Volume Title: Postwar Cycles in Manufacturers' Inventories

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Volume Publisher: NBER

Volume ISBN: 0-870-14094-9

Volume URL: http://www.nber.org/books/stan62-1

Publication Date: 1962

Chapter Title: The Role of Inventory Investment in Business Cycles: A Preliminary View

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Chapter URL: http://www.nber.org/chapters/c1999

Chapter pages in book: (p. 5 - 16)

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The Role of Inventory Investment in Business Cycles: A Preliminary View

In the present chapter it will be shown that during both the prewar and postwar periods, changes in nonfarm inventory investment have made a major contribution to changes in national product during contractions, and a significant but less important contribution during expansions. Typically, the impact during expansions is greatest in its early stages. Increases in inventory investment since World War II have comprised a significantly smaller part of rises in national product than they did before the war. Of great importance for the present study is the observation that movements in manufacturers' inventory investment during both expansion and contraction phases of the business cycle account for a major part of the changes in total nonfarm inventory investment.

Inventory Investment During Contractions

Table 1 and charts 1 and 2 present evidence of the importance of nonfarm inventory investment movements in both prewar and postwar business cycles. Measured on the basis of annual data, the changes are found to have accounted for at least 42 percent of the decline in national product in every business cycle contraction except that of 1929–32.[1] Quarterly data, available for the postwar period only, indicate that changes in investment comprised 195, 62, and 35 percent of the declines in national product from the peak to the trough quarters of the recessions of 1948–49, 1953–54, and 1957–58.

[1] Inventory investment (i.e., the changes in stocks), like manufacturers' investment in durable equipment, is a component of gross national product. Accordingly, it is the change in inventory investment that must be compared with changes in GNP.

TABLE 1.—*Changes in gross national product and nonfarm inventory investment, 1919–60*

Business cycle phase	Change in GNP		Change in nonfarm inventory investment		Col. 3÷col. 1 (percent)	Col. 4÷col. 2 (percent)
	Annual data (1)	Quarterly data (2)	Annual data (3)	Quarterly data (4)	(5)	(6)
EXPANSIONS						
Prewar (billions of 1929 dollars):						
1919–20	+$1.4	(1)	+$0.4	(1)	29	(1)
1921–23	+14.6	(1)	+2.4	(1)	16	(1)
1924–26	+8.2	(1)	+1.5	(1)	18	(1)
1927–29	+7.6	(1)	+2.3	(1)	30	(1)
1932–37	+28.7	(1)	+5.7	(1)	20	(1)
Total, 1919–37	60.5	(1)	12.3	(1)	20	(1)
Postwar (billions of 1954 dollars):						
1946–48	+10.4	(1)	−6.1	(1)	−58	(1)
1949–53	+76.3	+$80.2	+3.7	+$9.5	5	12
1954–57	+45.5	+48.9	+2.8	+4.0	6	8
1958–60	+39.5	+48.2	+6.2	+9.0	16	19
Total, 1949–60 [2]	161.3	177.3	12.7	22.5	8	13
Average (prewar and postwar) [2]					14	(1)
CONTRACTIONS						
Prewar (billions of 1929 dollars):						
1920–21	−$3.6	(1)	−$2.9	(1)	81	(1)
1923–24	+1.5	(1)	−3.2	(1)	−213	(1)
1926–27	+1.0	(1)	−1.3	(1)	−130	(1)
1929–32	−32.0	(1)	−5.3	(1)	17	(1)
1937–38	−3.1	(1)	−3.6	(1)	116	(1)
Total, 1920–38	−36.2	(1)	16.3	(1)	45	(1)
Postwar (billions of 1954 dollars):						
1948–49	−.4	−$4.3	−5.6	−$8.4	1,400	195
1953–54	−5.9	−11.1	−3.2	−6.8	54	62
1957–58	−7.3	−15.8	−3.1	−5.6	42	35
Total, 1948–58	13.6	−31.2	−11.9	−20.8	88	67
Average (prewar and postwar)					66	(1)
FULL CYCLES						
Prewar (billions of 1929 dollars):						
1919–21	$5.0	(1)	$3.3	(1)	66	(1)
1921–24	13.1	(1)	5.6	(1)	43	(1)
1924–27	7.2	(1)	2.8	(1)	39	(1)
1927–32	39.6	(1)	7.6	(1)	19	(1)
1932–38	31.8	(1)	9.3	(1)	29	(1)
Total, 1919–38	96.7	(1)	28.6	(1)	30	(1)
Postwar (billions of 1954 dollars):						
1949–54	82.2	$91.3	6.9	$16.3	8	9
1954–58	52.8	64.7	5.9	9.6	11	15
Total, 1949–58	135.0	156.0	12.8	25.9	9	17
Average (prewar and postwar)					20	(1)

[1] Not available.
[2] Expansion of 1946–48 is omitted.

