

Federal Reserve Bank of Cleveland

What Happened to the Inventory Overhang?

by Terry J. Fitzgerald and Jennifer K. Ransom

During the first half of 1997, real output in the U.S. economy expanded at a robust 4.3 percent annual rate. Despite such good news, many observers voiced concern about one characteristic of this growth: It was accompanied by the largest six-month increase in business inventories in 13 years.

Media reports last summer warned that the inventory buildup might have created excessive inventory holdings, or an “inventory overhang.”¹ Analysts argued that such an occurrence would be “a significant drag on GDP and production growth during the second half,” had “crucial negative implications for the economy for the rest of 1997,” and meant that “the economy could weaken significantly toward the end of this year and into next year.”² *The New York Times* characterized the inventory overhang story as follows:

*When goods pile up excessively on store shelves—and in warehouses and factory yards—this costly situation must be redressed sooner or later. This...means production is cut back and economic growth sags—or even disappears.*³

One economic interpretation of this story is that aggregate demand slowed unexpectedly in the first half of 1997, while production remained strong. This resulted in a pileup of inventories. If the slowdown in aggregate demand was expected to continue, production would be cut back not only to bring output in line with the new lower level of expected demand, but also to run down the undesirably high level of inventory holdings. This sequence of events might thereby lead to a recession.

Now, in the spring of 1998, we know that predictions of a substantial deceleration in GDP growth were not realized in the second half of 1997; in fact, real output expanded at a relatively strong 3.3 percent annual rate. Furthermore, few forecasters see a recession in the near future.

So what happened to the inventory overhang? Were observers justified in their concerns about the buildup? If so, why did the predicted slowdown fail to materialize?

Why Watch Inventories?

Before addressing “what happened,” it is helpful to understand why some analysts and policymakers pay such close attention to inventories. Their focus is particularly interesting given that inventory investment, or the change in business inventories, is a minor part of total output, averaging only one-half of 1 percent of real GDP over the postwar period. The bulk of GDP comprises personal consumption expenditures (68 percent), fixed investment (16 percent), and government consumption (18 percent).⁴

The reason many observers watch inventories closely is that, although the level of inventory investment is relatively small, *changes* in such investment are not. For example, quarterly movements in inventory investment over the postwar period have been, on average, more than one-third the size of quarterly changes in real GDP.⁵ Because policymakers are typically interested in changes in GDP and not in the level itself, it is the size of the changes in the components of GDP that matters.

The large inventory buildup during the first half of last year caused the media to warn that firms would respond to the “excessive” pileup by cutting back production, thereby leading to a substantially weaker economy by year’s end. Instead, real output expanded at a healthy 3.3 percent annual rate in the last half. So what happened?

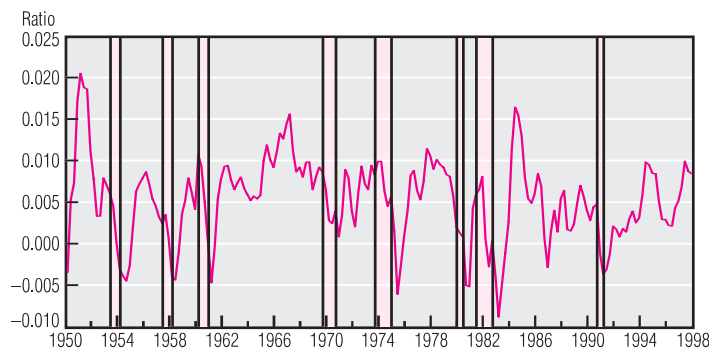
Changes in inventory investment during recessions are notably large. One study reported that declining inventory investment accounted for 87 percent of the drop in aggregate output during the average postwar recession.⁶ This has led some economists to argue that inventory behavior holds the key to understanding business cycles.

Last year’s inventory overhang story, then, can be viewed as an attempt to connect the large buildup of inventories in the first half of 1997 with the substantial decline in inventory investment that has historically accompanied recessions.

