Evidence of Improved Inventory Control

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The advent of the computer and changes in business management techniques are commonly believed to have improved inventory control. As evidence of such improvement, most analysts cite the decline in the ratio of inventories to sales in manufacturing. But improved inventory control implies a faster adjustment of inventories to changes in sales as well as a decline in the average ratio of inventories to sales. Moreover, there are other goods-stocking sectors to consider besides manufacturing.

Most economists who relate inventory behavior to the business cycle seem to take for granted that because aggregate inventory-sales ratios have declined in the last decade, inventory cycles have become much smaller. For example, one economist noted that the recent recession "was remarkable for the almost total absence of a recognizable inventory cycle, *so far as one can judge from the behavior of aggregate inventory-sales ratios* [italics added]."[1] The effect of higher speeds of adjustment on inventory investment would, however, tend to offset that of lower inventory-sales ratios in evaluating changes in the size of inventory cycles. Thus, contrary to widely held opinion, improved inventory control can result in increased, rather than reduced, volatility in inventory investment.[2]

The question of whether inventory control has improved is an empirical one whose resolution is the primary purpose of this article. The resolution has important implications for the business cycle because recessions largely turn on the behavior of inventory adjustments.

In the following sections, we first review a popular model of investment that is often used in studies of inventory investment. We then use a basic form of

this model to test the hypothesis of improved inventory control. Our objective is to focus on possible changes in parameters from one period of time to another, not to refine existing models or to add to the existing theory on inventory behavior.[3]

Our findings provide clear evidence of improved inventory control in manufacturing, both in finished goods stocks and in inventories of materials and supplies and work in progress. For retail and wholesale trade, our results are mixed.

Finally, we seek to determine empirically what effect these refinements have had on inventory investment volatility. Our findings show that, contrary to popular belief, investment volatility has increased in both the manufacturing and trade sectors.

A MODEL OF INVENTORY INVESTMENT

In the following discussion, we use a standard partial stock-adjustment model, first presented in Lovell (1961), to test the hypothesis of improved inventory control. In this model, the amount of inventory investment that takes place in a given period, II_t, is the sum of desired, or planned, inventory investment and unanticipated inventory investment. Desired inventory investment during any period t is a fraction s of the difference between the actual stock of inventories KI at the end of the previous period and the desired stock KI^d at the end of the current period. In addition, if firms use inventories as a buffer against unexpected demand shocks, any deviation of sales from expected sales will result in unintended inventory investment.

$$(1) \quad II_t = s \cdot (KI_t^d - KI_{t-1}) - c \cdot (S_t - S_t^e)$$

where S_t is sales and S_t^e is expected sales. The variable s is commonly referred to as the "speed-of-adjustment" parameter because s determines how fast a given gap between actual and desired inventory

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[1] William C. Melton, Chief Economist, IDS Financial Services, *Wall Street Journal*, September 9, 1991, p. A1.

[2] Bechter and Able (1979) explored the business cycle implications of improvements in inventory control. At the time, inventory data were less rich than desired for establishing clear evidence of improved inventory control, but the data did provide suggestive evidence which, used in simulations, implied smaller but quicker adjustments of inventories to reduced sales.

[3] Blinder and Maccini (1990) provide an excellent summary of recent econometric and theoretical work on inventories.

levels is closed.[4] The variable c measures the extent to which inventories serve as a "buffer stock" against unexpected changes in sales.

We assume that the expected level of sales S^e in period $t+1$ determines the desired stock of inventories for the end of period t (i.e., going into period $t+1$):

(2) $KI_t^d = a + i \cdot S_{t+1}^e$.

The coefficient i measures the change in desired inventories accompanying a unit change in expected sales. Thus, i is the desired *marginal* inventory-sales ratio.[5]

Expected sales are not observed and must be modeled. Theory does not provide one specific method for modeling expected sales. Thus, to avoid introducing an unnecessary source of contention into the model, we represent expected sales as simply as possible by assuming that sales expected in the next period are equal to actual sales S in the current period:[6]

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[4] There are a number of different reasons why a firm would want to hold inventories. The most obvious is to avoid disruptions in sales. To avoid running out of stock, a firm tries to maintain some average desired inventory-sales ratio (which implies some desired marginal inventory-sales ratio). When actual sales differ from expected sales, the firm will miss its targeted average inventory-sales ratio. It then adjusts its desired marginal inventory-sales ratio in the next period to try to get its average ratio back to the original target. Given a production function, the average desired inventory-sales ratio for a firm is influenced by such things as the cost and probability of a disruption in its sales. See Blinder and Maccini (1990) for a brief discussion of this topic.