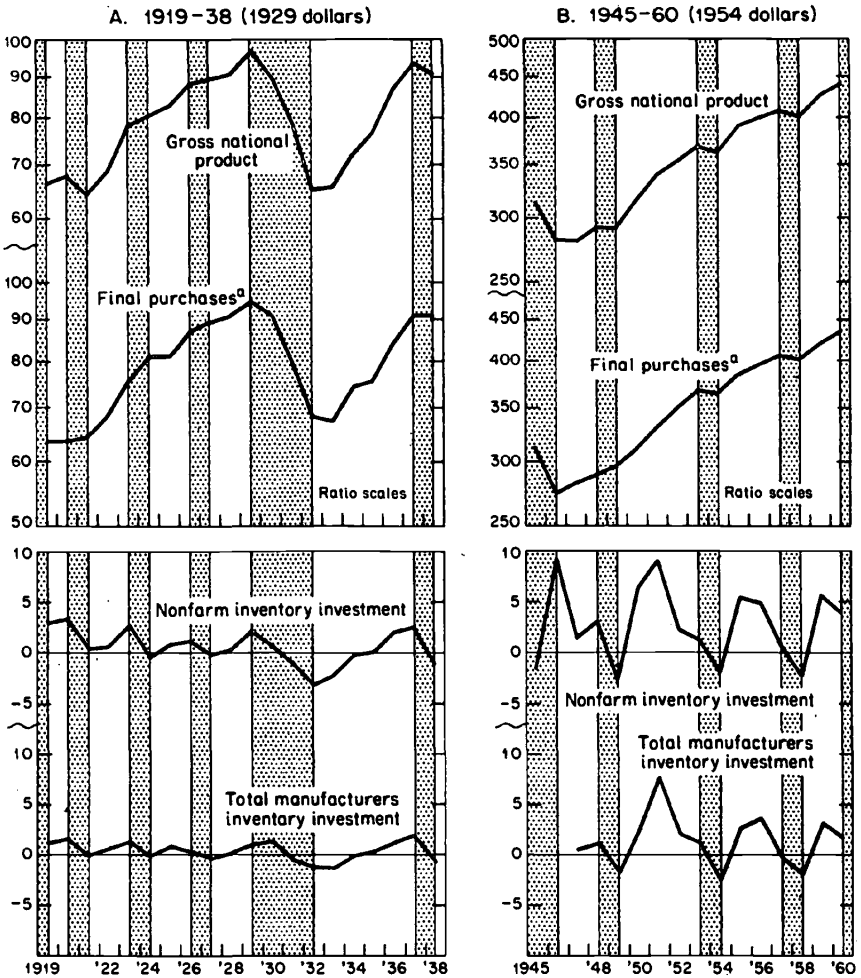
NOTE.—Quarterly comparisons are based on business cycle reference dates.

Source: Prewar GNP data, compiled from Simon Kuznets, "National Product Since 1869" (NBER, 1946), table I-15; inventory data from Moses Abramovitz, "Inventories and Business Cycles" (NBER 1950), p. 568.
Postwar GNP and nonfarm inventory investment changes based on data in Survey of Current Business 1954 National Income Supplement and July 1961 issue.

CHART 1

GROSS NATIONAL PRODUCT, FINAL PURCHASES, AND INVENTORY INVESTMENT, ANNUAL TOTALS, 1919–60

[Billions of dollars]

