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III The Decline in the Rate of Growth of Industrial Materials Output

After rising 19% from 1938 to 1939, 15% from 1939 to 1940, and 17% from 1940 to 1941, our index of industrial materials production did not rise at all from 1941 to 1942. Similarly, it rose 10% from 1914 to 1915 and 15% from 1915 to 1916, but only 4% from 1916 to 1917; and it declined 4% from 1917 to 1918. The retardations can be dated more precisely from the monthly indexes in Table 2.[20] The rapid expansion in the production of industrial materials ended by June 1941, and production has remained substantially at the June 1941 level for more than two years. The highest points to date were reached in November 1941, January 1942, and February 1943. Thus production of materials leveled off 21 months after the start of the war and 6 months before the United States entered it, with no substantial change since. In the first war the rapid expansion in industrial materials ended by December 1915, 16 months after the start of the war and 16 months before our entry, and production was maintained at approximately the December 1915 level for almost three years. The high point was reached in May 1917.[21]

In both wars, then, the rapid expansion in the production of materials ended prior to our entry, and was followed by a period of little change in level. The group indexes in Table 4 indicate that in both wars the decline in the rate of growth was general. All groups except nondurable commodities, products of foreign origin, fuels, and miscellaneous increased less rapidly or decreased more rapidly from 1916 to 1917 than from 1914 to 1915 or 1915 to 1916. All groups except manufactured foods increased less rapidly or decreased more rapidly from 1917 to 1918 than from 1914 to 1915, 1915 to 1916, or 1916 to 1917. Similarly, all the indexes rose less rapidly or declined more rapidly from 1941 to 1942 than from 1940 to 1941, and all except one, manufactured foods, rose less rapidly or declined more rapidly from 1941 to 1942 than from 1939 to 1940. The year to year

[20] In annual form these indexes correspond quite closely to ours. The percentage changes in the annual averages of the current Federal Reserve Board index excluding manhours series, 1938-39 to 1941-42, are 22, 12, 19, 2; for the early Federal Reserve Board index, 1914-15 to 1917-18, they are 12, 19, 2, −5. Cf. Chart 2.

[21] The index for the first war leveled off 12 months after it began to rise (Dec. 1914) and reached a peak after 29 months of expansion. The index for the second war started to rise in June 1938 and leveled off 36 months later. Whether or not a peak has yet been reached, the current expansion has already lasted longer than the expansion in the first war.

directions of change of the 47 individual commodities also indicate generality of retardation in the two wars. Whereas 87% of the commodities (95% in terms of their importance in our index in 1914) increased in output from 1915 to 1916, only 57% (66 on a weighted basis) did in 1916-17, and in 1917-18 there was a definite preponderance of declines (Table 8 and Chart 5). Indeed, the figures for 1917-18 closely resemble those for 1913-14. In 1940-42 the decline in the proportion of commodities whose output increased was similar to that in 1915-17; the percentage dropped from over 90 in 1940-41 to 68 in 1941-42.

TABLE 8

Distribution of 47 Industrial Materials Series according to Direction of Change from Year to Year, 1913–18, 1937–42