[5] Inflation and interest rates are among the other supposed determinants of desired inventories. Inflation encourages stockpiling of inventories by increasing the probability that firms can realize a capital gain by holding (investing in) inventories for some relatively short period of time. The real rate of interest might also affect investment decisions since it reflects either the cost of financing or the opportunity cost of holding inventories. Despite the theoretical plausibility of these effects, empirical efforts to establish their significance have been largely unsuccessful. Our effort abstracts from these other variables to focus on the relationship of inventories to sales. We return to interest rates briefly at the end of the paper.

[6] A number of papers have employed more complicated models of expected sales. See, for example, Irvine (1981) or Lovell (1961). Blinder (1986) points out that what is "unexpected" to the econometrician in that it cannot be forecast by some econometric model (e.g., an ARIMA model) may well be "expected" by the firm. Thus, the firm may be able to alter its production plans and its desired inventory level to what appear to be unanticipated shocks to the econometrician. Given this inherent difficulty in establishing a precise model of firms' sales expectations, we view the gains from our admittedly oversimplified model in terms of tractability as outweighing any potential losses in accuracy. Further, re-estimating the equations with several relatively simple alternatives resulted in models with less explanatory power.

$S_{t+1}^e = S_t$.

Equation 2 becomes

(3) $KI_t^d = a + i \cdot S_t$.

Substituting (3) into (1) and substituting for S_t^e yields:

$$II_t = s \cdot (a + i \cdot S_t - KI_{t-1}) - c \cdot (S_t - S_{t-1})$$

which simplifies to

(4) $II_t = a' + b \cdot S_t - s \cdot KI_{t-1} - c \cdot \Delta S_t$

where

s = the speed-of-adjustment parameter;
i = the desired marginal inventory-sales ratio;
$a' = a \cdot s$;
$b = i \cdot s$; and

$$\Delta S_t = S_t - S_{t-1}.$$

The two parameters that we will employ to capture a firm's inventory management behavior are the speed-of-adjustment parameter, s, and the desired marginal inventory-sales ratio, i. Inventory investment, sales, the change in sales and the lagged inventory stock are all observable, so equation 4 may be used as a regression equation. The empirical results yield estimates of the two key parameters, i and s. These estimates are summarized in the following section.

ESTIMATION RESULTS OF THE INVENTORY INVESTMENT MODEL

We test the hypothesis of improved inventory control by considering the possible changes over time in the behavior of manufacturers, retailers and wholesalers. Moreover, we consider both manufacturers' finished goods inventories and their stocks of materials and supplies and work in progress. We disaggregate total business inventories to this extent because inventory behavior may have changed in different ways for different reasons in different sectors. Movements in aggregate inventory numbers might therefore give a misleading picture of the effects of the changes in inventory control.[7]

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[7] Blinder and Maccini (1990) note that most past studies of inventory behavior have been limited to manufacturers' finished goods stocks. They show (and we confirm below) that these inventories are the least variable among major categories. Thus, inventory studies limited to manufacturers' finished goods probably underpredict the volatility of inventory investment in the economy as a whole.

Equation 4 is estimated with quarterly data over two sample periods. The data are constant dollar inventory numbers supplied from the National Income and Product Accounts. The first period extends from 1967 through 1980 for the two manufacturing regressions, and from 1967 through the second quarter of 1979 for the two trade regressions. The second period begins in 1981 for manufacturing and in the third quarter of 1979 for retail and wholesale trade. All second period regressions end with the second quarter of 1991.[8] The estimated coefficients, with other selected results, appear in Tables 1 and 2.

The manufacturing regressions yield the most conclusive results. The estimate of the desired marginal inventory-sales ratio for materials and supplies and work in progress declines from 1.77 (= 0.209/0.118) to 0.52 from the first to the second period, while the estimate of the speed of adjustment rises from 11.8 percent to 48.4 percent.[9] For manufacturers' finished goods, i falls from 0.35 to 0.08 while s increases from 8.9 percent to 36.8 percent. Clearly, manufacturers controlled their inventories much more tightly after 1980 than before 1980.