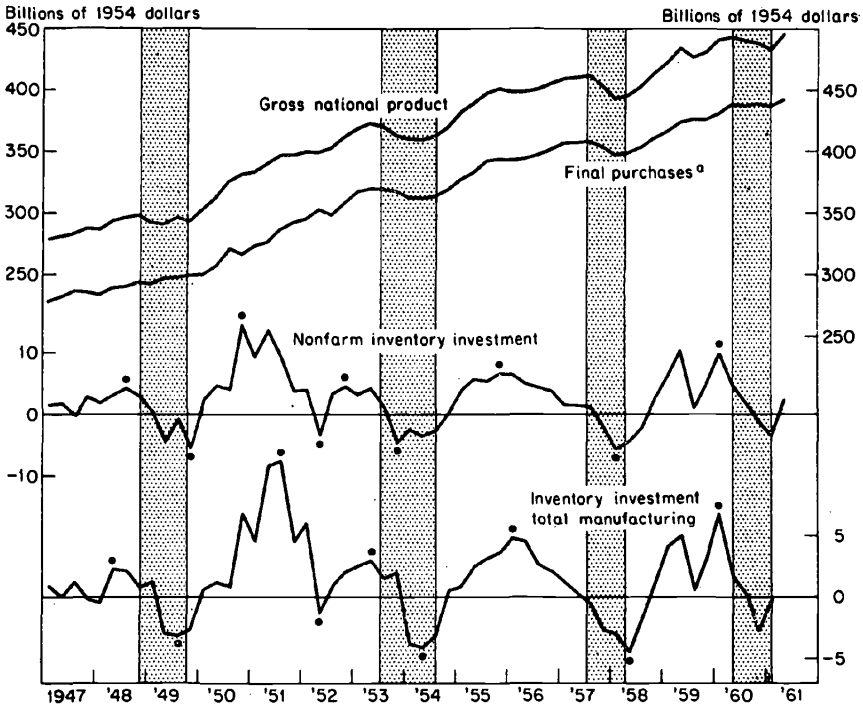


[a] Final purchases equal GNP less total inventory investment.
Shaded areas represent business contractions; unshaded areas, expansions.

Source: Prewar data for gross national product and final purchases, from tables I-15 and I-11, Simon Kuznets, "National Product Since 1869," NBER 1946; for inventory investment, from Moses Abramovitz, "Inventories and Business Cycles," NBER 1950. Postwar data from Department of Commerce.

CHART 2

GROSS NATIONAL PRODUCT, FINAL PURCHASES, AND INVENTORY INVESTMENT, QUARTERLY AT ANNUAL RATES, 1947–61



[a] Final purchases equal GNP less total inventory investment.
Shaded areas represent business contractions; unshaded areas, expansions.

Source: Department of Commerce.

It is difficult with certainty to rank the various contractions according to the relative importance of inventory investment movements, but comparison is facilitated by making use of final purchases (gross national product less nonfarm and farm inventory investment) rather than national product data. In table 2 changes in nonfarm inventory investment are compared with changes in final purchases; phases are ranked according to what appears to be the relative contribution of the former. It will be noted that in terms of annual data, final purchases rose during the contraction of 1948–49 and during all the prewar contractions except those of 1929–32 and 1937–38. Declines in inventory investment may, therefore, be regarded as the principal cause of contraction. The contractions of 1923–24 and 1948–49 belong at the top of the list in this respect, but it is debatable which should be accorded first place.

TABLE 2.—*Ranking of eight contractions according to magnitude of change in nonfarm inventory investment relative to change in final purchases, 1920–58* [1]

Rank	Contraction	Change in nonfarm inventory investment		Change in final purchases		Col. 1+ col. 3 (percent)	Col. 2+ col. 4 (percent)
		Annual data	Quarterly data [2]	Annual data	Quarterly data [2]		
		(1)	(2)	(3)	(4)	(5)	(6)
1	1923–24	−3.2	[3]	+5.2	[3]	−61	[3]
2	1948–49	−5.6	−8.4	+7.6	+5.8	−74	−145
3	1920–21	−2.9	[3]	+.6	[3]	−483	[3]
4	1926–27	−1.3	[3]	+1.8	[3]	−72	[3]
5	1937–38	−3.6	[3]	−.2	[3]	180	[3]
6	1953–54	−3.2	−6.8	−3.8	−5.9	84	115
7	1957–58	−3.1	−5.6	−4.2	−10.1	74	55
8	1929–32	−5.3	[3]	−26.4	[3]	20	[3]

[1] Prewar data in 1929 prices. Postwar data in 1954 prices.
[2] Quarterly comparisons are based on quarterly reference cycle dates.
[3] Not available.