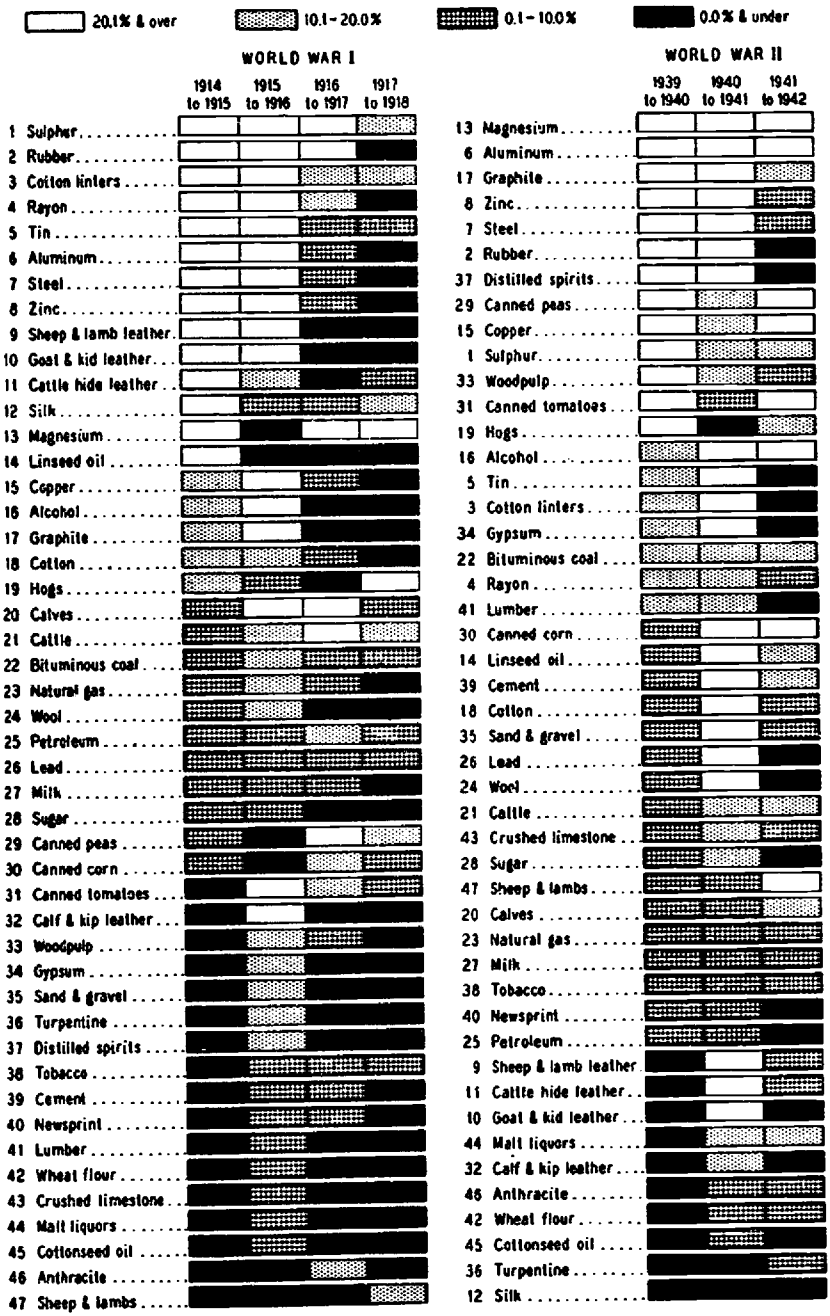
	SERIES THAT RISE			SERIES THAT FALL		
	Number	% of Total Number	% Weight*	Number	% of Total Number	% Weight*
1913–14	17.5	37.2	22.5	29.5	62.8	77.5
1914–15	30.5	64.9	64.0	16.5	35.1	36.1
1915–16	41	87.2	95.0	6	12.8	5.0
1916–17	27	57.4	66.1	20	42.6	33.9
1917–18	17	36.2	32.6	30	63.8	67.4
1937–38	10	21.3	7.9	37	78.7	92.1
1938–39	35	74.5	92.1	12	25.5	7.9
1939–40	37.5	79.8	91.9	9.5	20.2	8.1
1940–41	44	93.6	97.5	3	6.4	2.5
1941–42	32	68.1	68.5	15	31.9	31.5

Computed from data in Appendix Tables 1 and 3. Entries for series that do not change are distributed equally between the 'rise' and 'fall' columns.
* 1914 weights for 1913-18; 1939 weights for 1937-42.

If for each of the commodities we compare the later with the earlier rates of change we find only nine commodities (anthracite, petroleum, sulphur, rubber imports, canned corn, canned peas, milk, cattle slaughter, and calves slaughter) whose percentage changes from 1916 to 1917 were higher (algebraically) than in either of the two preceding yearly intervals (1914-15 and 1915-16); for 29 commodities they were lower. In only two commodities (hogs slaughter and sheep slaughter) were the rates of change higher in 1917-18 than in any of the three preceding yearly intervals; in 27 the rates were lower. Similarly, in the second war only eight commodities (aluminum, magnesium, anthracite, alcohol, turpentine, canned tomatoes, calves slaughter, and sheep slaughter) registered larger percentage increases

CHART 5

Year to Year Percentage Changes in 47 Industrial Materials Series 1914–18 and 1939–42



(or smaller decreases) in 1941-42 than in 1939-40 or 1940-41, while 21 registered smaller increases (or larger decreases).

If the retardation in the output of materials were confined to a few products, to products of little significance in the war effort, or to products whose output might reasonably be expected to increase substantially after a short recession, the phenomenon would not be important. But Table 8 and Chart 5 demonstrate that the output of more than a third of the commodities shrank from 1941 to 1942 and many others increased less rapidly than in previous years. Also, while among the few products whose output expanded at an accelerating rate through 1942 some are of great importance to the war effort (such as aluminum and magnesium), the rate of expansion of many vital war materials, such as steel and petroleum, slackened appreciably. Finally, consideration of the kinds of commodities affected and the factors underlying their behavior indicates that there is little reason to expect the retardation to be short-lived and that it will soon be succeeded by a substantial advance.