The results for the trade sectors are inconclusive. In retail trade, the estimates for the desired marginal inventory-sales ratio actually increase from 1.62 to 1.84 from the earlier to the later period, just the opposite of what tighter inventory control would imply. On the other hand, the estimate of the speed-of-adjustment parameter increases significantly, from 28.4 percent to 47.4 percent, consistent with the hypothesis of tighter inventory control. In wholesale trade, the estimates move in the right directions, but the changes are small and insignificant: the desired marginal inventory-sales ratio decreases from 1.44 to 1.19 while the speed-of-adjustment parameter rises from 13.5 percent to 20.0 percent.[10] The results

for the trade sectors thus neither confirm nor reject the hypotheses of improved inventory control in the trade sectors.

Behavior of the Parameters over Time

We turn now to the question of how the parameters changed over time. Intuitively, we felt the parameters were unlikely to display constancy in the earlier period, abrupt changes at the break point, and then constancy again. Instead, we thought a gradual transformation more likely.

To observe this process, we ran rolling regressions to obtain a time series of coefficients.[11] Each regression covered 40 calendar quarters of data. In each successive regression, a new quarter was added to the end of the sample period and an old quarter was deleted from the beginning. These rolling regressions produced a time series for each of the regression coefficients from 1977:2 through 1991:2.[12]

The results of the rolling regressions are presented in Charts 1-8. Two parameter charts are displayed for each sector: the desired marginal inventory-sales ratio and the speed of adjustment.[13]

For manufacturers' inventories of materials and supplies and work in progress, Charts 1 and 2 show generally steady improvement in the two key parameters. The speed-of-adjustment parameter moves steadily up while the desired marginal inventory-sales ratio trends downward. The most noteworthy movements in the parameters occur over

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[8] The justification for the timing of the breaks is discussed in the appendix. Data for these series (seasonally adjusted quarterly data in 1982 dollars) are not available for years before 1967.

[9] An acknowledged flaw in the partial stock-adjustment model is that it tends to produce implausibly low speed-of-adjustment estimates [see Blinder and Maccini (1990) for a brief discussion of this issue]. Thus, it follows that our results may be biased downward also. We maintain, however, that the changes in the regression coefficients from the earlier period to the later period are made no less meaningful by such bias. There seems to be little reason why the results of one period would be more biased than the results of the other. Further, the measures of goodness of fit are relatively stable across periods, indicating that the model is no more or less misspecified from one period to the next.

[10] The change-in-sales variable was left out of the final form of the wholesale trade regressions because it was insignificant. Results including the variable were virtually the same as the reported results.

[11] We first tried forming a time series of coefficients by repeatedly regressing equation 4, adding one quarter to the sample period each time. This "updating formulae" method generally provided disappointing results because the marginal influence of one quarter of data was negligible once the number of observations became relatively large. Technical treatments of both the updating formulae method and a version of the rolling regression technique are available in Brown, Durbin and Evans (1975).

[12] Rolling regressions of shorter lengths (e.g., 30 quarters) were too noisy. As a result, we have no reliable measure of how the key parameters behaved during the first oil crisis in 1973 and 1974. Our intuition is that desired marginal inventory-sales ratios and speed-of-adjustment parameters fluctuated dramatically during this period, perhaps imposing a significant effect on the aggregate results in Tables 1 and 2. In fact, the data from tests using the updating formulae method show sharp movements over this period, but a combination of low degrees of freedom and often insignificant coefficients in the regressions imply that the results are totally unreliable.

[13] Each observation is assigned to the endpoint of the 40-quarter sample period over which that regression is run (e.g., the coefficients obtained from the regression over the period 1979:1 through 1988:4 are assigned to 1988:4).

