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Finished Commodities

since 1879

Output and its Composition

WILLIAM H. SHAW

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BETWEEN 1879 and 1939 the output of finished commodities destined for consumption within the United States increased almost eightfold. Since population increased only some two and one-half times, the per capita gain is notable. The shifts in the proportions of the various finished commodities produced are also striking. At the beginning of the period durable commodities constituted less than one-fifth of the total; at the end they constituted almost one-third. It is with these increases and shifts, as well as with short term fluctuations, that this paper is chiefly concerned.

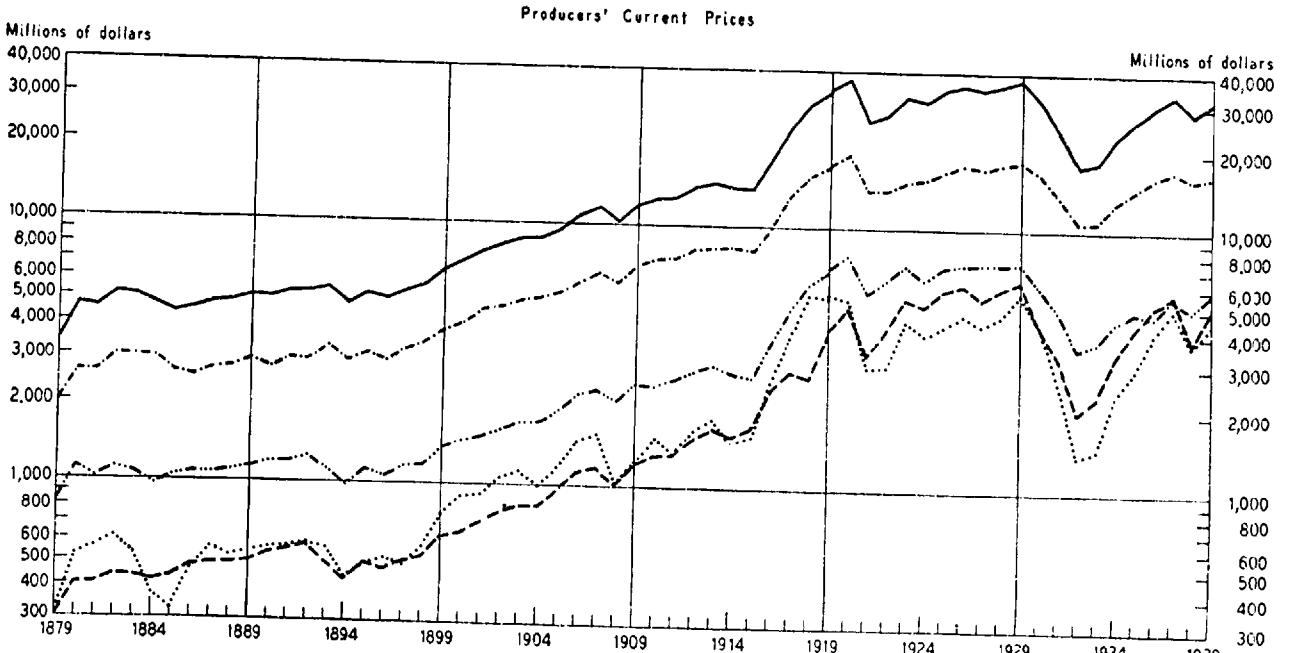
We define 'finished' commodities as all products of farming, fishing, mining, and manufacturing that have reached the stage at which they will be used by ultimate consumers without further fabrication. We consider 'finished' also such commodities as machinery and equipment intended for multiple use in production and with an average life of three or more years. But we do not include construction materials; their inclusion would of course affect both the relative importance and the variations of the durable groups.

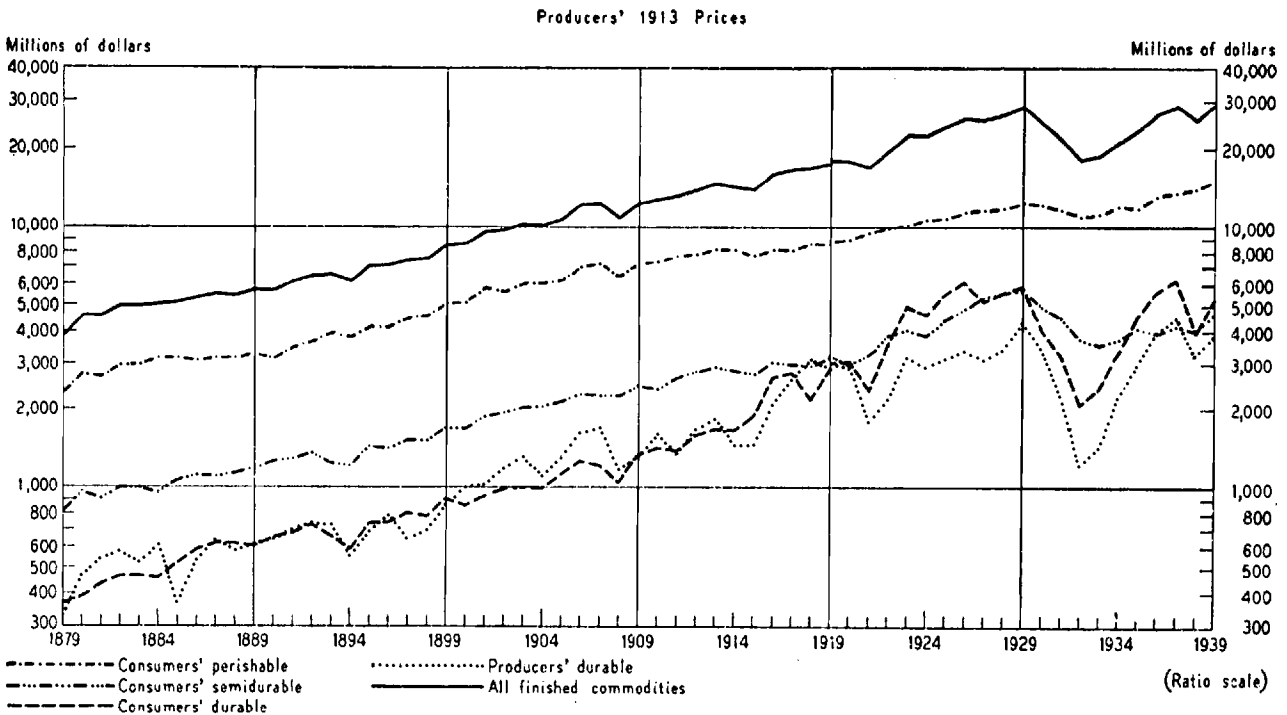
The word 'finished' does not apply solely to the degree of processing; it indicates as well the use to which an article is put. Flour, for example, is considered finished if it is to be consumed in households, in institutions, in service establishments like hotels, or in governmental agencies or enterprises; [1] it is considered unfinished if it is to be consumed

1 Although ideally commodities going to institutional and service purchasers and governmental agencies should be treated separately, the data preclude segregation or even a satisfactory estimate of the amounts involved. In most years the output of finished commodities destined for these groups has been small, but during the 1914-18 War purchases by government alone of food, clothing, and other supplies were substantial. That the repercussions of these purchases were felt also in later years is indicated by government receipts of more than a billion dollars from the resale of commodities during the early 1920's. This was a realization of approximately 50 per cent of the original cost (J. M. Clark, *The Costs of the World War to the American People*, Yale University Press, 1931, p. 54). Although these resales are

CHART 1

Output, Major Groups of Finished Commodities Destined for Domestic Consumption, 1879–1939




Producers' 1913 Prices
Millions of dollars
Millions of dollars
40,000
30,000
20,000
10,000
8,000
6,000
5,000
4,000
3,000
2,000
1,000
800
600
500
400
300
1879
1884
1889
1894
1899
1904
1909
1914
1919
1924
1929
1934
1939
Consumers' perishable
Consumers' semidurable
Consumers' durable
Producers' durable
All finished commodities
(Ratio scale)

by a factory engaged in making bread or other products for which flour is a raw material. A barrel of apples destined for home consumption is included in our estimates of finished commodities, whereas a similar barrel of apples shipped to the commercial bakery is excluded.

To differentiate between finished and unfinished commodities was often not easy, and further to classify finished commodities into detailed minor groups was sometimes difficult. These and other limitations, as well as the sources and the methods of estimate, are discussed in the Appendix.

Our estimates are in terms of manufacturers' or producers' valuation, that is, prices quoted f.o.b. factory, farm, or mine,[2] and have been corrected to exclude exports and to include imports. Two sets of prices are used: those current at the time of production (or shipment) and those prevailing during 1913.

For the estimates in current prices (Table 1 A and Chart 1) several thousand manufactured commodities and large numbers of agricultural, mineral, marine, and forest products were first classified as finished or unfinished. Finished commodities were then classified into forty-four minor groups and subgroups (Table 3). Finally, the forty-four minor groups were combined into four major groups: consumers' perishable, semidurable, and durable, and producers' durable. Consumers' perishable commodities usually last less than six months (foods, stationery, fuels, etc.); consumers' semidurable, six months to three years (clothing, shoes, light housefurnishings, etc.). Durable commodities, usually lasting more than three years, are divided into two major groups: consumers' durable (household furniture, heavy housefurnishings, passenger cars, etc.) and producers'

not covered in our estimates they are reflected indirectly in the composition of industrial output.

[2] Since our estimates are not in terms of the final cost to ultimate consumers, they are not directly comparable with those in *Commodity Flow and Capital Formation*, Vol. One, Part VIII, or in *Bulletin 74*.

durable (industrial machinery, farm equipment, office and store equipment, etc.).

The estimates in 1913 prices (Table 1 C and Chart 1) were derived by dividing the respective current price figures for each of the forty-four minor groups by appropriate price indexes and adding to make major group aggregates. Composite price indexes (Table 1 B) were then computed by dividing the major group totals in current prices by the corresponding aggregates in 1913 prices. The composite indexes therefore reflect changes in the relative importance of the minor groups within each major group.