It is true that a considerable part of the retardation in the total is attributable to the decline in imports from 1941 to 1942, and that the output of products manufactured from imported materials may expand as the shipping situation improves and as we open up sources of supply now closed to us or develop substitute sources. However, the index of products of domestic origin also shows retardation, rising 13% from 1939 to 1940 and 17% from 1940 to 1941, but only 6% from 1941 to 1942. One component of this index, construction materials, would show a decline from 1942 to 1943. It rose less than 1 per cent from 1941 to 1942 after increasing 11 and 19% in 1939-40 and 1940-41, and there are other definite indications that the wartime peak in construction activity has been passed.[22]

The current and prospective decline in construction suggests that limited plant capacity, one of the factors that undoubtedly contributed to the retardation in the output of industrial materials, will continue to be effective. At the beginning of both wars more industrial mate-

[22] Employment in construction work, according to the seasonally adjusted figures of the Federal Reserve Board, reached a peak in February 1941, but did not decline appreciably until the beginning of 1943; by July 1943, however, it had declined to a level 44% below the 1942 average. The value of construction contracts, also according to the seasonally adjusted index of the Federal Reserve Board, reached a peak in July 1942, and the level in July 1943 was 64% below the 1942 average. Finally, the seasonally adjusted Federal Reserve indexes of lumber and cement production reached peaks in August 1941 and October 1942, respectively, and the July 1943 indexes were 9 and 30% below the 1942 averages (cf. Chart 6).

rials could be produced relatively easily without expanding physical plant, since much plant capacity was then underutilized (cf. Table 3). The rapid initial increase in production is attributable, at least in part, to the utilization of this idle capacity. As the expansion proceeded, however, it must have become more and more difficult to augment production without expanding plant. In both wars, apparently, new plant in the industries producing industrial materials represented relatively small additions to total plant capacity. These industries are for the most part old and well established, and constitute a rather large segment of total industry. Most of the new construction of plant and equipment during the wars was in industries producing finished munitions rather than in industries producing basic materials. Steel ingot capacity, for example, expanded 8% from 1939 to 1942, or 2½% per year; the capacity of active bituminous coal mines expanded 7% from 1914 to 1918, or 1½% per year. In general it seems that in neither war was the expansion of capacity in these industries sufficient to maintain a high rate of increase in production.

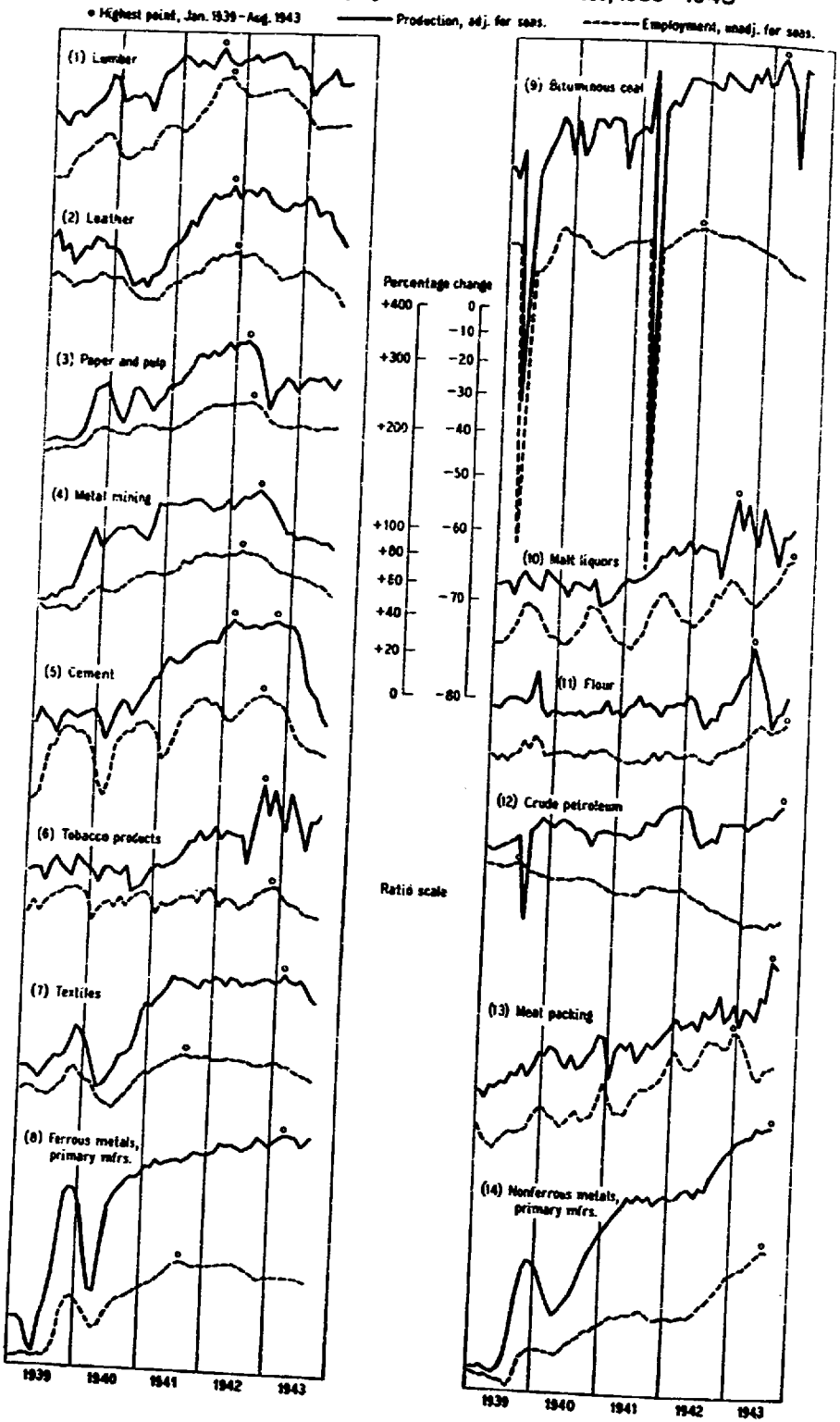
While plant capacity can limit the expansion of production, it is not likely to bring about a decline. Another factor that has a controlling influence in both directions is manpower. Although we have no index of employment comparable with our production index, the monthly production and employment series assembled in Chart 6 represent most of the industries in our index (annual series of approximately the same coverage as the monthly production series receive 81% of the weight in our index in 1939).[23] We find that:

[23] The exact titles of the monthly series in the latest of the original sources (*Federal Reserve Bulletin*, Nov. 1943, and B.L.S. 'Employment & Payrolls', Sept. 1943) are:

Group No.	*Production: FRB indexes*	*Employment (wage earner): BLS indexes*
1	Lumber	Lumber & timber basic products
2	Leather tanning	Leather
3	Paper & pulp	Paper & pulp
4	Metals	Metal mining
5	Cement	Cement
6	Tobacco products	Tobacco manufactures
7	Textiles & products	Textile-mill products & other fiber mfrs.
8	Iron & steel	Blast furnaces, steel works & rolling mills
9	Bituminous coal	Coal mining: bituminous
10	Malt liquor	Malt liquors
11	Wheat flour	Flour
12	Crude petroleum	Crude petroleum production
13	Meat packing	Slaughtering & meat packing
14	Nonferrous metals & products	Smelting & refining, primary, of nonferrous metals

CHART 6

Production and Employment in Basic Industries, 1939–1943



1) Eleven industries have either already reached a definite peak in production (judging from the duration, size, and continuity of the subsequent decline), or show a marked decline in the rate of increase in output (suggesting that the indicated high point may be the actual peak, or at least is not far below it).

(a) In nine of these industries a definite peak in employment has been reached: lumber, leather, paper and pulp, metal mining, cement, tobacco, textiles, ferrous metals, and bituminous coal.

(b) In two there is no definite peak or retardation in employment: malt liquors and flour.

2) Three industries show no definite peak or retardation in production.

(a) In two of these a definite peak in employment has been reached: petroleum and meat packing.

(b) In one there is no definite peak or retardation in employment: nonferrous metals.

Despite some rather glaring differences in the behavior of the production and employment series, due partly to our failure to seasonally adjust the employment series, partly to lack of comparability in coverage, and partly to longer hours of work, the relation between employment and production in these basic industries seems clear. In all except three of the 14 industries (malt liquors, flour, and nonferrous metals) employment has declined considerably from the levels reached in 1941 or 1942. Unless these declines are checked, a substantial rise in the total production of industrial materials seems very unlikely and a moderate decline not at all unlikely. The latter outcome would not be without precedent; our index declined 4% from 1917 to 1918.

IV Industrial Materials Output and Total Industrial Production in Peace and War

In Section I we made certain tests of the validity of our industrial materials production index, but deferred consideration of the relation between the output of industrial materials and total industrial production. Obviously there would be little point in the foregoing analysis if *no* relation were to be expected. However, total industrial production depends not only on the output of materials but also on the rate at which they are consumed and on the amount of labor and other factors of production applied to them. In this section we attempt to