Table 1

Regression Results

1967:2 through 1980:4 for manufacturing sectors

1967:2 through 1979:2 for trade sectors

| | REGRESSION COEFFICIENTS | | | OTHER SUMMARY STATISTICS | | | | |
SECTOR	SALES	CHANGE IN SALES	LAGGED STOCK	DESIRED MARGINAL I-S RATIO	R̄ SQ	SEE	D.W.	AR1
MANUFACTURING: MATERIALS AND WORK IN PROGRESS	0.209 (6.6)	−0.115 (−2.2)	−0.118 (−5.6)	1.77	0.62	1.20	2.18	YES
MANUFACTURING: FINISHED GOODS	0.031 (1.8)	−0.094 (−2.9)	−0.089 (−2.2)	0.35	0.21	0.81	1.95	YES
RETAIL TRADE	0.461 (5.8)	−0.289 (−1.7)	−0.284 (−5.7)	1.62	0.40	1.23	1.94	YES
WHOLESALE TRADE	0.194 (2.4)		−0.135 (−2.2)	1.44	0.16	1.19	2.00	YES

Table 2

Regression Results

1981:1 through 1991:2 for manufacturing sectors

1979:3 through 1991:2 for trade sectors

| | REGRESSION COEFFICIENTS | | | OTHER SUMMARY STATISTICS | | | | |
SECTOR	SALES	CHANGE IN SALES	LAGGED STOCK	DESIRED MARGINAL I-S RATIO	R̄ SQ	SEE	D.W.	AR1
MANUFACTURING: MATERIALS AND WORK IN PROGRESS	0.253 (3.4)	−0.163 (−2.2)	−0.484 (−4.1)	0.52	0.59	1.41	2.11	YES
MANUFACTURING: FINISHED GOODS	0.029 (1.9)	−0.075 (−1.2)	−0.368 (−3.1)	0.08	0.22	1.16	2.13	YES
RETAIL TRADE	0.874 (5.0)	−0.725 (−3.2)	−0.474 (−5.0)	1.84	0.38	2.22	1.92	YES
WHOLESALE TRADE	0.239 (3.8)		−0.200 (3.8)	1.19	0.21	1.53	1.79	NO

NOTE: t-statistics are in parentheses. AR1 indicates whether the regression corrects for first-order serially correlated errors using the Cochrane-Orcutt method. AR1 was employed when the Durbin-Watson statistic was outside of the 5 percent confidence range. D.W. refers to the Durbin-Watson statistic of the reported regression.

MANUFACTURING: MATERIALS AND SUPPLIES AND WORK-IN-PROGRESS SECTORS

Chart 1

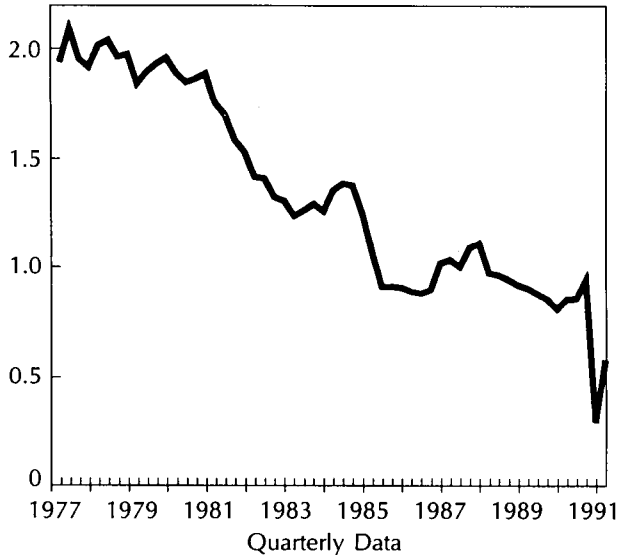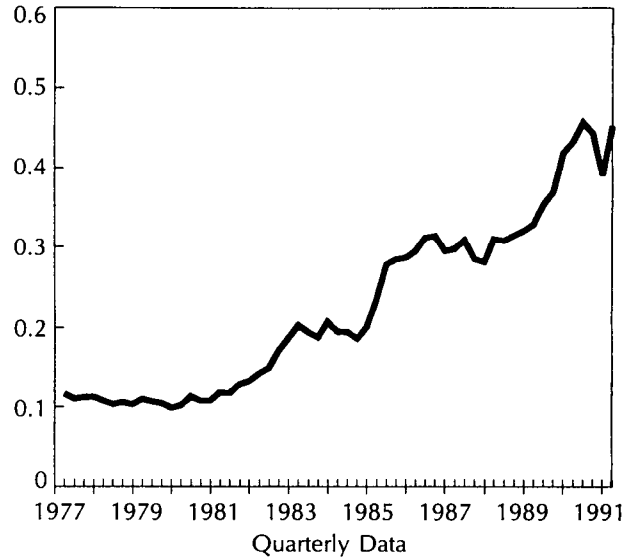**DESIRED MARGINAL INVENTORY-SALES RATIO**