Source: For nonfarm inventory investment data see table 1. Prewar data for final purchases from Simon Kuznets, "National Product Since 1869," NBER 1946, tables I-15 and I-11. Postwar final purchases computed from GNP and nonfarm inventory investment data, see table 1.

In general, inventory investment has contributed in large measure to recessions both before and since the war, with no well-defined difference apparent in its importance in the two periods. Only in the contraction of 1929–32 was its role a relatively minor one.

INVENTORY INVESTMENT DURING EXPANSIONS

Table 1 reveals that changes in nonfarm inventory investment, though important, are significantly less so for expansions than for contractions. In all expansions, prewar and postwar, changes in nonfarm inventory investment average 14 percent of changes in national product, whereas the comparable figure for contractions is 66 percent.

Moses Abramovitz noted this difference in the relative importance of inventory investment in the prewar data, and gave as a possible explanation the fact that expansions are longer than contractions.[2] He observed that, ceteris paribus, the total change in the level of output may be expected to be greater the longer the phase, even though the rate of change may remain the same or decline. On the other hand, inventory investment is simply the rate of change in inventories in a given time period, and it is influenced by the rate of growth (or decline) of output in that period. Consequently it is not to be expected that the change in the levels of inventory investment in the terminal periods will be greater the longer the phase. It follows, therefore, that the share of change in inventory investment relative to the change in national product during a phase may not be expected to be as large for expansions as for the shorter contractions.

This is a cogent argument, and no doubt partially explains the phenomenon.[3] It is not the entire explanation however, for the generalization also holds for year-to-year changes within business cycle phases. In the interwar and postwar periods in only 2 years of

[2] Moses Abramovitz, "Inventories and Business Cycles, with Special Reference to Manufacturers Inventories," New York, National Bureau of Economic Research, 1950, p. 484.
[3] It may also help to explain why the share of inventory investment in the long and severe contraction of 1929–32 was so small.

significant expansion (1927–28 and 1928–29) the change in nonfarm inventory investment constitutes as large a proportion of that in gross national product as in the year of sharpest disinvestment during the subsequent recession (table 3). Possible reasons for this important characteristic will be examined in chapter 8.

Another finding (table 3) is that increases in inventory investment relative to the increase in GNP tend to be larger in the early than in the later stages of expansions. This was true in three of the four prewar expansions which were of sufficient duration (i.e., 2 years or more) to permit observation and in three of the four postwar expansions.[4]

TABLE 3.—*Annual changes in gross national product and nonfarm inventory investment compared, 1919–38, 1945–60*

Years of—		Change in GNP during—		Change in nonfarm inventory investment during—		Col. 3÷ col. 1 (percent)	Col. 4÷ col. 2 (percent)
Expansion	Contraction	Expansion (1)	Contraction (2)	Expansion (3)	Contraction (4)	(5)	(6)
		Prewar (billions of 1929 dollars)					
1919–20		+1.4		+0.4		29	
	1920–21		−3.6		−2.9		81
1921–22		+4.7		+.2		4	
1922–23		+9.9		+2.2		22	
	1923–24		+1.5		−3.2		−213
1924–25		+2.6		+1.1		42	
1925–26		+5.6		+.4		7	
	1926–27		+1.0		−1.3		−130
1927–28		+1.1		+.6		54	
1928–29		+6.5		+1.7		26	
	1929–30		−7.1		−1.4		20
	1930–31		−11.3		−1.8		16
	1931–32		−13.6		−2.0		15
1932–33		+.5		+.8		160	
1933–34		+6.7		+2.2		33	
1934–35		+4.6		+.3		6	
1935–36		+10.4		+1.9		18	
1936–37		+6.5		+.5		8	
	1937–38		−3.1		−3.6		116
		Postwar (billions of 1954 dollars)					
1946–47		−0.2		−7.7		385	
1947–48		+10.8		+1.6		15	
	1948–49		−0.4		−5.6		1,400
1949–50		+25.4		+9.1		36	
1950–51		+23.7		+2.5		11	
1951–52		+11.7		−6.8		−58	
1952–53		+15.5		−1.1		−7	
	1953–54		−5.9		−3.2		54
1954–55		+29.6		+7.5		25	
1955–56		+8.2		−.5		−6	
1956–57		+7.7		−4.2		−55	
	1957–58		−7.3		−3.1		42
1958–59		+27.1		+8.0		29	
1959–60		+12.4		−1.8		−14	

Source: See table 1 for sources.

