment, 52 percent. Also, the relative weights for metal-forming machine tools, truck trailers, plastics machinery, and automotive maintenance equipment moved down.

Within consumer goods, one of the most dramatic shifts was the 27-percent decline for passenger cars, which now represents 6.4 percent of the finished goods category, compared to 8.8 percent under the previous weight structure. Sales of domestic cars fell to under 6 million in 1982, compared with over 9 million in 1972. During the same

period, import sales steadily climbed. This was one of the most dramatic examples of the cyclical effect on recession-sensitive industries, but it also indicates the long-term problem of the U.S. auto industry in dealing with the increased market share of foreign producers. The stronger 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 rose 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 hikes of the 1970's. Jewelry and jewelry products declined 48 percent, and mobile homes decreased 51 percent over the same period.

One of the largest gains among consumer goods was for the home electronic equipment category, where an increase of 93 percent was noted for hi-fidelity components and speakers. Sharp increases were also registered for phonograph records and prerecorded tapes, 62 percent, and televisions, 46 percent. Long-term strength in consumer demand for these products outweighed the cyclical weakness that afflicted other consumer durable goods.

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 hikes during the 1970's, and because of health concerns. In the PPI, the relative importances of both the beef and veal and the pork categories fell by 10 percent; beef and veal now accounts for under 2.2 percent of the total finished goods category, while pork accounts for about 1.5 percent.

Many Americans substituted poultry and fish for meats in their diets. The increased consumption of poultry was partly due to its relatively low prices 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. Alcoholic beverages increased 29 percent, while soft drinks advanced 11 percent. Among other foods, the proportion accounted for by salad dressings rose significantly, due in part to recent dietary trends as well as higher prices for reduced-calorie varieties. Increases also occurred for spices, frozen packaged sandwiches, and snack foods, while bakery products were 17 percent lower under the 1982 weight structure.

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 imposition of a nationwide 55-mile-per-hour speed limit, reduced demand for motor vehicle fuels from its long-term growth trend. Gasoline still accounts for about 3.6 percent of the weight of the finished goods index on the 1982 scheme, the same as under the previous weight structure. A substantial increase in home insulation efforts likewise reduced demand for home heating oil, which now represents 0.6 percent of the finished goods category, about the same as before. However, the relative importance of natural gas rose to 3.3 percent of the finished goods category, compared with 2.1 percent previously; this reflected the inclusion of interplant transfers in the PPI universe.

From 1972 to 1982, athletic footwear rose 33 percent in importance, as more costly shoes were marketed to both fitness- and fashion-conscious consumers. 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. □

FOOTNOTES

[1] The program to revise the methodology of the PPI and to expand its coverage began in the late 1970's. By January 1986, nearly all mining and manufacturing industries were represented in the PPI by indexes under the Standard Industrial Classification code (SIC) system. Unlike the traditional commodity grouping structure of the PPI, the SIC-based indexes of the PPI Revision system pay special attention to where each product is produced. Every business establishment in the United States is assigned an SIC code based on the establishment's primary source of revenue. For more information on the methodological difference between commodity-classified and industry-classified indexes or updated information on the PPI, please see the upcoming issue of the *BLS Handbook of Methods* or contact the Office of Prices and Living Conditions, Bureau of Labor Statistics.

[2] 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 understate the importance of items experiencing declines in prices. See, for example, William Mendenhall and James E. Reinmuth, *Statistics for Management and Economics*, (Duxbury Press, 1974), p. 421.

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