Has the Inventory Overhang Story Held?

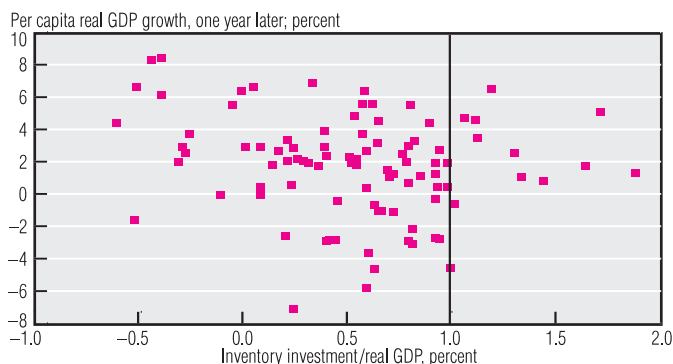
One straightforward method of examining the empirical accuracy of the overhang story is to explore whether its predictions are consistent with historical relationships in the data. The story’s fundamental predictions are that periods of high inventory investment will be followed by periods of low inventory investment and slow or negative GDP growth.

FIGURE 1 INVENTORY INVESTMENT/GDP



NOTE: Data are semiannual, 1992 chain-weighted dollars. Shaded areas indicate recessions.
SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis.

FIGURE 2 INVENTORY INVESTMENT VERSUS GDP GROWTH, 1950–97



NOTE: Data are semiannual, 1992 chain-weighted dollars.
SOURCES: U.S. Department of Commerce, Bureau of Economic Analysis; and U.S. Department of Labor, Bureau of Labor Statistics.

To examine the reliability of these predictions, we look at semiannual data from 1950 through 1997. We chose this frequency because it is consistent with the media reports that focused on inventory growth during the first half of 1997. Presumably, quarterly jumps in inventory investment that are immediately reversed would be less likely to be associated with an inventory overhang.

The first prediction—that inventory investment booms are followed by inventory investment busts—is not borne out by the data. In fact, inventory investment is highly persistent. Periods of high inventory investment tend to be followed by more periods of high, rather than low, inventory investment.

This persistence does not completely unravel the basic story, however. Recall that in an accounting sense, it is the *change* in inventory investment that

contributes to output growth. And the level of inventory investment is negatively correlated with future *changes* in inventory investment. That is, although periods of high inventory investment tend to be followed by more of the same, the level of inventory investment tends to decline in subsequent periods. This results in a negative *change* in inventory investment—reason enough to believe that high inventory investment may precede low or negative output growth.

The second prediction—that inventory investment booms are followed by slow or negative output growth—is not clearly confirmed or rejected by the data. Although the association between current-period inventory investment and subsequent output growth is negative, as the story predicts, the link is weak.

Figure 1 presents the ratio of inventory investment to output from 1950 through 1997, with the recession periods shaded. Two features stand out. First, inventory investment declines sharply during recessions. Second, periods of high inventory investment are sometimes followed by recessions (1960, 1969, 1974), but more often they are not (1951, 1965–67, 1977, 1984, 1994). In fact, the three periods with the largest inventory buildups (more than 1.5 percent of GDP) were not immediately followed by recessions.

Figure 1 appears to provide little support for the inventory overhang story. However, it does not include information on the rate of output growth following inventory investment booms. If output growth were only weakly positive after those booms not followed by a recession, the prediction of an economic slowdown would still hold. Getting to the bottom of the story clearly requires further digging.

Has the Story Held?: A Closer Look

To better understand the behavior of the economy following periods of high inventory investment, we next divide the postwar data into periods of high inventory investment and all other periods. High investment periods are defined as those in which inventory growth over the previous half year was at least 0.99 percent of GDP—the level attained during the first six months of 1997.