TABLE 1

Output and Price Indexes
Major Groups of Finished Commodities Destined for Domestic Consumption, 1879, 1889–1939 [1]

	CONSUMERS'			PRODUCERS' DURABLE	ALL FINISHED COMMODITIES
	Perishable	Semi-durable	Durable		
	A OUTPUT, PRODUCERS' CURRENT PRICES				
1879	1,996	828	304	313	3,441
1889	2,906	1,133	499	513	5,081
1890	2,705	1,196	539	562	5,002
1891	2,965	1,197	557	566	5,285
1892	2,909	1,256	579	587	5,331
1893	3,314	1,124	496	566	5,500
1894	2,916	971	429	436	4,752
1895	3,119	1,115	498	496	5,228
1896	2,944	1,065	475	519	5,003
1897	3,223	1,154	506	493	5,376
1898	3,432	1,176	529	572	5,709
1899	3,821	1,374	634	757	6,586
1900	4,101	1,466	659	895	7,121
1901	4,620	1,528	719	914	7,781
1902	4,765	1,614	786	1,063	8,228
1903	5,013	1,735	826	1,129	8,703
1904	5,168	1,746	827	993	8,734
1905	5,404	1,925	955	1,167	9,451
1906	5,913	2,244	1,130	1,466	10,753
1907	6,453	2,310	1,178	1,583	11,524
1908	5,988	2,156	1,011	1,036	10,191

	CONSUMERS'			PRODUCERS' DURABLE	ALL FINISHED COMMODITIES
	Perishable	Semi-durable	Durable		
	A OUTPUT, PRODUCERS' CURRENT PRICES				
1909	6,922	2,447	1,213	1,243	11,825
1910	7,386	2,417	1,332	1,524	12,659
1911	7,491	2,571	1,339	1,348	12,749
1912	8,101	2,754	1,538	1,635	14,028
1913	8,230	2,900	1,675	1,827	14,632
1914	8,296	2,710	1,570	1,478	14,054
1915	8,080	2,636	1,700	1,570	13,986
1916	9,893	3,574	2,396	2,526	18,389
1917	13,174	4,791	2,799	3,782	24,546
1918	15,807	6,076	2,647	5,450	29,980
1919[2]	17,215	6,770	3,921	5,358	33,264
1919[2]	17,392	7,020	4,076	5,544	34,032
1920	19,236	7,873	4,899	5,277	37,285
1921	14,023	5,632	3,270	2,939	25,864
1922	14,059	6,314	4,056	2,964	27,393
1923	15,176	7,230	5,367	4,395	32,168
1924	15,574	6,401	5,034	3,948	30,957
1925	16,870	7,131	5,786	4,256	34,046
1926	17,785	7,296	6,109	4,668	35,858
1927	17,264	7,391	5,436	4,320	34,411
1928	17,911	7,383	5,936	4,662	35,892
1929	18,384	7,458	6,312	5,628	37,782
1930	16,590	6,069	4,273	4,328	31,260
1931	13,432	4,931	3,252	2,628	24,243
1932	10,755	3,526	2,047	1,399	17,727
1933	10,873	3,773	2,321	1,487	18,454
1934	12,987	4,502	3,307	2,371	23,167
1935	14,572	4,938	4,257	2,978	26,745
1936	16,239	4,776	5,158	4,085	30,258
1937	17,295	5,591	5,742	5,039	33,667
1938	16,028	5,019	3,794	3,706	28,547
1939	16,556	5,867	5,096	4,422	31,911
	B PRICE INDEXES[3]				
1879	86.6	102.2	83.2	95.4	90.4
1889	88.3	95.6	81.9	88.2	89.1
1890	86.1	94.9	82.3	87.7	87.8
1891	84.8	92.6	82.1	81.1	85.7
1892	79.8	92.6	79.2	80.0	82.4
1893	84.7	90.5	74.8	78.4	84.1

	CONSUMERS'			PRODUCERS' DURABLE	ALL FINISHED COMMODITIES
	Perishable	Semi-durable	Durable		
	B PRICE INDEXES [3]				
1894	76.3	80.5	72.3	78.2	76.9
1895	75.0	77.1	67.4	72.2	74.4
1896	70.9	75.5	63.8	66.1	70.6
1897	72.0	75.5	63.0	75.9	72.1
1898	74.9	77.3	67.5	82.5	75.3
1899	75.4	81.0	70.0	88.1	77.2
1900	80.2	86.7	77.0	90.0	82.3
1901	79.6	81.9	77.5	88.9	80.9
1902	84.1	83.5	79.9	89.7	84.2
1903	83.3	86.0	82.7	86.2	84.1
1904	85.5	86.0	83.5	88.8	85.8
1905	86.9	90.5	85.3	89.7	87.8
1906	84.9	98.2	89.1	90.6	88.6
1907	89.7	102.6	97.7	93.6	93.4
1908	92.3	96.0	96.6	89.3	93.1
1909	96.9	99.3	90.4	94.3	96.4
1910	100.0	100.9	93.5	95.3	98.8
1911	96.2	97.4	95.8	99.1	96.7
1912	102.8	98.6	96.2	97.6	100.6
1913	100.0	100.0	100.0	100.0	100.0
1914	101.4	96.5	94.4	100.3	99.5
1915	103.7	96.5	90.3	106.4	100.7
1916	120.6	117.6	90.4	120.5	115.0
1917	161.1	161.0	100.8	145.5	148.5
1918	182.8	206.2	121.9	175.7	177.7
1919 [2]	199.9	212.4	136.4	185.0	189.3
1919 [2]	196.5	219.0	134.5	184.1	188.0
1920	213.4	265.6	157.8	181.0	207.2
1921	146.5	173.8	139.8	164.5	152.7
1922	141.2	163.2	113.4	135.2	139.8
1923	147.7	177.6	108.2	138.7	143.1
1924	143.5	164.9	108.5	131.8	138.8
1925	154.3	160.0	103.3	135.0	141.0
1926	154.3	150.4	98.8	138.4	138.3
1927	146.9	137.4	104.0	138.5	135.1
1928	150.0	131.7	105.4	136.5	134.9
1929	147.4	130.7	106.4	131.1	133.0
1930	135.1	122.0	104.3	125.6	126.0
1931	114.1	109.2	99.8	117.2	111.3
1932	96.7	93.6	98.0	112.9	97.3
1933	95.0	105.0	96.8	104.6	97.9
1934	107.8	120.6	98.5	107.6	108.6

	CONSUMERS'			PRODUCERS' DURABLE	ALL FINISHED COMMODITIES
	Perishable	Semi-durable	Durable		
	B PRICE INDEXES[3]				
1935	122.4	119.2	93.6	99.6	113.4
1936	122.6	120.6	90.8	102.0	112.5
1937	126.4	132.6	91.9	112.1	117.5
1938	113.3	121.2	95.3	114.3	112.4
1939	107.9	126.2	97.0	116.1	109.9
	C OUTPUT, PRODUCERS' 1913 PRICES				
1879	2.304	810	365	328	3.807
1889	3.291	1.185	609	615	5.700
1890	3.143	1.260	651	611	5.698
1891	3.197	1.292	678	697	6.164
1892	3.646	1.356	731	731	6.467
1893	3.912	1.243	663	721	6.539
1894	3.822	1.207	593	557	6.179
1895	4.158	1.446	737	687	7.028
1896	4.151	1.410	744	787	7.092
1897	4.476	1.528	803	649	7.456
1898	4.581	1.521	782	693	7.577
1899	5.069	1.698	905	858	8.530
1900	5.114	1.690	851	995	8.653
1901	5.802	1.865	926	1.028	9.621
1902	5.668	1.933	983	1.184	9.768
1903	6.021	2.016	998	1.310	10.345
1904	6.042	2.031	989	1.118	10.180
1905	6.216	2.128	1.118	1.301	10.763
1906	6.968	2.286	1.266	1.618	12.138
1907	7.190	2.251	1.206	1.691	12.338
1908	6.488	2.246	1.046	1.161	10.911
1909	7.141	2.465	1.341	1.318	12.265
1910	7.389	2.396	1.424	1.599	12.808
1911	7.785	2.639	1.398	1.359	13.181
1912	7.879	2.791	1.599	1.671	13.916
1913	8.230	2.900	1.675	1.827	14.632
1914	8.184	2.807	1.664	1.474	14.129
1915	7.793	2.732	1.883	1.475	13.883
1916	8.204	3.040	2.651	2.095	15.990
1917	8.179	2.976	2.777	2.599	16.531
1918	8.650	2.917	2.171	3.102	16.870
1919[2]	8.612	3.188	2.875	2.896	17.571
1919[2]	8.850	3.206	3.030	3.012	18.098

	CONSUMERS'			PRODUCERS' DURABLE	ALL FINISHED COMMODITIES
	Perishable	Semi-durable	Durable		
	OUTPUT, PRODUCERS' 1913 PRICES				
1920	9.014	2.964	3.105	2.916	17.999
1921	9.574	3.240	2.340	1.786	16.940
1922	9.959	3.868	3.577	2.192	19.596
1923	10.274	4.072	4.962	3.170	22.478
1924	10.854	3.882	4.639	2.929	22.304
1925	10.936	4.158	5.598	3.152	24.144
1926	11.528	4.850	6.184	3.374	25.936
1927	11.755	5.377	5.227	3.119	25.478
1928	11.944	5.605	5.631	3.416	26.599
1929	12.472	5.707	5.932	4.294	28.405
1930	12.279	4.974	4.096	3.463	24.812
1931	11.774	4.517	3.257	2.242	21.790
1932	11.124	3.765	2.090	1.239	18.218
1933	11.444	3.594	2.398	1.421	18.857
1934	12.047	3.733	3.358	2.203	21.341
1935	11.903	4.143	4.518	2.991	23.585
1936	13.215	3.960	5.681	4.005	26.891
1937	13.684	4.217	6.250	4.194	28.645
1938	14.144	4.041	3.981	3.242	25.408
1939	15.348	4.649	5.255	3.809	29.061

[1] Estimates were made also for the years between 1879 and 1889, but because of their lower order of reliability, are used only for computing average annual rates of growth over the entire sixty years and decade averages in later tables.

[2] Since the series for the years after 1919 are not strictly comparable with those for earlier years, two sets of figures are given for 1919. The differences are so small as to allow the series to be considered approximately continuous.

[3] The selection of 1913 as a base is not to be construed as indicating a normal year; that year was chosen because it fell almost at the center of the period and because many of the available price indexes were already on a 1913 base.

Rates of Growth and Changes in Composition

In current prices the total output of finished commodities increased from 1879 to 1939 at an annual rate of 4 per cent; the long term rise in the price index of all finished commodities reduced the rate to 3.2 per cent in 1913 prices (Table 2). But even the lower rate means a doubling of output every 22 years. Meanwhile, population was increasing at an average annual rate of only 1.3 per cent; in other words, it rose only 260 per cent in 60 years.

The rates for both durable groups exceed considerably those for the nondurable, and the rate for consumers' durable is highest of all. Growing at an average annual rate of 5 per cent, consumers' durable commodity output in current prices gained more than one-third again as rapidly as nondurable. Measurement in 1913 prices removes the long term price rises of some 10 to 20 per cent, thereby reducing the rates of growth of all groups. Nevertheless, since durable commodities rose less in price than other commodities, the intergroup differences are greater. The rate of 4.7 per

TABLE 2

Average Annual Rate of Growth, 1879–1939 and Percentage Distribution, 1879, 1939, 1879–1888, and 1929–1938, Output of Finished Commodities

	CONSUMERS'			PRODUCERS' DURABLE	ALL FINISHED COMMODITIES
	Perishable	Semidurable	Durable		
	PRODUCERS' CURRENT PRICES				
Avg. annual rate of growth, 1879–1939	+3.7	+3.7	+5.0	+4.3	+4.0
% Distribution					
1879	58.0	24.1	8.8	9.1	100.0
1939	51.8	18.4	16.0	13.8	100.0
Absolute change	−6.2	−5.7	+7.2	+4.7	
% Distribution					
Avg. 1879–88	57.8	22.6	9.3	10.4	100.0
Avg. 1929–38	54.1	18.6	14.9	12.4	100.0
Absolute change	−3.6	−4.0	+5.6	+2.0	
	PRODUCERS' 1913 PRICES				
Avg. annual rate of growth, 1879–1939	+2.9	+2.9	+4.7	+3.6	+3.2
% Distribution					
1879	60.5	21.3	9.6	8.6	100.0
1939	52.8	16.0	18.1	13.1	100.0
Absolute change	−7.7	−5.3	+8.5	+4.5	
% Distribution					
Avg. 1879–88	59.6	20.4	10.0	10.0	100.0
Avg. 1929–38	52.2	17.9	17.5	12.4	100.0
Absolute change	−7.4	−2.5	+7.5	+2.4	

cent for consumers' durable products in 1913 prices, which is only slightly below that for output in current prices, is almost two-thirds higher than the rates for the nondurable groups, which fall far short of the corresponding rates in current prices.