Chart 2

SPEED OF ADJUSTMENT

Quarterly Data

Quarterly Data

the most recent business cycle. The desired marginal inventory-sales ratio and the speed of adjustment temporarily plummet as firms evidently are caught with unusually high stocks of unintended inventories. This behavior contradicts the conventional view, held before the latest recession, that lower inventory-sales ratios would reduce the size of cyclical inventory adjustments.

Manufacturers' finished goods (Charts 3 and 4) show what appears to be a one-time shift in the parameters. The speed of adjustment increases and

MANUFACTURING: FINISHED GOODS SECTOR

Chart 3

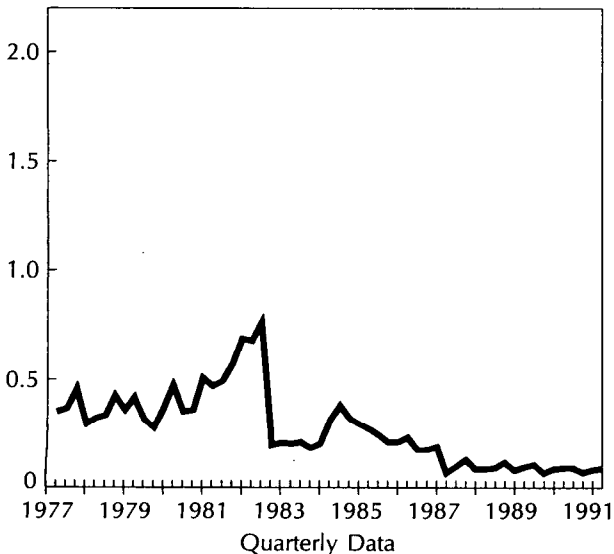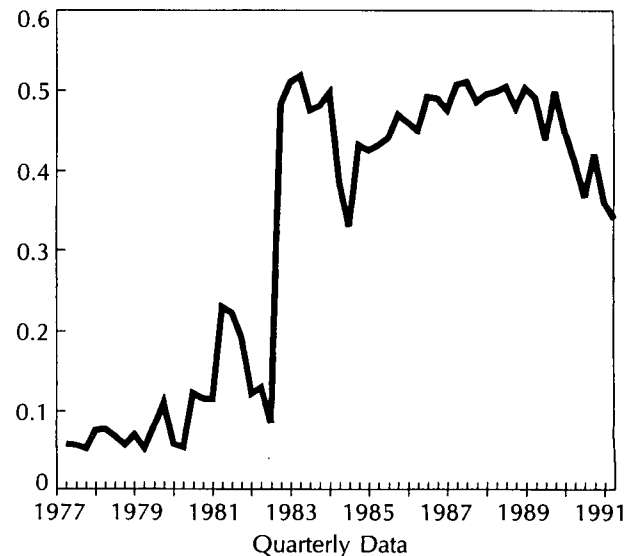**DESIRED MARGINAL INVENTORY-SALES RATIO**

Chart 4

SPEED OF ADJUSTMENT

Quarterly Data

Quarterly Data

the desired marginal inventory-sales ratio decreases from 1982:3 to 1982:4 by relatively large amounts.[14] By 1991, the desired marginal inventory-sales ratio is down to about 0.10, implying that a firm expecting its sales to increase by 10 percent would only want to increase its finished goods inventories by 1 percent. In other words, manufacturing firms appear to be holding extremely small finished goods inventories. Thus, a study of inventory control which focuses only on manufacturers' finished goods will poorly explain the behavior of inventory investment over the last decade or so.

In retail trade, Charts 5 and 6 show no clear trends in the parameters. The hypothesis of improved inventory control is supported by our findings of decreasing desired marginal inventory-sales ratios and increasing speeds of adjustment until about 1984. After then, however, the two parameters move in the opposite directions.