Finally, it will be noted (table 1) that changes in nonfarm inventory investment played a much larger part in prewar expansions (20 percent of total changes in gross national product) than in the postwar expansions (8 percent). Two possible explanations may be advanced. First, as already noted, postwar expansions have been longer than

[4] It will be noted in table 6 that for manufacturers' inventory investment the generalization held in each of the four prewar expansions for which comparison was possible and in three of the four postwar expansions.

prewar expansions. This added phase length would tend to reduce the role of changes in inventory investment. Second, peaks in inventory investment have displayed longer leads in postwar than in prewar expansions. Under such conditions, measurement of change in inventory investment from business cycle trough to peak understates the role of inventory investment during the postwar expansions.

In order to take account of differences in length of phase and of the earlier occurrence of peaks in inventory investment during the postwar period, changes in final purchases and inventory investment have been computed for both complete expansions and the first 2 years of expansions (table 4). Computing annual changes separately for the first 2 years of expansion compensates for differences in the length of phase. It also measures the change from the trough to the approximate investment peak in the two postwar expansions which were more than 2 years in duration.

TABLE 4.—*Changes in final purchases and nonfarm inventory investment, eight expansions, 1919–60*

Business cycle expansion	Length of expansion (years)	Change in—		Col. 3+col. 2 (percent)
		Final purchases	Nonfarm inventory investment	
	(1)	(2)	(3)	(4)
		Billions of 1929 dollars		
1919–20	1	0	+0.4	
1921–23	2	+11.8	+2.4	20
1924–26	2	+6.1	+1.5	25
1927–29	2	+5.6	+2.3	41
1932–37	5 (2)	+22.9 (+6.3)	+5.7 (+3.0)	24 (48)
		Billions of 1954 dollars		
1946–48	2	+15.2	−6.1	−40
1949–53	4 (2)	+72.2 (+35.8)	+3.7 (+11.6)	5 (32)
1954–57	3 (2)	+42.3 (+31.7)	+2.8 (+7.0)	7 (22)
1958–60	2	+34.0	+6.2	18

Parenthetic entries are for 1st 2 years of expansion.

Source: See table 1 for sources.

During the initial 2-year interval the ratio of inventory investment change to change in final purchases was substantially larger than during the full expansions; it appears that the smaller role of changes in inventory investment during the postwar period is associated with the greater phase length and early occurrence of the investment peak. Among the three expansions which were longer than 2 years, the greatest change in inventory investment in the earlier years occurred in the prewar expansion of 1932–35. The next greatest occurred in the 1949–51 period which included the abnormal inventory accumulations of the early months of the Korean war. During the first 2 years of the 1954–57 expansion the relative magnitude of changes in inventory investment appears to have been roughly comparable to that of the 1921–23 and 1924–26 expansions. During the most recent expansion it was somewhat less.

Manufacturers' Inventory Investment

Changes in manufacturers' inventory investment have been particularly significant during business cycles, especially in contractions. During the recessions of 1948–49, 1953–54, and 1957–58, they accounted for 79, 56, and 25 percent of the change in gross national product from the peak to the trough business cycle quarters (table 5). When the postwar and prewar annual data are compared, it is found that changes in this investment have contributed significantly to business cycles in both periods.

Manufacturers' inventory investment exhibits the same characteristics as were observed for nonfarm investment:

1. The contribution to instability has been greatest during contractions (table 5).
2. During expansions change in investment tends to reach a maximum during the first half of the expansion (table 6).
3. Investment has played a larger role in prewar than in postwar expansions (table 5).

This is not surprising, for movements in the two series have been similar, though not always identical, in both the prewar and postwar periods (charts 1 and 2). During the first two postwar expansions, both nonfarm and manufacturers' inventory investment established two peaks, a major one early in the phase and a lesser one toward the end. In both instances the earlier movement was essentially influenced by war. The sharp rise in investment from 1945 to mid-1946 represented necessary restocking of inventories which had been seriously depleted by the war, and the sharp upward movement from mid-1950 to mid-1951 was strongly influenced by the speculative psychology which prevailed during the early stages of the Korean war. In the 1954–57 expansion there was only a single upward movement in the two series, with peaks occurring during the first half of 1956.