The higher rates for the durable groups mean that commodities in these categories increased in relative importance over the six decades (Table 2). The share of consumers' durable products alone in current prices rose from 8.8 per cent in 1879 to 16.0 per cent in 1939; in 1913 prices from 9.6 to 18.1 per cent; that of producers' durable rose from 9.1 to 13.8 and 8.6 to 13.1 in current and 1913 prices respectively. Similar shifts are observed when terminal decades are compared, although for the decade 1929-38, which includes the great depression, they are somewhat less pronounced.[3]

From the shifts in the composition of total output it may be inferred that the productive structure of the economy changed fundamentally. Some understanding of the changes is gained through study of the more detailed commodity classification in Table 3. Here it is apparent immediately that most of the increase in total consumers' durable commodities was due not to a rise in the output of older products but to the remarkable development of three new classes: automotive equipment, household electrical appliances, and radios. To some extent these new classes may be said to have superseded some older ones—motor vehicles and parts taking the place of horse-drawn vehicles; [4] electrical appliances, of non-electrical; radios, of musical instruments and phono-

3 Inclusion of transportation charges and distributive mark-ups reduces the percentage share of the producers' durable group. For the decade 1929-38 the four commodity groups, measured at final cost to ultimate consumers in current prices, averaged 54.8, 20.8, 14.5, and 9.9 per cent of the total. The importance of producers' durable commodities would thus seem to be slightly exaggerated by measurement at producers' prices instead of final cost. But the effects on the relative movements of the various groups are probably very small.

4 Motor vehicles were used also in place of railroad equipment.

TABLE 3

Output of Finished Commodities by Major and Minor Groups
Averages for 1879 and 1889, 1929 and 1939
Producers' Current Prices

	MILLIONS OF DOLLARS		PERCENTAGE DISTRIBUTION	
	1879 and 1889	*1929 and 1939*	*1879 and 1889*	*1929 and 1939*
Consumers' Perishable, Total	2,450.9	17,419.8	57.52	50.04
1a Food & kindred prod., mfd.	1,198.6	9,279.8	28.13	26.66
1b Food & kindred prod., nonmfd.	836.6	3,770.6	19.63	10.83
2 Cigars, cigarettes, & tobacco	161.1	1,283.8	3.78	3.69
3 Drug, toilet, & household preparations	61.0	934.0	1.43	2.68
4 Magazines, newspapers, stationery & supplies & misc. paper prod.	77.7	611.2	1.82	1.84
5a Fuel & lighting prod., mfd.	49.6	1,219.6	1.16	3.50
5b Nonmfd. fuels	66.4	290.8	1.56	0.84
Consumers' Semidurable, Total	980.6	6,662.9	23.01	19.14
6 Dry goods & notions	272.4	766.2	6.39	2.20
7 Clothing & personal furnishings	459.5	3,993.4	10.78	11.47
8 Shoes & other footwear	204.9	929.2	4.81	2.67
9 Housefurnishings (semidurable)	24.2	403.0	0.57	1.16
10 Toys, games, & sporting goods	19.6	216.4	0.46	0.62
11 Tires & tubes		354.6		1.02
Consumers' Durable, Total	401.8	5,704.0	9.43	16.39
12 Household furniture	79.3	531.6	1.86	1.53
13a Heating & cooking apparatus & household appliances, except electrical	31.0	317.5	0.73	0.91
13b Electrical household appliances & supplies		255.2		0.73
13c Radios		280.2		0.80
14 Housefurnishings (durable)	77.2	625.8	1.81	1.80
15 China & household utensils	38.8	255.5	0.91	0.73
16 Musical instruments	21.2	79.9	0.50	0.23
17 Jewelry, silverware, clocks & watches	58.9	332.8	1.38	0.96
18 Printing & publishing: books	26.8	169.9	0.63	0.49
19 Luggage	8.9	55.2	0.21	0.16
20a Passenger vehicles, motor		2,149.9		6.18
20b Motor vehicle accessories		490.4		1.41
20c Passenger vehicles, horse-drawn, & accessories	44.6	...[1]	1.05	...[1]
21 Motorcycles & bicycles	1.0	20.8	0.02	0.06
22 Pleasure craft	1.2	22.7	0.03	0.07
23 Ophthalmic products & artificial limbs	1.6	74.4	0.04	0.21
24 Monuments & tombstones	11.4	42.2	0.27	0.12

		MILLIONS OF DOLLARS		PERCENTAGE DISTRIBUTION	
		1879 and 1889	*1929 and 1939*	*1879 and 1889*	*1929 and 1939*
	Producers' Durable, Total	427.8	5,025.3	10.04	14.44
25a	Industrial machinery & equipment	141.6	1,802.8	3.32	5.18
25b	Tractors		140.1		0.40
26	Electrical equipment, industrial & commercial	7.5	789.0	0.18	2.27
27	Farm equipment	75.6	465.9	1.77	1.34
28	Office & store machinery & equipment	5.9	191.4	0.14	0.56
29	Office & store furniture & fixtures	20.8	235.7	0.49	0.68
30	Locomotives & rr. cars	61.8	199.9	1.45	0.57
31	Ships & boats	22.0	158.8	0.52	0.46
32a	Business vehicles, motor		471.3		1.35
32b	Business vehicles, horse-drawn	23.2	...[1]	0.54	...[1]
33	Aircraft		73.4		0.21
34	Professional & scientific equipment	2.2	80.2	0.05	0.23
35	Carpenters & mechanics' tools	17.1	102.0	0.40	0.29
36	Misc. subsidiary durable equipment	50.2	311.8	1.18	0.90
	All Finished Commodities	4,261.0	34,812.0	100.00	100.00

[1] Included with farm equipment.

graphs. But they soon came to exceed in value of output the peaks previously reached by the older classes. The value of passenger cars and replacement parts averaged more than $2.6 billion or almost 8 per cent of all finished commodities in 1929 and 1939. The contribution of electrical appliances and radios was smaller; their average value in 1929 and 1939, $535 million, constituted only 1.5 per cent of total output.

The rise of the automotive industry not only altered the composition of the consumers' durable group but also was reflected in the other major commodity groups: in the perishable group, by the pronounced rise in manufactured petroleum products, in the semidurable, by that in tires and tubes, and in the producers' durable group, by the more obvious increases in trucks and tractors and by the partly concealed increases in the machinery group that must have resulted from the demand for special automotive machinery and tools. No automotive products were made in 1879 and

1889; by 1929 and 1939 they constituted 20 per cent of total finished output.

This tremendous growth takes on added importance when it is recalled that passenger cars and the larger electrical appliances are commodities that can be sold in large quantities only when purchasing power and the material standard of living are relatively high. Moreover, to the degree that their purchase can be postponed readily, their production is subject to rather violent fluctuations. If they make up an important segment of total output, their fluctuations have serious repercussions on the economy as a whole.

Other intragroup shifts also influenced the major groups during the long period. In recent decades the relatively greater consumption of processed foods and the marked rise in drug, toilet, and household preparations all helped to maintain the share of the perishable group. In the semidurable group the relatively greater production of ready-made clothing is suggested by the decline in the relative standing of the dry goods group and by the relative stability of the clothing group. The share of the shoe group declined, that of light housefurnishings increased. Within the consumers' durable group many of the old-line commodities at least held their own.

Notable in the producers' durable group is the long term rise in the output of electrical equipment. From $7 million, or less than .2 per cent of average total output in 1879 and 1889, it rose to almost $800 million, or 2.3 per cent of average total output in 1929 and 1939. Together with the increases in the output of machinery and of trucks and tractors, this growth is chiefly responsible for the larger share of the producers' durable group in recent decades.

Variations from Decade to Decade

The measures thus far presented are essentially of differences between two still photographs—the one taken at the beginning of the period, the other at the end. To understand

these differences we must examine the regularity and continuity of the changes through the decades. Were they gradual or erratic? How much did they vary from one decade to the next? When were the greatest and smallest changes?

For this analysis successive ten-year averages with five-year overlaps, periods long enough to damp cyclical and random fluctuations yet short enough to reveal the relative persistence of trends, are used. True, the terminal years of the decades may fall in different phases of business cycles, thereby failing to minimize the influence of cyclical fluctuations. But experimentation with other time units indicated movements similar to those in the decade averages.[5]

If the long run movements in total output and in its components and in the corresponding price indexes were characterized by constant or uniformly changing rates, the lines in Charts 2 and 3 would either remain horizontal or move upward or downward in unison. But they do neither. For total output in current prices the per year rate of change is less than 2.0 from the first to the second decade average; rises to 6.7 for the interval 1894-1903 to 1899-1908; declines again to 5.5 during the next interval; resumes its rise to a peak of 9.0 for 1909-18 to 1914-23; and becomes negative in the last two decades (Table 4 and Charts 2 and 3).

In view of the changes in price levels, which in the past have extended over long periods and been pronounced, these movements are not unexpected. Indeed, as Chart 2 indicates, the rates of change in total output in current prices and in the price index of all finished commodities have a closely related pattern, which suggests that fluctuations in the latter contribute substantially to fluctuations in

5 E.g., when we used peak years of business cycles as terminal years and stayed as close to decades as possible, we found that the periods varied from 8 to 12 years in length. The movements of the averages for these periods resembled those of the averages for the arbitrary decades upon which this discussion is based.

TABLE 4

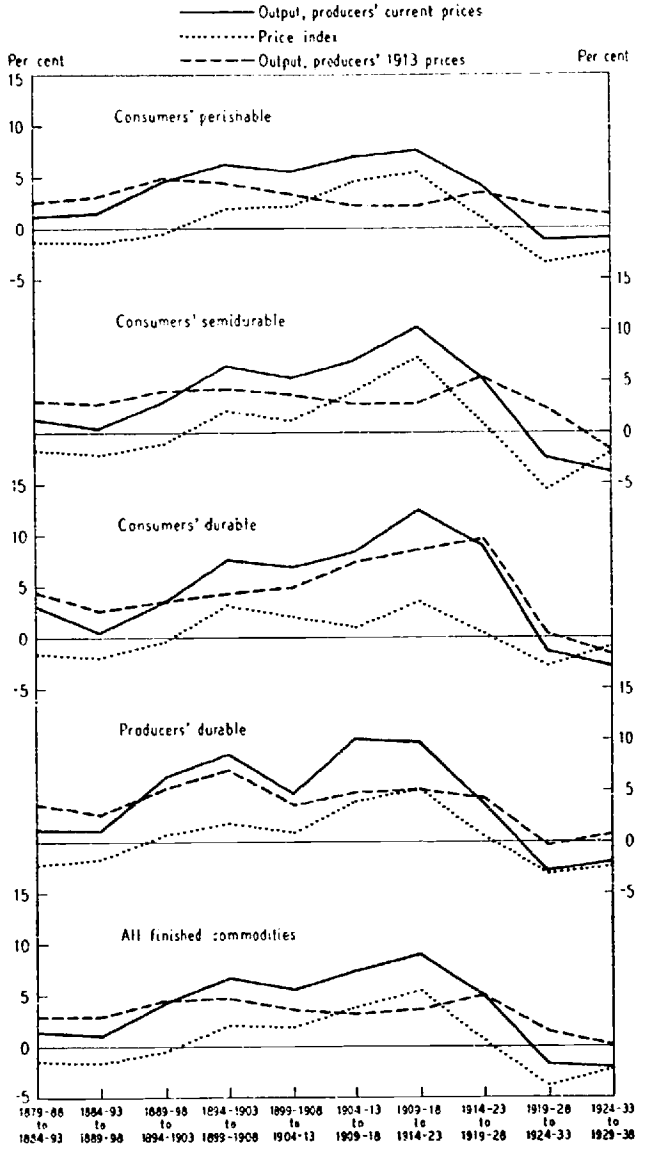
Change per Year from One Overlapping Decade to the Next in the Output of Finished Commodities and in the Price Indexes