We seek to answer two questions. First, does a clear negative relationship between inventory investment and future output growth show up at high levels of inventory investment? Second, how does the change in inventory investment contribute to, or detract from, the overall growth in GDP during and after inventory investment booms?

To address the first question, we plot current-period inventory investment against GDP growth one year (two six-month periods) later (see figure 2). We chose this timing because it produces the largest negative correlation (about -0.2) between inventory investment and future output growth. The right side of figure 2 shows that despite the overall negative correlation, high inventory investment periods are not clearly associated with low levels of future output growth. In fact, all periods in which inventory investment clearly exceeded 1.0 percent of output were followed by

TABLE 1 INVENTORY INVESTMENT AND GDP GROWTH

	1973–97	High Inventory Investment Periods ^a	One Period Later	Two Periods Later	1997	
					First Half	Second Half
Inventory investment/real GDP ^b	0.44	1.14	0.94	0.69	0.99	0.84
Per capita GDP growth ^c	1.16	3.41	1.72	1.02	3.39	2.35
Contribution to GDP growth						
Inventory investment ^c	0.02	1.03	-0.36	-0.49	1.00	-0.28
All other components ^{c,d}	1.14	2.38	2.08	1.51	2.39	2.63

a. 1973:IIIQ and IVQ; 1977:IIQ and IIIQ; 1978:IQ and IIQ; 1983:IVQ and 1984:IQ; 1984:IIQ and IIIQ; and 1994:IQ and IIQ.

b. Percent.

c. Annualized percent change.

d. Includes personal consumption expenditures, fixed investment, government consumption expenditures, and net exports. “Contribution” is defined here as GDP growth minus the contribution of inventory investment.

NOTE: Data are semiannual, 1992 chain-weighted dollars. First four columns are averages.

SOURCE: Authors’ calculations based on data obtained from the U.S. Department of Commerce, Bureau of Economic Analysis.

periods of positive (sometimes *strongly* positive) output growth. Furthermore, while some periods in which inventory investment was roughly 1.0 percent of GDP were followed by declines in per capita GDP as large as 4.5 percent, others were followed by output growth of up to 5.5 percent.⁷

This finding raises another issue. Earlier, we reported that inventory investment is negatively associated with future changes in inventory investment. Thus, we would expect inventory investment booms to be followed by a decline in the change in inventory investment, one of the accounting components that determine GDP growth. Furthermore, we have shown that recessions are accompanied by large declines in this component.

This brings us back to our second question: Why aren’t inventory investment booms associated with slower GDP growth? To address this issue, we next examine the behavior of GDP and its components during and immediately after high inventory investment episodes.

Table 1 shows that over the last 25 years, high inventory investment periods have been associated with strong GDP growth. Average output growth during the subsequent half-year periods remains above its 25-year mean, and returns to roughly its long-run mean two periods (one year) later.

As expected, the change in inventory investment contributes substantially (in an accounting sense) to the high GDP growth seen during inventory investment booms. Also as expected, the

change in inventory investment is negative on average in subsequent periods, creating a drag on GDP growth. This negative pull, however, is not large enough to offset the continued strong average growth in the other components of GDP (see table 1).⁸

What’s Wrong with the Story?

So why aren’t periods of high inventory investment consistently followed by slow output growth? One possibility is that inventory investment booms may result from factors other than an unexpected and ominous decline in aggregate demand. Suppose, for example, that firms experience an unanticipated increase in productivity or a decrease in costs. Such “supply-side” shocks could lead to an inventory buildup as firms produce more than expected or take advantage of temporarily lower costs. Inventory investment could also rise because of a belief that demand will increase in the future, leading companies to stock up.

In contrast to the “unexpected decline in aggregate demand” rationale, these alternative reasons for an inventory investment boom support much more optimistic views about the economy’s future performance. Furthermore, there is reason to believe that productivity shocks may have played an important role in at least some high inventory investment periods. Three of the six periods included in table 1 were accompanied by productivity growth exceeding the 25-year average of roughly 1.2 percent.⁹ It is also noteworthy that productivity growth fell at a 2.3 percent annual rate during the inventory investment boom in the second half of 1973. Those six months marked the only high

inventory investment period in the last 25 years to be immediately followed by a recession.