Finally, Charts 7 and 8 provide further evidence that, in wholesale trade, the magnitude of change has been the least of the four sectors. The speed-of-adjustment parameter increases over the period 1982

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[14] Because these series are 40-quarter moving averages, a large change in the speed-of-inventory-adjustment estimate from the 1982:3-ending regression to the 1982:4-ending regression implies a dramatic, sudden modification in the behavior of inventory investment.

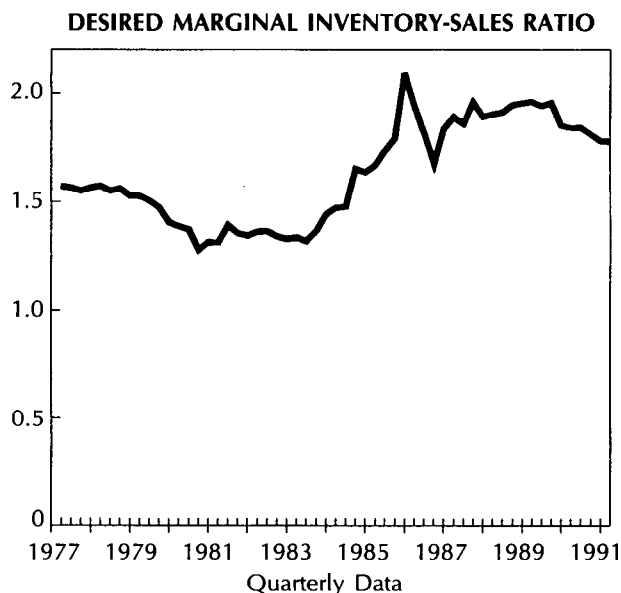to 1984, but the amount of the change is relatively small. The desired marginal inventory-sales ratio does appear to trend downward, but does not exhibit the kind of dramatic movements characteristic of the other three sectors.

In sum, the results of the rolling regressions for the manufacturing sector suggest a fairly sharp change in the inventory control parameters for finished goods and a steady but larger change in those for materials and supplies and work in progress. Our hypotheses concerning the parameters that determine inventory control behavior are supported by strong evidence for the manufacturing sectors. In the trade sectors, however, the key parameters wander over time.

Implications for Inventory Investment Volatility

Contrary to popular belief, inventory investment is not less volatile today. Leaner inventories are not a sufficient condition for less variability in inventory investment because increasing speeds of adjustment can more than offset decreases in inventory-sales ratios. Since the regression results show that these two parameters have indeed been moving in opposite directions, the effect on variability becomes an empirical question.

To answer this question, we divide the inventory investment series into two time periods for each

RETAIL TRADE SECTOR

Chart 5

DESIRED MARGINAL INVENTORY-SALES RATIO

Quarterly Data

Chart 6

SPEED OF ADJUSTMENT

Quarterly Data

Chart 7

DESIRED MARGINAL INVENTORY-SALES RATIO
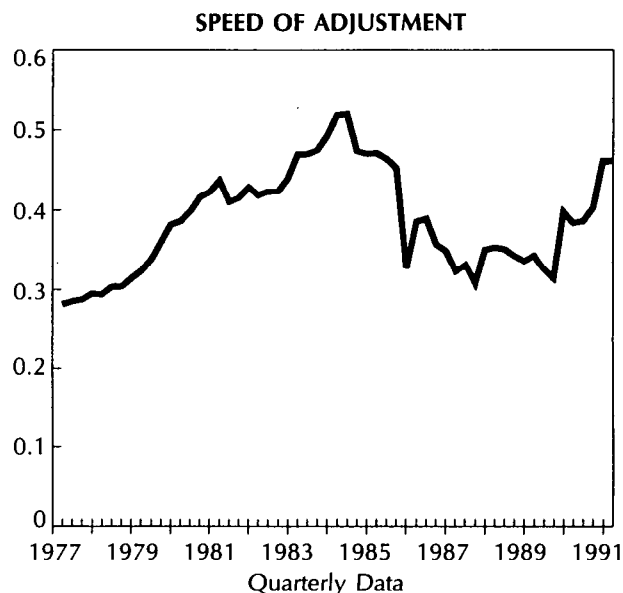
Chart 8