	1879–88 to 1884–93	*1884–93 to 1889–98*	*1889–98 to 1894–1903*	*1894–1903 to 1899–1908*	*1899–1908 to 1904–13*	*1904–13 to 1909–18*	*1909–18 to 1914–23*	*1914–23 to 1919–28*	*1919–28 to 1924–33*	*1924–33 to 1929–38*
PRODUCERS' CURRENT PRICES										
Consumers' Perishable	1.2	1.5	4.5	6.2	5.5	6.9	7.6	4.1	—1.2	—1.1
Consumers' Semidurable	1.4	0.4	3.0	6.5	5.3	7.0	10.3	5.4	—2.5	—3.8
Consumers' Durable	3.1	0.5	3.5	7.6	6.9	8.3	12.4	8.9	—1.4	—2.8
Producers' Durable	1.2	1.1	6.4	8.6	4.7	10.1	9.8	3.7	—2.8	—2.0
All Finished Commodities	1.4	1.1	4.3	6.7	5.5	7.4	9.0	5.0	—1.7	—2.0
PRICE INDEXES										
Consumers' Perishable	—1.3	—1.4	—0.6	1.8	2.1	4.5	5.4	1.0	—3.4	—2.5
Consumers' Semidurable	—1.7	—2.2	—1.1	2.1	1.7	3.9	7.3	0.9	—5.6	—2.0
Consumers' Durable	—1.6	—2.0	—0.4	3.1	2.0	1.0	3.4	0.4	—2.7	—1.0
Producers' Durable	—2.3	—1.7	0.7	1.8	0.9	3.9	5.1	0.5	—3.0	—2.4
All Finished Commodities	—1.5	—1.7	—0.5	2.0	1.9	3.8	5.4	0.6	—3.8	—2.1
PRODUCERS' 1913 PRICES										
Consumers' Perishable	2.5	3.1	4.8	4.4	3.3	2.2	2.2	3.4	2.1	1.3
Consumers' Semidurable	3.1	2.8	4.0	4.3	3.7	2.8	2.8	5.4[1]	2.4	—1.8
Consumers' Durable	4.5	2.6	3.5	4.3	4.9	7.3	8.5	9.6[1]	0.3	—1.6
Producers' Durable	3.7	2.7	5.2	7.0	3.6	4.8	5.1	4.2[1]	—0.3	0.7
All Finished Commodities	2.9	2.9	4.5	4.7	3.6	3.2	3.6	5.0[1]	1.5	0.1

[1] What seems to be an inconsistency between the rates of change for output in current prices and those for output in 1913 prices, in view of the price changes in this period, is due to the method of calculation. The ten-year averages upon which the rates of change for output in 1913 prices are based are aggregates of single years; they are not obtained by dividing the ten-year averages of output in current prices by the ten-year averages of the price indexes.

CHART 2

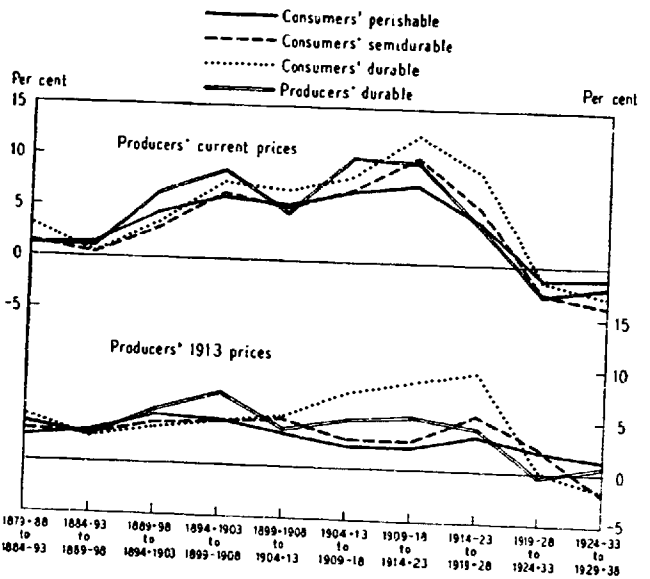
Change per Year from One Overlapping Decade to the Next in the Output of Finished Commodities and in the Price Indexes



the former. How much may be seen by comparing the deviations from the mean rates of change for the entire period. For total output in current prices the mean rate of change is 3.67; the average deviation of the decade rates, signs disregarded, is 3.18; for the price index the mean rate of change is 0.41 and the average deviation 2.33. For output in 1913 prices the variability is greatly reduced: from a mean rate of 3.20 the average deviation is only 1.08. In some decades, moreover, the fluctuation in the price index exceeds that for output in current prices; when price fluctuations are eliminated, the rate of change in output is reversed. For example, the rate for total output in current prices rises from the interval 1899-1908 to 1904-13 to a peak in the interval 1909-18 to 1914-23; in 1913 prices the rate declines in the interval

CHART 3

Change per Year from One Overlapping Decade to the Next in the Output of Finished Commodities Producers' Current and 1913 Prices



following 1899-1908 to 1904-13 and does not reach its peak until the interval 1914-23 to 1919-28.

The rates for the four major commodity groups show similarities as well as differences in behavior. First, as in the case of total output in current prices and in the price index of all finished commodities, there is marked correspondence between the patterns of output and prices traced by the rates for each group. Both sets (except prices of perishable commodities) reach an early peak in 1894-1903 to 1899-1908; decline to a temporary trough in the next or second following interval; rise to another and more pronounced peak in 1909-18 to 1914-23 (except producers' durable commodities in current prices, which reach a peak in the preceding interval); and decline precipitously thereafter.

Second, since in the output of all four groups in current prices, as in total output on the same basis, fluctuations in the rates for the price indexes contribute appreciably to fluctuations in the rates of change, the rates for output in

TABLE 5

Arithmetic Average of Changes per Year from Overlapping Decade to Overlapping Decade in the Output of Finished Commodities and in the Price Indexes

	CONSUMERS'			PRODUCERS' DURABLE	ALL FINISHED COMMODITIES
	Perishable	Semi-durable	Durable		
	OUTPUT, PRODUCERS' CURRENT PRICES				
Arithmetic avg.	3.52	3.30	4.70	4.08	3.67
Avg. deviation	2.74	3.60	4.12	3.84	3.18
	PRICE INDEXES				
Arithmetic avg.	0.56	0.33	0.22	0.35	0.41
Avg. deviation	2.40	2.85	1.76	2.16	2.33
	OUTPUT, PRODUCERS' 1913 PRICES				
Arithmetic avg.	2.93	2.95	4.39	3.67	3.20
Avg. deviation	0.87	1.15	2.57	1.60	1.08

Based on Table 4.

1913 prices fluctuate much less. However, the degree to which movements in the price indexes make for diverse patterns in the long term movements of output in current prices differs significantly among the four commodity groups (Table 5). The rates of change in the price index of consumers' durable products vary least from decade to decade; and the consequent reduction in the fluctuations of the rates for consumers' durable output in 1913 prices is smaller than for any other group. Despite the narrower fluctuations of the rates for each group, the intergroup variability of output in 1913 prices is marked. In the perishable group the average deviation is especially low; and while the order of increasing variability (perishable, semidurable, producers' durable, consumers' durable) is the same for output in both current and 1913 prices, the range of the average deviations in the latter is from 0.9 to 2.6; from 2.7 to 4.1 in the former.

Finally, the patterns of the rates for output in 1913 prices and in current prices resemble each other in varying degree. In the two durable groups the fluctuations are more or less parallel; in the nondurable groups there are significant divergences. Consequently, the divergence in total output is attributable chiefly to the perishable and semidurable groups.

If the output of the four commodity groups each had changed at the same rate from one overlapping decade to the next, so that the groups retained their relative positions, the percentage share accounted for by each would have remained constant. That this did not happen indicates that important shifts occurred from decade to decade in the shares (Table 6). Even for output in current prices, in which the similarity in the fluctuations in the rates for the price indexes tends to make the rates of change in output similar, there are differences in pattern; in 1913 prices, the differences among the four groups are greater.

In any attempt to interpret the shifts, the interdependence of the percentages must not be forgotten. A change in one

TABLE 6

Percentage Distribution of Output, Successive Overlapping Decades

	1879–88	*1884–93*	*1889–98*	*1894–1903*	*1899–1908*	*1904–13*	*1909–18*	*1914–23*	*1919–28*	*1924–33*	*1929–38*
					PRODUCERS' CURRENT PRICES						
Percentage Distribution											
Consumers' Perishable	57.8	57.1	58.2	58.9	57.5	57.5	56.0	52.5	50.4	51.7	54.1
Consumers' Semidurable	22.6	22.6	21.8	20.5	20.3	20.1	19.7	20.9	21.2	20.4	18.6
Consumers' Durable	9.3	10.1	9.8	9.4	9.8	10.5	10.9	12.7	15.2	15.5	14.9
Producers' Durable	10.4	10.3	10.2	11.3	12.4	11.9	13.4	13.9	13.1	12.4	12.4
Absolute Changes from One Overlapping Decade to the Next											
Consumers' Perishable		—0.7	+1.1	+0.7	—1.4	0.0	—1.5	—3.5	—2.1	+1.3	+2.4
Consumers' Semidurable		0.0	—0.8	—1.3	—0.2	—0.2	—0.4	+1.2	+0.3	—0.8	—1.8
Consumers' Durable		+0.8	—0.3	—0.4	+0.4	+0.7	+0.4	+1.8	+2.5	+0.3	—0.6
Producers' Durable		—0.1	—0.1	+1.1	+1.1	—0.5	+1.5	+0.5	—0.8	—0.7	0.0
					PRODUCERS' 1913 PRICES						
Percentage Distribution											
Consumers' Perishable	59.6	58.3	58.7	59.4	58.7	57.9	55.1	51.4	47.7	49.1	52.2
Consumers' Semidurable	20.4	20.5	20.4	19.8	19.5	19.6	19.2	18.5	18.9	19.8	17.9
Consumers' Durable	10.0	10.8	10.6	10.1	10.0	10.6	12.9	16.3	20.2	19.0	17.5
Producers' Durable	10.0	10.4	10.3	10.6	11.9	11.9	12.8	13.8	13.2	12.1	12.4
Absolute Changes from One Overlapping Decade to the Next											
Consumers' Perishable		—1.3	+0.4	+0.7	—0.7	—0.8	—2.8	—3.7	—3.7	+1.4	+3.1
Consumers' Semidurable		+0.1	—0.1	—0.6	—0.3	+0.1	—0.4	—0.7	+0.4	+0.9	—1.9
Consumers' Durable		+0.8	—0.2	—0.5	—0.1	+0.6	+2.3	+3.4	+3.9	—1.2	—1.5
Producers' Durable		+0.4	—0.1	+0.8	+1.3	0.0	+0.9	+1.0	—0.6	—1.1	+0.3

percentage—occasioned by a relative retardation or acceleration in the rate of output of one commodity group—is necessarily accompanied by proportionate changes in the others. Although we summarize the major movements in the shares of all groups, we believe that the greater part of what may be termed the controlling changes has its source in the durable, i.e., that variations in the shares of the nondurable reflect primarily changes in the output of durable commodities.

In current prices the share of the perishable group hovered between 57 and 59 per cent through 1904-13. Sizeable declines then took place, especially from 1909-18 to 1914-23 and from 1914-23 to 1919-28. Although in the final two overlapping decades, both of which include years of severe depression, the share of perishable products recovered somewhat, it did not reach even the 1909-18 level. In 1913 prices the long term relative decline is accentuated: from an average share of 59.6 for 1879-88, the perishable group fell almost continuously to 47.7 by 1919-28.

The share of the semidurable group traces a less definite pattern. In current prices it decreased slightly but without interruption through 1909-18, increased slightly during the next two intervals, then declined further. Price adjustments moderate even these rather mild fluctuations. A tendency to decline still persists in the share measured in 1913 prices, but with the exception of the fairly sharp falling off from 1924-33 to 1929-38, there are no large overlapping decade shifts.