TABLE 5.—*Changes in gross national product and manufacturers' inventory investment, 1919–60*

Business cycle phase	Change in GNP		Change in manufacturers inventory investment		Col. 3 divided by col. 1 (percent)	Col. 4 divided by col. 2 (percent)
	Annual data (1)	Quarterly data (2)	Annual data (3)	Quarterly data (4)	(5)	(6)
EXPANSIONS						
Prewar (billions of 1929 dollars):						
1919–20	+$1.4	[1]	+$0.4	[1]	29	[1]
1921–23	+14.6	[1]	+1.4	[1]	10	[1]
1924–26	+8.2	[1]	+.6	[1]	7	[1]
1927–29	+7.6	[1]	+1.4	[1]	18	[1]
1932–37	+28.7	[1]	+3.3	[1]	11	[1]
Total, 1919–37	60.5	[1]	7.1	[1]	12	[1]
Postwar (billions of 1954 dollars):						
1946–48	+10.6	[1]	[1]	[1]	[1]	[1]
1949–53	+76.3	+$80.2	+3.0	+$5.6	4	7
1954–57	+45.5	+48.9	+2.2	+2.7	5	6
1958–60	+39.5	+48.2	+3.7	+6.2	9	13
Total, 1949–60 [2]	161.3	177.3	8.9	14.5	6	8
Average (prewar and postwar) [2]					9	[1]
CONTRACTIONS						
Prewar (billions of 1929 dollars):						
1920–21	−$3.6	[1]	−$1.6	[1]	44	[1]
1923–24	+1.5	[1]	−1.6	[1]	−107	[1]
1926–27	+1.0	[1]	−.7	[1]	−70	[1]
1929–32	−32.0	[1]	−2.4	[1]	8	[1]
1937–38	−3.1	[1]	−2.7	[1]	87	[1]
Total, 1920–38	−36.2	[1]	−9.0	[1]	25	[1]
Postwar (billions of 1954 dollars):						
1948–49	−.4	−4.3	−3.0	−3.4	750	79
1953–54	−5.9	−11.1	−3.8	−6.2	64	56
1957–58	−7.3	−15.8	−1.6	−4.0	22	25
Total, 1948–58	13.6	−31.2	−8.4	−13.6	62	44
Average (prewar and postwar)					44	[1]
FULL CYCLES						
Prewar (billions of 1929 dollars):						
1919–21	$5.0	[1]	$2.0	[1]	40	[1]
1921–24	13.1	[1]	3.0	[1]	30	[1]
1924–27	7.2	[1]	1.3	[1]	18	[1]
1927–32	39.6	[1]	3.8	[1]	10	[1]
1932–38	31.8	[1]	6.0	[1]	19	[1]
Total	96.7		16.1	[1]	17	[1]
Postwar (billions of 1954 dollars):						
1949–54	82.2	$91.3	6.8	$11.8	8	13
1954–58	52.8	64.7	3.8	6.7	7	10
Total	135.0	156.0	10.6	18.5	8	12
Average (prewar and postwar)					12	[1]

[1] Not available.
[2] Expansion of 1946–48 omitted.

Source: See table 1 for sources of prewar data and postwar GNP data. Deflated manufacturers' inventory investment changes based on material from Department of Commerce.

TABLE 6.—*Annual changes in gross national product and manufacturers' inventory investment compared, 1919–38, 1945–60*

Years of		Change in GNP during		Change in manufacturers inventory investment during		Col. 3 divided by col. 1 (percent)	Col. 4 divided by col. 2 (percent)
Expansion	Contraction	Expansion (1)	Contraction (2)	Expansion (3)	Contraction (4)	(5)	(6)
		Prewar (billions of 1929 dollars)					
1919–20		+1.4		+0.4		29	
	1920–21		−3.6		−1.6		44
1921–22		+4.7		+.9		19	
1922–23		+9.9		+.5		5	
	1923–24		+1.5		−1.6		−107
1924–25		+2.6		+.9		35	
1925–26		+5.6		−.4		−7	
	1926–27		+1.0		−.7		−70
1927–28		+1.1		+.6		54	
1928–29		+6.5		+.9		14	
	1929–30		−7.1		+.2		−3
	1930–31		−11.3		−1.9		17
	1931–32		−13.6		−.7		5
1932–33		+.5		−.02		−4	
1933–34		+6.7		+1.2		18	
1934–35		+4.6		+.4		9	
1935–36		+10.4		+1.0		10	
1936–37		+6.5		+.7		11	
	1937–38		−3.1		−2.7		87
		Postwar (billions of 1954 dollars)					
	1945–46		−31.5				
1946–47		−0.2					
1947–48		+10.8		+0.7		6	
	1948–49		−.4		−3.0		750
1949–50		+25.4		+4.5		18	
1950–51		+23.7		+5.5		23	
1951–52		+11.7		−5.8		−50	
1952–53		+15.5		−.8		−5	
	1953–54		−5.9		−3.8		64
1954–55		+29.6		+5.2		18	
1955–56		+8.2		+1.0		12	
1956–57		+7.7		−4.0		−52	
	1957–58		−7.3		−1.6		22
1958–59		+27.1		+5.2		19	
1959–60		[a] +12.4		−1.5		−12	