What Happened in 1997?

The first half of 1997 also qualifies as a high inventory investment period according to our definition. So how did the economy’s behavior in the second half of last year compare with its performance following the other postwar inventory investment booms?

The economy’s behavior in 1997 was consistent with its average performance during the earlier high inventory investment episodes. In the first half of the year, the inventory investment boom was accompanied by strong output growth. In the second half of the year, output growth remained above average, despite the expected negative contribution of inventory investment.

Supply-side shocks may have contributed to last year’s inventory investment boom. Productivity increased at a relatively strong 1.7 percent annual rate in the first six months of the year. This contrasts with the sharp decline in productivity seen during the second half of 1973, the last inventory investment boom to be immediately followed by a recession.

Based on this analysis, it is difficult to infer much about the behavior of the economy in 1998. On average, GDP growth has returned to its postwar average during the second six-month period following an inventory investment boom. This average, however, masks a great deal of variability. Per capita GDP fell 4.5 percent after the inventory buildup in the second half of 1973, but rose 7.0 percent after the boom in the middle of 1977.

Making Sense of It All

It is true that output growth generally slows following inventory investment booms. This, however, simply reflects the fact that output growth tends to be exceptionally strong during these periods. It is not surprising that output would slow toward its long-run average.

The historical data presented here provide little support for the theory that high inventory investment periods precede economic downturns. Inventory investment booms may instead reflect positive supply shocks or expected increases in aggregate demand—hardly harbingers of bad times.

This is not to say that inventory investment may not provide important clues about the future performance of the economy. But until we have a clearly articulated version of the inventory overhang story that incorporates the effects of different types of disturbances and is consistent with prominent features of the data, we recommend that readers look elsewhere for their economic forecasts—and enjoy the current “overhang” for as long as it lasts.

■ Footnotes

1. We treat the terms “excessive inventories” and “inventory overhang” as shorthand notation for periods with relatively large inventory investment. It is not clear that they have any precise meaning beyond that.

2. Quotations are from *The New York Times*, “As Inventories Rise, Will There be a Ripple Effect?” August 17, 1997; *The San Diego Union-Tribune*, “Economy Displays Abiding Strength,” August 30, 1997; and the *Knight-Ridder/Tribune Business News*, “Expect the Fed to Hold Steady for the Rest of 1997,” August 18, 1997.

3. *The New York Times*, “As Inventories Rise, Will There Be a Ripple Effect?” (footnote 2).

4. Figures are for 1997. Total exceeds 100 percent because of the negative contribution of net exports to GDP.

5. Here, the volatility of a variable is defined as the time average of the absolute changes in that variable, expressed as a percentage of gross output.

6. See Alan S. Blinder and Louis J. Maccini, “The Resurgence of Inventory Research: What Have We Learned?” *Journal of Economic Surveys*, vol. 5, no. 4 (1991), pp. 291–328.

7. If anything, figure 2 provides support for an “inventory underhang” story, since low inventory investment has typically been followed by strong output growth. These data observations are central to the overall negative association between these variables.

8. One must be careful in interpreting the numbers in table 1, since the averages mask tremendous variability in the behavior of GDP and its components following the high inventory investment episodes. Furthermore, the quantitative results are sensitive to the criterion used in defining periods of high inventory investment. The qualitative findings reported here still apply, however.

9. Productivity numbers are for the nonfarm business sector.

Terry J. Fitzgerald is an economist and Jennifer K. Ransom is a senior research assistant at the Federal Reserve Bank of Cleveland. The views stated herein are those of the authors and not necessarily those of the Federal Reserve Bank of Cleveland or the Board of Governors of the Federal Reserve System.

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