As indicated, the more significant as well as the more striking shifts in the composition of total output are the increased shares of the durable groups, especially consumers' durable. In current prices the average share of consumers' durable rose from less than 10 per cent in the early decades to more than 15 in the later. But this substantial gain was not gradual: the greater part occurred in the single decade 1919-28. For 1909-18 the average share was 10.9 per cent; for 1919-28 it was 15.2. Moreover, despite the severe curtailment in production during the depression of the 1930's,

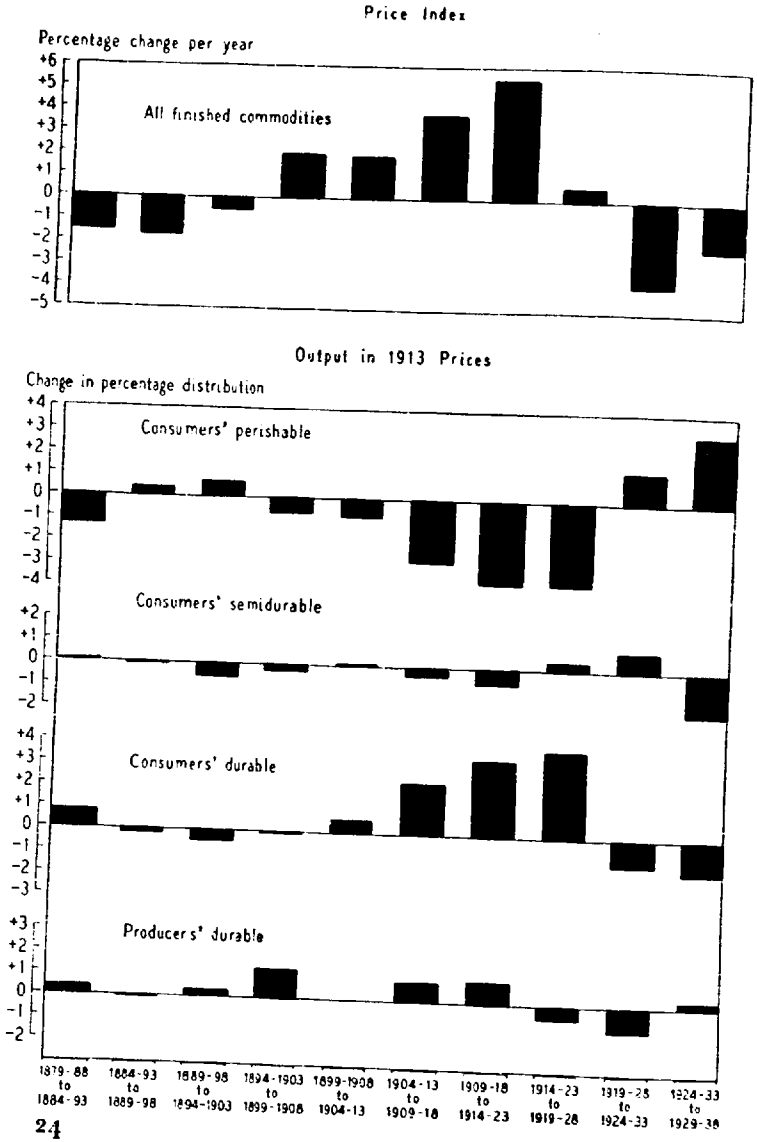
consumers' durable commodities continued to average about 15 per cent of total output. In 1913 prices the advances are even more notable. After hovering around 10 per cent through 1904-13, the average share increased to almost 13 for 1909-18, to 16 for 1914-23, and for 1919-28, to more than 20. Even though the ensuing relative decline was slightly more marked than when measured in current prices, the consumers' durable group still averaged 17.5 per cent during 1929-38. Throughout the entire sixty years the percentages for the shares in 1913 prices are higher than in current prices —a reflection of a price differential in favor of consumers' durable commodities. This was especially true during 1919-28 when consumers' durable commodities in 1913 prices constituted almost one-fifth of total output, although in current prices they made up less than one-sixth.

The share of producers' durable commodities also gained, but not as much as consumers' durable. Moreover, the gains were spread fairly evenly; in the shares in current prices there was a gradual rise from between 10 and 11 to between 13 and 14 per cent of total output. Perhaps the chief feature was that the peak shares were attained in the decades that include the war years. After a slight decline the average share settled at between 12 and 13 per cent. Although correction for price changes does not affect the average share appreciably, it does enhance the relative rise. Furthermore, in 1913 prices the share reached peak proportions not during the war but immediately after, an indication that its wartime increase in current prices was due chiefly to advances in prices.

Shares of nondurable groups vary inversely, and those of durable groups directly, with rises and declines in the rates at which prices changed. Such negative and positive correlation between the shifts in composition measured in 1913 prices and the rates of change in the price index of all finished commodities (Chart 4), especially high for perishable and consumers' durable output respectively, indicates

CHART 4

Change per Year from One Overlapping Decade to the Next in the Price Index of All Finished Commodities compared with Changes in the Percentage Distribution of Output in 1913 Prices



that during periods of more sharply rising (or falling) prices the output of commodities for which demand is more postponable expands (or contracts) more rapidly than the output of commodities for which demand is less postponable.

To summarize: until 1914 total output of finished commodities did not change appreciably in composition. The concentration of gain in the share of durable goods in 1919-28 emphasizes how much large scale production of automobiles and electrical appliances affected the economy. The great depression of the 1930's was the first major interruption to the long term rise in the relative importance of durable commodities. Whether this interruption was a natural sequence of excessive acceleration in the 1920's or the beginning of a period in which the durable groups will not better their position—war and post-war activity excepted—is difficult to determine. Undoubtedly during the next few years the composition of commodity output will be determined largely by armament production.

Average Behavior during Business Cycles

How did the output and price series behave during reference cycles?[6] What were the average fluctuations and how well

[6] Because of the uncertain reliability of our annual estimates before 1889 we confine our analysis to the thirteen complete cycles since that year. The reference cycle dates, i.e., the turning points in the business activity of the economy as a whole, established in the National Bureau study of business cycles, give the following trough and peak years: trough—1891, 1894, 1896, 1900, 1904, 1908, 1911, 1914, 1919, 1921, 1924, 1927, 1932, and 1938; peak—1892, 1895, 1899, 1903, 1907, 1910, 1913, 1918, 1920, 1923, 1926, 1929, and 1937. A full explanation of the derivation of these dates, together with an exhaustive treatment of the problems of business cycle measurement, will appear in a National Bureau monograph by Wesley C. Mitchell and Arthur F. Burns: *Methods of Measuring Cyclical Behavior.*

In interpreting our results the reader should keep in mind the limitations of annual series, which are less trustworthy than quarterly or monthly for revealing cyclical behavior. Mild contractions, for example, are likely to be concealed when the secular trend is rising. Moreover, since annual series average and cancel fluctuations within each year, both amplitude and conformity tend to be less than in monthly data.

did the series conform to cycle turning points? Were there any long term tendencies in the amplitude of fluctuation or in the apparent conformity?

The measures of amplitude and conformity with which we attempt to answer these questions are not difficult to derive. In order that the series may be presented in comparable form, the values at the initial trough, the peak, and the terminal trough of each reference cycle are expressed as percentages of the average value for the entire cycle.[7] The differences among these percentages, or reference cycle relatives, measure the total relative amplitude during expansions and contractions. But since the phases as well as the complete cycles vary in length, the changes in the reference cycle relatives must be placed on an annual basis before meaningful comparisons of amplitude can be made.

Yet averages of per year changes fail to measure the consistency with which a series responds to the beginning and end of cyclical expansions and contractions, as defined by the reference cycle dates. For that purpose we use the indexes of conformity in the last columns of Tables 7, 8, and 9, which take account of direction but not of magnitude. These were derived, first, by crediting a series with + 100 for every rise during an expansion or decline during a contraction, with − 100 for every decline during an expansion or rise during a contraction, and with 0 when there is no change; and, second, by taking an arithmetic mean of all the entries.

The indexes for the complete business cycle are based on the total average swings.[8] They are usually higher than if we had averaged the corresponding expansion and contrac-

[7] This is a simplified description. For example, to avoid overweighting the trough years, the value for each reference trough year is given one-half weight, for when cycles are measured from trough to trough the terminal trough of one cycle is always the initial trough of the succeeding cycle.

[8] Separate indexes are computed from the trough-to-trough and from the peak-to-peak swing. The final index is an arithmetic mean of the separate indexes, each weighted by the number of cycles covered. For further details see *Methods of Measuring Cyclical Behavior*.

TABLE 7

Average Behavior of Output and of the Price Indexes 13 Reference Cycles from 1891 to 1938

	AVERAGE STANDING AT			AVERAGE CHANGE PER YEAR DURING REFERENCE		TOTAL AVG.	INDEX OF CONFORMITY REFERENCE		
	Initial Trough	Peak	Terminal Trough	Expansion	Contraction	SWING PER YEAR	Expansion	Contraction	Complete Cycle
OUTPUT, PRODUCERS' CURRENT PRICES									
Consumers' Perishable	90.0	109.0	103.3	+7.0	—3.3	—10.3	+85	—8	+92
Consumers' Semidurable	89.8	111.4	101.4	+8.6	—5.9	—14.5	+100	+23	+76
Consumers' Durable	84.7	114.7	99.6	+12.4	—9.4	—21.8	+100	+38	+84
Producers' Durable	83.5	122.7	98.7	+13.6	—17.5	—31.1	+85	+69	+76
All Finished Commodities	88.4	112.1	101.7	+8.9	—6.6	—15.5	+100	+38	+76
PRICE INDEXES									
Consumers' Perishable	96.3	105.4	99.2	+2.7	—1.1	—6.8	+69	+23	+50
Consumers' Semidurable	96.3	107.2	98.6	+3.5	—6.5	—10.0	+31	+62	+68
Consumers' Durable	100.9	102.6	102.3	+0.3	+0.4	+0.1	+8	—8	—4
Producers' Durable	99.4	103.7	101.9	+0.3	—1.0	—1.3	—8	0	+12
All Finished Commodities	97.4	104.9	99.9	+2.1	—3.3	—5.4	+23	+54	+60
OUTPUT, PRODUCERS' 1913 PRICES									
Consumers' Perishable	93.6	103.5	104.0	+4.3	+0.9	—3.4	+100	—23	+60
Consumers' Semidurable	93.4	104.2	102.1	+5.0	+0.4	—4.7	+85	+23	+44
Consumers' Durable	84.5	112.2	96.5	+11.6	—10.5	—22.2	+100	+69	+84
Producers' Durable	84.4	118.7	96.0	+13.0	—16.7	—29.8	+85	+69	+76
All Finished Commodities	90.9	107.1	101.3	+6.7	—3.3	—10.0	+85	+38	+84

tion indexes, because when total swings are used, a series will conform to the complete cycle not only when there is conformity during both expansion and contraction, but also when a per year rise during the contraction is less than during the expansion, or when a per year decline during the expansion is less than during the contraction.

The behavior of the output and price series during the thirteen complete cycles between 1889 and 1938 (Table 7) confirms the conclusion obvious from our discussion of the broader changes: that as a whole the period is characterized essentially by expansion of output and rising prices. For total output in current and 1913 prices and for the price index of all finished commodities, the differences between the average standing at trough and peak years show that the average increases from initial trough to peak are much greater than the declines from peak to terminal trough.

Because most of the expansions lasted longer than most of the contractions, the relations between rises and falls are modified considerably when changes are measured on an annual basis. For total output in current prices the average rise remains slightly greater than the average fall. For the price index, however, the average per year change during contractions exceeds that during expansions. Consequently the removal of price fluctuations affects the amplitudes of output in 1913 prices much more during contractions than during expansions.