Source: See table 5 for sources.

The similarity in patterns of movement in the two inventory investment series is largely due to the fact that manufacturers' inventory investment is the major component of nonfarm inventory investment. Table 7 shows that manufacturers' stocks have comprised between 46 and 56 percent of nonfarm inventories in the prewar and postwar periods. Moreover, in six of the eight cycles, movements in manufacturers' inventory investment have been larger than would be expected on the basis of the proportion of total stocks held (in one case, they were equal). During the single cycle in which they were smaller, the 1924–27 episode, atypical countermovements in durable-goods inventory investment occurred, serving to dilute the intensity of movements in total manufacturers' inventory investment (see table 10, ch. 3).

TABLE 7.—*Analysis of relative size of cyclical changes in manufacturers' inventory investment, 1919–60*

Cycle	Manufacturers' inventories as percent of nonfarm inventories [1]		Change in manufacturers' inventory investment				Change in gross national product as percent of average gross national product
			As percent of change in nonfarm inventory investment [2]			As percent of manufacturing inventories [1]	
	Abramovitz-Kuznets	Department of Commerce	Expansion	Contraction	Total cycle	contraction	contraction
Prewar:							
1919–21	46	----	100	55	61	16	5.4
1921–24	48	----	58	50	54	14	2.0
1924–27	49	----	40	54	46	6	1.2
1927–32	50	----	61	45	50	17	37.0
1932–38	53	54	58	75	65	19	3.9
Weighted average	50	----	58	55	56	12	12.0
Postwar:							
1946–49	----	55	[3] 91 (4)	54 (40)	[3] 73 (4)	8	.01
1949–54	----	56	81 (59)	119 (91)	99 (72)	8	1.7
1954–58	----	56	79 (68)	52 (71)	64 (70)	3	1.8
1958–60	----	----	60 (69)	----	----	----	----
Weighted average [5]	----	55	70 (64)	71 (65)	83 (71)	6	1.4

[1] Cycle averages of inventories were used in these comparisons.
[2] Figures in parentheses are based on quarterly data.
[3] Measured from 1945 to 1948 in order to compare trough and peak inventory investment.
[4] Not available.
[5] Averages exclude 1946–48 expansion; include 3 expansions, 3 contractions, 2 full cycles.

Source: Prewar figures computed from data in Abramovitz, Inventories and Business Cycles, pp. 476, 568. Postwar figures from material provided by Department of Commerce. All data are deflated.

The continuing importance of postwar movements in nonfarm and manufacturers' inventory investment is especially interesting in view of the fact that stocks are smaller relative to the volume of sales and output than they were before the war. For the years 1919 to 1939 Abramovitz constructed indexes of year-end ratios of deflated manufacturing stocks to output.[5] Similar ratios have been computed here for the years 1947 through 1954. The 1947–54 average compares as follows with decade averages for the twenties and the thirties:

1920–29	103
1930–39	119
1947–54	77

Comparable data are not available for distributive and other firms but the fact that such stocks have also been reduced sharply relative to sales is attested to by their decreased share of total nonfarm inventories (table 7). It is concluded therefore, that although manufacturing and other nonfarm stocks are relatively smaller today than before the war, their movements have played an equivalent role in postwar business cycle contractions.

It should be kept in mind, however, that postwar recessions have been comparatively mild. Changes in inventory investment have been large relative to changes in gross national product (tables 1 and 5); but movements in national product during contractions have not been large relative to average levels of national product, and postwar changes in manufacturers' inventory investment have not been large in relation to the average size of stocks (table 7).

[5] Abramovitz, "Inventories and Business Cycles," p. 570.