The total average swings of output in both current and 1913 prices are much wider than that of the price index. For output in current prices the swing is almost three times as wide, and in 1913 prices (which reflect the adjustment for the swing in the price index), almost twice. Price fluctuations thus account for about one-third of the average swing of output in current prices.

In a growing economy—dominated by expansions—there is some reason to expect more consistency in the rises of production series during expansions than in the declines during

contractions. The behavior of the conformity indexes fulfills this expectation. For output in current prices there is perfect conformity during expansions but an index of only + 38 during contractions. A similar though less close correspondence is revealed by the indexes of output in 1913 prices.

Changes in the price index of all finished commodities, however, consistently conform more closely during contractions, which suggests that prices may be more sensitive to these phases of business cycles.

During the complete cycle the conformity indexes differ less than the measures of amplitude. The turning points of all three series agree fairly well with reference cycle dates. Even the conformity index for prices is fairly high; while the index of + 84 for output in 1913 prices, which exceeds slightly that for output in current prices, implies almost perfect positive conformity.

Among the commodity groups the differences in behavior are pronounced. The average rises in the durable groups greatly exceed those in the nondurable. The average decline per year in the output of producers' durable commodities in current prices is more than five times, and of consumers' durable almost three times, that in the perishable group. That these are not merely differences in amplitude is revealed by the conformity indexes during contractions. The index for producers' durable products implies conformity in 11 of 13 contractions, that for consumers' durable in 9, that for semidurable in 8, and that for perishable in only 6.

When total average swings per year are compared, the durable groups show amplitudes two or three times as wide as the nondurable. But the complete cycle indexes of conformity are high for all four groups. In fact, perishable commodities conform most closely, which indicates not only that there was conformity during expansions but also that,

although *absolute* declines did not always take place during contractions, *relative* declines usually did.

Not only do the group price indexes change less on the average during reference cycles than the output of corresponding groups in current prices, they also behave very differently. The largest fluctuations, during expansions and contractions as well as during the complete cycle, are in the nondurable groups. Likewise, the conformity indexes for the nondurable groups are considerably higher than for the

TABLE 8

Average Behavior of the Percentage Shares of Output
13 Reference Cycles from 1891 to 1938

		AVERAGE CHANGE PER YEAR DURING REFERENCE: Expansion	Contraction	TOTAL AVG. SWING PER YEAR	INDEX OF CONFORMITY TO REFERENCE: Expansion	Contraction	Complete Cycle
PRODUCERS' CURRENT PRICES							
Consumers'	Perishable	—1.9	+3.1	+5.3	—77	—54	—68
	Semidurable	—0.2	+0.6	+0.8	—15	—31	—12
	Durable	+3.8	—3.3	—7.1	+85	+62	+76
Producers' Durable		+4.9	—10.8	—15.7	+85	+69	+64
PRODUCERS' 1913 PRICES							
Consumers'	Perishable	—2.5	+4.3	+6.9	—69	—54	—64
	Semidurable	—1.6	+3.6	+5.3	—46	—38	—36
	Durable	+5.2	—6.8	—12.0	+85	+46	+56
Producers' Durable		+6.6	—13.4	—20.0	+54	+69	+68

durable. It is clear that the prices of durable commodities usually respond less sensitively and less consistently to business cycles than the prices of nondurable.

The effects of inter-group differences in the fluctuations of the price indexes are apparent in the measures of output in 1913 prices. The average per year rises are reduced in all groups; the declines, in all except consumers' durable. However, since these reductions are much greater for the nondurable groups, the inter-group differences in amplitude are widened. Indeed, during contractions both perishable and semidurable output *rise* slightly per year after adjustments

for price changes, while durable declines considerably. The total average swing of the producers' durable group is eight times that of the perishable, and of the consumers' durable six times.

To some extent the greater sensitivity of the durable groups to business cycles can be ascribed to the kinds of commodity included. Purchases of machinery and of consumers' durable commodities are more likely to decline during depressions than is the consumption of food and clothing. Moreover, the fluctuations in the prices of the former are relatively small. The evidence in Table 7 points to little, if any, price reduction during contractions.

The inter-group differences in amplitude are reflected also in the behavior of percentage shares of total output (Table 8). In current prices the shares of the perishable and semidurable groups decline during expansions and rise during contractions; the reverse holds for the durable. The shifts are especially great during contractions. Moreover, the conformity indexes of the shares of the nondurable groups during both expansions and contractions are negative, those for the perishable considerably so. The conformity indexes of the shares of the durable groups are strongly positive. During the entire cycle the widest swings are in the shares of the durable groups, especially producers' durable; but the conformity indexes for all groups have much the same relations as do those measuring conformity during expansions and contractions separately.

Differences in the relative behavior of the price indexes are reflected in the shares of total output in 1913 prices. Intensifying considerably the rises and declines already noted for the shares in current prices, they widen the average swings. These increases in amplitude are not, however, accompanied by higher conformity. The proportions of inverse movements in the nondurable shares and of positive movements in the durable are about the same as for shares in current prices.

TABLE 9

Average Behavior of Output and its Percentage Shares and of the Price Indexes 7 Cycles from 1891 to 1914 and 6 Cycles from 1914 to 1938

	AVERAGE CHANGE PER YEAR DURING REFERENCE EXPANSION		AVERAGE CHANGE PER YEAR DURING REFERENCE CONTRACTION		TOTAL AVG. SWING PER YEAR		INDEX OF CONFORMITY COMPLETE CYCLE	
	7 Cycles 1891 to 1914	*6 Cycles 1914 to 1938*	*7 Cycles 1891 to 1914*	*6 Cycles 1914 to 1938*	*7 Cycles 1891 to 1914*	*6 Cycles 1914 to 1938*	*7 Cycles 1891 to 1914*	*6 Cycles 1914 to 1938*
Output, Producers' Current Prices								
Consumers' Perishable	+5.9	+8.2	0.0	−7.2	−6.0	−15.4	+86	+100
Consumers' Semidurable	+7.5	+9.9	−2.4	−10.0	−9.9	−19.9	+71	+82
Consumers' Durable	+10.1	+15.1	−5.3	−14.1	−15.3	−29.3	+100	+64
Producers' Durable	+12.1	+15.4	−11.0	−25.1	−23.1	−40.5	+71	+82
All Finished Commodities	+7.4	+10.6	−2.4	−11.5	−9.8	−22.0	+71	+82
Price Indexes								
Consumers' Perishable	+0.4	+5.4	+0.3	−9.2	−0.1	−14.6	+14	+82
Consumers' Semidurable	+1.0	+6.5	−2.2	−11.5	−3.2	−18.1	+43	+100
Consumers' Durable	0.0	+0.6	−0.4	+1.3	−0.5	+0.7	0	−9
Producers' Durable	+0.5	+0.1	−0.7	−1.1	−1.1	−1.5	0	+27
All Finished Commodities	+0.5	+1.0	−0.1	−6.7	−0.9	−10.6	+43	+82
Output, Producers' 1913 Prices								
Consumers' Perishable	+5.5	+2.8	−0.3	+2.2	−5.8	−0.6	+86	+27
Consumers' Semidurable	+6.4	+3.4	−0.2	+1.0	−6.7	−2.3	+72	+9
Consumers' Durable	+9.9	+13.7	−1.7	−17.4	−14.6	−31.0	+100	+64
Producers' Durable	+11.4	+11.9	−10.4	−24.2	−21.8	−39.0	+57	+100
All Finished Commodities	+6.9	+6.6	−2.0	−1.8	−8.9	−11.3	+100	+64

	AVERAGE CHANGE PER YEAR DURING REFERENCE EXPANSION		CONTRACTION		TOTAL AVG. SWING PER YEAR		INDEX OF CONFORMITY COMPLETE CYCLE	
	7 Cycles 1891 to 1914	*6 Cycles 1914 to 1938*	*7 Cycles 1891 to 1914*	*6 Cycles 1914 to 1938*	*7 Cycles 1891 to 1914*	*6 Cycles 1914 to 1938*	*7 Cycles 1891 to 1914*	*6 Cycles 1914 to 1938*
	PERCENTAGE DISTRIBUTION OF OUTPUT							
Output, Producers' Current Prices								
Consumers' Perishable	−1.5	−2.4	+2.4	+4.5	+3.9	+6.9	−57	−82
Consumers' Semidurable	+0.1	−0.6	+0.1	+1.2	−0.1	+1.8	0	−27
Consumers' Durable	+2.9	+4.9	−2.7	−4.1	−5.5	−9.0	+86	+64
Producers' Durable	+4.7	+5.0	−8.5	−13.5	−13.2	−18.6	+43	+91
Output, Producers' 1913 Prices								
Consumers' Perishable	−1.4	−3.9	+1.7	+7.3	+3.1	+11.2	−69	−64
Consumers' Semidurable	−0.4	−3.1	+1.7	+5.8	+2.1	+9.0	−14	−64
Consumers' Durable	+3.1	+7.7	−2.4	−11.9	−5.5	−19.6	+50	+64
Producers' Durable	+4.9	+8.7	−8.7	−18.8	−13.6	−27.5	+43	+100

Changes in Behavior during Business Cycles

Both the rises and declines in total output in current prices are greater, on the average, during the six reference cycles from 1914 to 1938 than during the seven from 1891 to 1914 (Table 9). Especially striking are the differences in the declines during contractions: the average decline during the contractions from 1914 to 1938 is almost five times that during earlier contractions. The total average swing per year for the cycles from 1914 to 1938 is more than twice that for the earlier cycles.

The average swings in the price index of all finished commodities also differ markedly, even more than those in output in current prices. During the last six reference cycles the average swing per year is almost twelve times that during the first seven—a clear indication that prices fluctuated more violently during recent cycles. Consequently, when changes in output in 1913 prices are compared, the differences between the seven- and six-cycle averages are considerably smaller. The average swing during the more recent cycles is only about one-fourth greater than during the earlier.

Total output and the price index of all finished commodities vary with respect to changes in their conformity to reference cycle turning points. The conformity of output in current prices is slightly higher, of the price index, considerably higher, and of output in 1913 prices, slightly lower, during the last six cycles. With the possible exception of the improvement in the conformity of the price index, there is little evidence of significant changes. Yet when intensity also is measured, the fluctuations, particularly in output in current prices and in the price index of all finished commodities, seem to be more violent during the last six recent reference cycles than during the earlier seven. For output in 1913 prices the greater intensity is less marked and is concentrated in the declines during contractions. Too few cycles are included in the averages to make definitive conclu-

sions possible, but this shift may be symptomatic of a tendency toward more violent fluctuations.

The average swings per year for successive overlapping combinations of three cycles (Table 10) substantiate this hypothesis. Even during the successive sets of pre-war cycles, total output in current prices tended to fluctuate more and more violently, and except during the three cycles from 1908 to 1919 and from 1921 to 1932 the increase in amplitude continued after the 1914-18 War. The swings in the price index of all finished commodities do not increase as much. Slightly greater swings through the war are followed by violent swings, then by a return to relatively mild ones. The removal of these fluctuations in prices is, of course, reflected in the measures for total output in 1913 prices. During the earlier cycles the swings are fairly wide but follow more or less the same pattern; then they narrow appreciably. But beginning with the cycles from 1914 to 1923, each three-cycle average widens noticeably.

The factors underlying these changes in the pattern of total output are better understood when the behavior of the individual commodity groups is examined. Do the swings widen in all four groups or in only one or two?

In current prices the output of all groups fluctuates more during expansions and especially during contractions in the six recent cycles than in the seven earlier. Average swings per year more than double in the nondurable groups and almost double in the durable. The increases in the amplitude of the price indexes, however, are much less evenly distributed. Sizeable increases take place during expansions in the nondurable groups alone, and even during contractions the increases for the nondurable groups are far greater than for the durable. Consequently, when average swings per year are compared, those in perishable and semidurable commodities are much wider and those in consumers' and producers' durable about the same.

In 1913 prices average per year changes in the output of

the nondurable groups are actually smaller during the expansion phases of the six cycles from 1914 to 1938; whereas the changes during contractions are not only greater, but are rises rather than declines. The average swing in semidurable output is two-fifths of that in the earlier, and in perishable, only one-fifth—an indication of the more weighty influence of price fluctuations during recent cycles. For the durable groups, adjustments for fluctuations in prices have little effect on either set of measures. The averages for the six cycles still exceed those for the seven, and in about the same proportions as those for output in current prices. So far as total output in 1913 prices is concerned, the durable groups alone are responsible for whatever tendency there is toward greater fluctuations during recent cycles.

The conformity indexes vary less than do the direct measures of amplitude; moreover, they do not suggest consistently higher conformity for the six recent cycles. The indexes of output in current prices are slightly higher for all groups, except the consumers' durable, as are those of the price indexes of the nondurable. The conformity of the price indexes of the durable groups is not good for either set of cycles. In 1913 prices the indexes of output are considerably lower for the nondurable groups and slightly lower for the consumers' durable. For the producers' durable alone is there indication of closer conformity. Thus with respect to the closeness with which the turning points of the four groups conform to reference cycle dates the differences between the cycles from 1891 to 1914 and from 1914 to 1938 are few and relatively small. Most significant perhaps is the less close conformity of nondurable output in 1913 prices during recent cycles. As in the case of total output, the major differences seem to be in the intensity of cyclical fluctuations rather than in conformity.

The timing of the changes revealed by the seven- and six-cycle comparisons can be approximated from the three-cycle averages of the per year swings (Table 10). For output in

current prices it varies considerably among the four groups. In the nondurable, sizeable increases in the average swings per year first appear in the three-cycle average from 1911 to 1921; thereafter the swings are consistently wider than in any earlier set of cycles. In the consumers' durable group the swings are fairly wide in the earlier sets, becoming wider through the cycles from 1904 to 1914. In the next three sets, one of which reflects the damping effects of the war on the output of consumers' durable commodities, the swings are narrower. Beginning with the average for the 1919 to 1927 cycles, however, the swings become and remain extremely violent. In producers' durable commodities the swings begin more mildly than in either perishable or semidurable, but with the cycle average from 1896 to 1908 they increase greatly and remain consistently more violent than the swings in any other groups. Not until the 1919 to 1927 set of business cycles are the swings in producers' durable commodities equaled by those in consumers' durable.

The average swings of the price indexes are less marked and less diverse than those of output in current prices. In the nondurable groups alone are the swings during the post-war cycles more violent, and even they diminish in violence during the most recent cycles. The durable groups trace no well defined pattern, and most of the average swings are relatively mild.

The tendency nondurable output in 1913 prices has toward milder swings reflects the more violent swings of the price indexes in the post-war cycles. In the durable groups, on the contrary, amplitude is little affected by adjustments for price changes.

Although an inquiry into the factors underlying the differences in the behavior of the measures of amplitude during the more recent and earlier cycles is beyond the scope of this paper,[9] a few observations that stem from the nature of

[9] At the very least, analyses of the series making up our major commodity

TABLE 10

Average Swing per Year in Output and its Percentage Shares and in the Price Indexes
Successive Overlapping Sets of 3 Reference Cycles, 1891 to 1938

	1891 to 1900	*1894 to 1904*	*1896 to 1908*	*1900 to 1911*	*1904 to 1914*	*1908 to 1919*	*1911 to 1921*	*1914 to 1924*	*1919 to 1927*	*1921 to 1932*	*1924 to 1938*
					OUTPUT AND PRICE INDEXES						
Output, Producers' Current Prices											
Consumers' Perishable	—3.6	—5.4	—6.3	—9.0	—9.2	—5.4	—16.0	—15.2	—17.1	—10.0	—15.6
Consumers' Semidurable	—12.2	—7.9	—7.3	—6.7	—9.4	—5.1	—19.9	—28.9	—24.5	—17.1	—15.8
Consumers' Durable	—14.3	—10.5	—13.1	—15.6	—19.1	+3.6	—11.3	—15.6	—36.3	—30.4	—42.9
Producers' Durable	—5.2	—6.4	—22.9	—36.7	—41.7	—33.4	—37.3	—36.2	—30.8	—33.4	—44.8
All Finished Commodities	—6.8	—6.7	—9.3	—12.5	—14.1	—7.9	—19.3	—20.6	—23.4	—17.8	—28.5
Price Indexes											
Consumers' Perishable	+1.5	+0.7	+2.4	—1.7	—2.3	—3.6	—15.5	—16.4	—18.5	—8.2	—12.8
Consumers' Semidurable	+0.2	+2.5	—2.5	—6.1	—7.8	—8.4	—26.4	—27.6	—24.1	—6.6	—8.3
Consumers' Durable	+2.8	+2.6	—0.2	—1.2	—3.4	+1.2	—9.5	—2.2	—1.4	+6.6	+3.6
Producers' Durable	—2.2	—0.8	—3.0	—0.4	—1.9	—2.0	—4.9	—2.7	—0.8	+1.1	—0.4
All Finished Commodities	+0.9	+1.2	+0.7	—2.3	—3.5	—4.4	—15.7	—14.9	—13.6	—3.5	—6.4
Output, Producers' 1913 Prices											
Consumers' Perishable	—5.2	—6.3	—8.9	—7.3	—6.8	—2.0	—0.3	+1.6	+1.9	—1.8	—2.7
Consumers' Semidurable	—12.5	—10.5	—5.0	—0.5	—1.5	+2.0	+5.2	+2.7	+0.6	—10.3	—7.3
Consumers' Durable	—16.8	—12.7	—13.0	—14.1	—15.2	—0.3	—4.6	—15.1	—33.6	—36.0	—47.0
Producers' Durable	—2.6	—5.2	—20.4	—36.3	—39.6	—31.9	—33.9	—34.0	—30.1	—34.3	—44.1
All Finished Commodities	—7.7	—7.9	—10.2	—10.2	—10.6	—4.4	—4.7	—6.5	—9.7	—13.3	—16.1

	1891 to 1900	*1894 to 1904*	*1896 to 1908*	*1900 to 1911*	*1904 to 1914*	*1908 to 1919*	*1911 to 1921*	*1914 to 1924*	*1919 to 1927*	*1921 to 1932*	*1924 to 1938*
	PERCENTAGE DISTRIBUTION OF OUTPUT										
Output, Producers' Current Prices											
Consumers' Perishable	+3.2	+1.3	+3.1	+3.6	+5.0	+3.2	+4.1	+6.1	+6.4	+8.0	+7.6
Consumers' Semidurable	—5.7	—1.1	+2.2	+6.1	+5.0	+2.8	—0.5	—3.2	—0.7	+0.6	+6.9
Consumers' Durable	—7.9	—3.7	—3.7	—3.1	—4.3	+7.6	+4.4	+1.1	—12.6	—13.3	—19.0
Producers' Durable	+0.6	—0.3	—13.6	—22.9	—26.7	—24.8	—19.5	—16.6	—8.5	—16.2	—20.6
Output, Producers' 1913 Prices											
Consumers' Perishable	+2.5	+1.6	+1.3	+2.9	+3.9	+2.7	+4.8	+8.5	+11.7	+13.0	+13.9
Consumers' Semidurable	—4.9	—2.9	+5.0	+9.4	+9.1	+6.2	+9.7	+9.0	+9.9	+3.8	+8.9
Consumers' Durable	—8.9	—4.6	—2.4	—4.0	—4.6	+3.4	—0.8	—10.2	—24.5	—22.8	—29.0
Producers' Durable	+3.5	+1.6	—10.8	—26.0	—29.2	—27.6	—30.1	—28.5	—21.3	—20.9	—26.5

the measures and from our knowledge of the changing composition of the commodity groups can be made. Since a low index of conformity implies that the troughs and peaks in a series match reference cycle dates only indifferently, there is reason to expect a close relation between the degree of conformity and amplitude. For example, the lower indexes of nondurable output in 1913 prices during the six recent cycles explain to some extent their narrower average swings. Similarly, the higher indexes of nondurable commodity prices as well as of the output of producers' durable in 1913 prices may explain in part their wider average swings.

Nevertheless, differences in conformity do not explain the wider average swing of consumers' durable output in 1913 prices during recent cycles. Here, and perhaps this is true in considerable degree of producers' durable also, the explanation may lie in the changing composition of the durable groups. If we are correct in assuming that commodities like passenger cars and the larger electrical appliances are especially sensitive to cyclical movements, then when they constitute a major segment of the group in which they are classified—as they do in recent years (Table 3)—the fluctuations of that group are likely to be more violent. On the basis of this assumption, much of the intensification in the average swings of consumers' durable output during recent cycles might be ascribed to the greatly increased production of new types of consumers' commodities. Obviously, however, the fluctuations in all the minor groups in the consumers' durable group must be studied before definitive conclusions can be reached.

We end this discussion of temporal changes in behavior during business cycles with a few comments on changes in the percentage shares. As noted above, the average shares of the durable groups rise during expansions and decline dur-

groups as well as comparisons with other production series would be required. Only by such analyses and comparisons can the behavior of the broader groups be properly interpreted.

ing contractions in all thirteen cycles, while the shares of the nondurable groups move inversely. Corresponding movements characterize the averages for both the seven earlier cycles and the six recent. During the latter, the fluctuations in the percentage shares are much more marked, particularly when measured in 1913 prices—a direct reflection, of course, of the more violent swings in the output of durable commodities during the cycles from 1914 to 1938. The timing of the wider swings in the shares of the durable groups parallels that of the wider swings in output (Table 10). The average swings in the producers' durable shares broaden considerably as far back as the three-cycle average for 1900-11; but the wider swings in the consumers' durable shares are essentially a phenomenon of the 1920's and 1930's.

Summary

1) Except for the final decade, the period 1879-1939 was characterized by a notable increase in the output of finished commodities destined for domestic consumption, whether measured in current prices or adjusted for changes in prices (a rough measure of physical volume). In 1879 total output in current prices was $3.4 billion, in 1913 prices, $3.8; in 1939 it was $31.9 billion and $29.1 billion respectively. In contrast to these increases of 940 and 770 per cent, population rose some 260 per cent.

2) Differences in rates of growth among the commodity groups caused the composition of total output to change appreciably. Especially striking was the increase in the proportion of consumers' durable commodities. From an average of some 10 per cent of total output during the early decades it reached an average of almost 20 per cent during the recent. The percentage share of producers' durable commodities increased from about 10 to 13. In 1879 the two durable groups combined constituted less than one-fifth of total finished output; in 1939, almost one-third.

3) The extraordinary increase in the output of durable

commodities can be credited in large part to the development of the automotive and electrical industries.

4) The increases in output were not spread evenly over the period or distributed equally among the four commodity groups. The peak rates of increase occurred in the interval 1894-1903 to 1899-1908 and during the 1920's and were concentrated chiefly in the durable groups. During the 1930's there was a distinct leveling off.

5) Variations from one decade to the next in the rates of change in the price index of all finished commodities are closely related to the variations in total output in current prices and account for a large part of them. As a result, the rates for total output in 1913 prices are not only usually lower than for output in current prices, but also are subject to smaller fluctuations.

6) Price adjustments affected the rates for perishable and semidurable output in 1913 prices most, reducing considerably both the rates and their variability from decade to decade; the rates for consumers' durable output were least affected.

7) The inverse relationship of the shares of the nondurable groups in 1913 prices, and the direct relationship of the durable groups, with the rises and declines in the rates of change in the price index of all finished commodities indicate that during periods of more sharply rising (or falling) prices the output of commodities for which demand is more postponable expands (or contracts) more rapidly than the output of commodities for which demand is less postponable.

8) The shifts in the percentage composition of total output occasioned by the great depression of the 1930's interrupted seriously for the first time the long term rise in the share of durable commodities.

9) Total output in both current and 1913 prices and the price index of all finished commodities fluctuated markedly during the thirteen complete business cycles since 1889.

Fluctuations in prices apparently accounted for about one-third of the fluctuations in total output in current prices.

10) The turning points of both total output series, as well as of the price index of all finished commodities. conformed rather consistently to the business cycle dates.

11) The four commodity groups behaved differently during business cycles. The average per year advances and declines, particularly the declines, in the durable groups were much greater than in the nondurable. The indexes of conformity also were higher.

12) The intensity of fluctuation during business cycles in total output and in the price index of all finished commodities tended to increase from 1889 to 1939, especially during the six cycles from 1914 to 1938. That of total output in current prices, reflecting the influence of price changes, increased most.

13) In current prices the average swings in the output of all four commodity groups were greater during the six recent cycles. In 1913 prices the swings of the nondurable groups were narrower, partly because of poorer conformity to the business cycle dates. Since the swings of the durable groups alone widened, responsibility for the wider swings in total output in 1913 prices lies with them. The wider swings of the durable groups, especially of consumers' durable, may be attributed in part to the greater production of such commodities as passenger cars and electrical appliances.

14) The shifts in the composition of total output, greatest during recent business cycles, reflect directly the violent fluctuations in the output of durable commodities. The shares of the nondurable groups usually decreased during expansions and increased during contractions; the shares of the durable groups usually behaved contrariwise.

APPENDIX

The following notes on sources and methods are intended chiefly to qualify the reliability of the estimates.[10] More details will be submitted in the volume now in preparation.

The output of legal private enterprise alone is covered. Finished commodities made in institutions and in governmental establishments as well as the products of illegal enterprises are not; in most years their output is probably relatively small.

Manufactured Commodities

The basic source on the production of manufactured commodities is the *Census of Manufactures* published decennially from 1879 to 1899, quinquennially from 1899 to 1919, and biennially since. Although the earlier volumes give somewhat less detail than the later, the difficulties of classifying several thousand commodities as finished or unfinished are not greater. In 1909, a Census year with typical problems of classification, 27.1 per cent of our total of finished manufactured commodities were originally classified as mixed (finished and unfinished). Although we had to approximate their allocation there is not necessarily a probable error of 27 per cent in the 1909 total. If the *net* error of allocation reached plus or minus 25 per cent, an extreme assumption, our estimate would be affected one way or the other by as much as 6.8 per cent. Hypothetical effects on each major group can be calculated in similar fashion.

		% OF MFD. COMMODITIES ORIGINALLY CLASSIFIED AS MIXED IN THE 1909 TOTAL	% VARIATION IN TOTAL THAT WOULD RESULT FROM AN EXTREME ERROR OF ALLOCATION (25%)
Consumers'	Perishable	30.9	7.7
	Semidurable	18.3	4.6
	Durable	14.7	3.7
Producers' durable		35.0	8.8
Total		27.1	6.8

[10] The estimates for 1919–33 are described fully in *Commodity Flow and Capital Formation*, Vol. One, Parts I and II; the comments in this Appendix apply chiefly to the years prior to 1919 and to the tentative estimates for the years since 1933.

We allocated the rather large segment of mixed commodities mainly on the basis of Census figures for materials consumed in manufacturing and on data from monographs and studies of specific industries. Special attention was given such commodities as flour and cotton and woolen woven goods, for they tend to reflect changes in consumption habits. For these and many others, varying percentages were derived. But even for commodities whose allocation had to be based on constant percentages it is not likely that the maximum error in any one year for any single commodity is large. The percentage effect of such errors on a minor group total is of course much smaller.

The occasional necessity of assigning the entire output of individual commodities to one or another of our groups led to the inclusion of some commodities that do not, strictly speaking, belong. This lack of precise classification was most marked in the consumers' and producers' durable groups; for example, it was not possible to segregate passenger cars used for business from those used for pleasure.[11] However, even for the durable groups the maximum net errors arising from all deficiencies in classification are probably too small to affect our measures of change seriously.

Census data seem to be roughly comparable from one year to another. The raising in 1919 of the lower limit of coverage of establishments from $500 to $5,000 hardly affects the comparability of earlier and later figures. The inclusion of neighborhood custom and hand trades in 1879 and 1889 might seem more serious; but our adjustments designed to exclude such establishments in 1889 on the basis of data for 1899 accounted for less than 3 per cent of the total output of finished commodities. Even if the adjustments understate considerably the output of small establishments, comparability would not be appreciably reduced.

The limitations upon the accuracy of the intercensal data cannot be dismissed so easily. Many of the interpolating series were compiled from production figures for appropriate industries given in various state reports. Eight states--Pennsylvania,

[11] *Ibid.*, Vol. One, p. 467, for an extended discussion of these problems.

Ohio, Massachusetts, New Jersey, Missouri, Connecticut, Rhode Island, and Virginia—compiled usable figures for five or more years; but the lack of data from the two great industrial states of New York and Illinois, the obvious regional deficiencies, and the use of industries to represent commodities, all point to possible weaknesses in the state series.

Additional series were derived from a wide variety of sources, both government and private. Government sources included reports and special studies of the Departments of Agriculture, Commerce, Labor, and Interior, the Interstate Commerce Commission, the Bureau of Corporations, the Federal Trade Commission, the Bureau of Internal Revenue, and the War Industries Board; private sources included industrial and commodity monographs, trade association releases, trade periodicals, and reports of corporations.

We tested all series as thoroughly as we could by noting carefully the extensiveness and intensiveness of coverage, by examining changes in the ratios of sample to Census data from Census year to Census year, and by comparing independently derived series whenever possible. These tests indicated that the annual estimates for the years after 1899 for most of the minor commodity groups were reasonably dependable approximations of year-to-year movements. For 1879-99, and especially for 1879-89, the interpolations were less accurate. However, when the minor groups were combined into major groups, even the estimates for these decades seemed reliable enough to be used in any analysis that did not demand extremely precise measurement.

Nonmanufactured Commodities

Important in two groups, foods and fuels, nonmanufactured commodities include products of farms, fisheries, mines, and forests. Most of the estimates were derived from publications of the Department of Agriculture, the Bureau of Mines, and the Bureau of Fisheries. For agricultural products a monograph by Frederick Strauss and L. H. Bean, *Gross Farm Income, Indexes of Farm Production and of Farm Prices in the United States, 1869-1937* (U. S. Department of Agriculture, Technical Bulletin 703, Dec. 1940), was especially helpful.

Many of the estimates for nonmanufactured commodities,

although fairly good indicators of long term movements, are less reliable than those for manufactured, and may not measure year-to-year changes accurately, especially before 1900. Fortunately these less reliable figures are important in the perishable group alone, and here constitute only 10 to 15 per cent of the total. Thus the consequence of even rather large errors would not be very great.

Imports and Exports

Annual data are reported in considerable detail in Department of Commerce and Treasury publications. Since for our adjustment, exports had to be valued at producers' prices, the chief task was to determine at what price level exports were reported and the corrections required. The corrections affected the minor group totals only slightly; indeed the entire adjustment for imports and exports made relatively little difference in most minor groups.

Price Indexes

So far as possible, price indexes were constructed for each minor group. Most of the series entering into the group compilations are from the wholesale price bulletins of the Bureau of Labor Statistics; some are from the President's Conference Committee [on Railroads], the Bureau of Valuation of the Interstate Commerce Commission, the Bureau of Corporations, the Federal Trade Commission, the Automobile Manufacturers' Association, and Senate Report 1934, *Wholesale Prices, Wages and Transportation* (Finance Committee, 52d Cong., 2d Sess., Part V).

All the series suffer from defects inherent in their origin. Those from the Bureau of Labor Statistics are usually list price quotations for specific grades of commodities in specific geographical locations. Moreover, despite attempts to obtain quotations on commodities qualitatively comparable over time, an indeterminate mixture of price and quality changes remains. In some series from other sources—for example, the per unit price of automobiles, which we had to use for the years before 1913—we could not differentiate between price and quality

changes. Yet it is unlikely that these defects, ubiquitous as they are, seriously impair the usefulness of the indexes.[12]

Of graver import is the absence of any price series whatever for many commodities. We tried to compensate, at least in part, by using indexes of the chief materials that enter into a commodity, for example, women's dress goods to represent women's dresses. This procedure did not provide sufficient series to ensure complete coverage, however, and for no minor group is there a series for every commodity in it. For a few, enough series are available to warrant an assumption of fair representativeness; but for many, including most of the durable groups, the coverage is below 25 per cent and the representativeness uncertain. Finally, for some minor groups we could not get any series at all; in 1909 such groups accounted for 3.1 per cent of the total value of semidurable commodities, 22.8 of consumers' durable, and 23.4 of producers' durable. To derive estimates in 1913 prices for these groups we had to resort to either an index for a related group or an average index based on all the other minor groups within the apposite major group for which we had compiled separate indexes.

Thus the price series are not entirely satisfactory. Even for the years since 1919 the indexes for the durable groups are none too reliable; for earlier years, especially before 1913, they are less so. The other groups also suffer from a relative scarcity of good series. However, despite the probability that the price indexes and consequently the estimates in 1913 prices are subject to a wider margin of error than the estimates in current prices, we believe them to be fairly adequate indicators of the movements they are intended to measure.

Estimates since 1919

To make a continuous series for more than half a century we supplemented the figures for 1879-1919 by approximately comparable data for 1919-33 from *Commodity Flow and Capital Formation*, Volume One, Parts I and II, and by tentative esti-

[12] For a recent appraisal of the BLS wholesale price series see Saul Nelson, A Consideration of the Validity of the Bureau of Labor Statistics Price Indexes, printed as Appendix I in *The Structure of the American Economy* (National Resources Committee, 1939).

mates for the years since 1933. In extending our groupings to the years since 1919 we had to reclassify some commodities. Adjustments eliminated the more serious discrepancies between the two sets of estimates; those that remain can be approximated by comparing the two figures for each group shown for 1919 in Table 1. Since the estimates for 1919-33 are based on the somewhat more detailed commodity classification of recent Census years, the later set is probably the more accurate, but the differences are small enough to warrant an assumption of comparability.

The figures for the years since 1933 are little more than tentative approximations. For the Census years 1935, 1937, and 1939 the estimates were made first by minor groups then summated into major groups; for the intercensal years 1934, 1936, and 1938, by major groups alone.

Estimates of manufactured commodities for 1935, 1937, and 1939 were derived from rough tabulations of data from the *Census of Manufactures*. Interpolations for 1934 and 1936 were based on the gross income of relevant groups of manufacturing corporations reported in *Statistics of Income*. For 1938 we used the Dun and Bradstreet sales estimates of manufacturing corporations (*Dun's Review*, May 1939), together with factory sales of passenger cars and motor trucks compiled by the Automobile Manufacturers' Association.

Estimates of nonmanufactured commodities for 1934-39 are based on data on farm income and on the value of products retained for home consumption compiled by the Bureau of Agricultural Economics, and on the output of anthracite coal as reported by the Bureau of Mines.

The price indexes for 1919-39 are essentially those described in *Commodity Flow and Capital Formation* (Vol. One, pp. 152-3). Although the indexes are modified somewhat by the addition or dropping of a few series, their reliability as a whole is not appreciably improved. For many minor groups, especially those comprising the durable groups, the indexes remain incomplete.

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