SPEED OF ADJUSTMENT
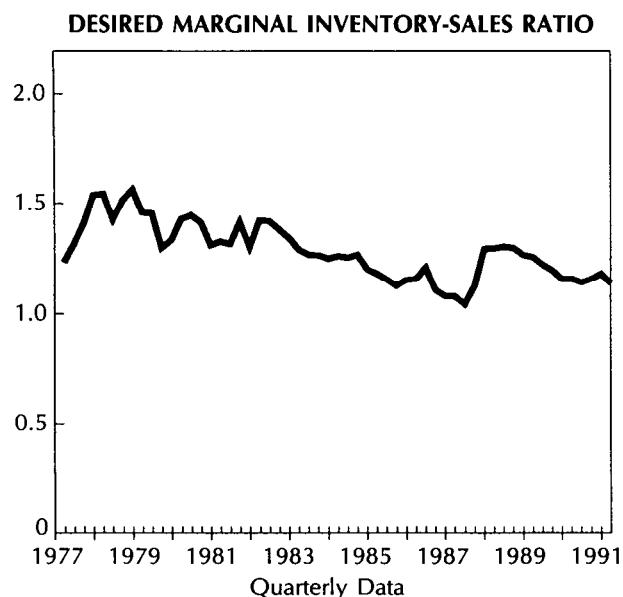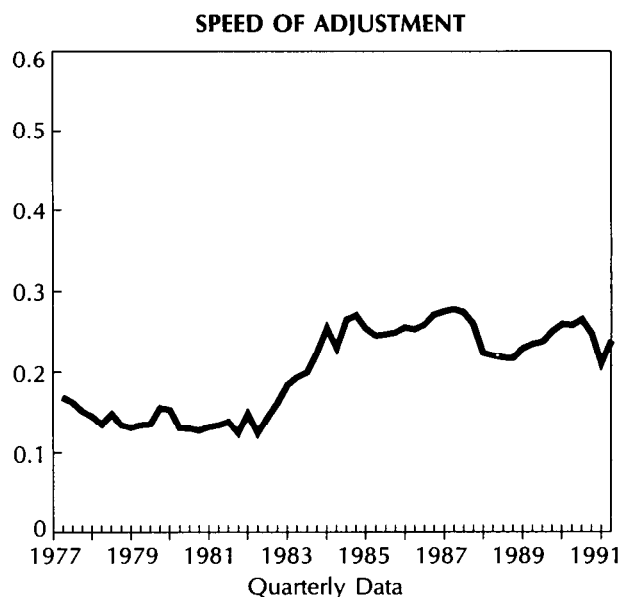
sector according to the break points given in Tables 1 and 2. We then calculate the variance for each of the periods. The results are summarized in Table 3. The investment variances for all four sectors are actually **larger** in the second period. Further, the increase in the variance is statistically significant at the 5 percent level.[15,16] Finally, these statistics confirm that inventory investment by manufacturers in finished goods is the least variable of the four types of inventory investment.

WHY HAS INVENTORY BEHAVIOR CHANGED?

We offer here some tentative explanations of our results. Tests of these hypotheses should provide the basis for further research.

The most obvious explanation for improved inventory control at earlier stages of processing in manu-

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[15] The F-statistic is $F(n_2, n_1) = [s_2^2 / (n_2 - 1)] / [s_1^2 / (n_1 - 1)]$ where s^2 represents variance of the sample, n represents number of observations in the sample and the subscripts denote the first and second sample periods.

[16] It could be argued that the variances in the second period are higher simply because the economy grew. Thus, we repeated the F-tests in Table 3 substituting coefficients of variation (standard deviation divided by the mean) for the standard deviations in the F-statistic formula. As it turns out, the means of inventory investment in all four sectors **decreased** from the first regime to the second so the coefficients of variation provide even stronger evidence of increased inventory volatility.

facturing is the advent of just-in-time techniques in the early 1980s. These procedures imply lower inventory-sales ratios as well as faster speeds of adjustment.

The decline in the ratio of inventories to sales for manufacturers' finished goods suggests that many producers may have switched to selling on a custom-order basis as opposed to selling from stocks as a supermarket does. Producing for orders is consistent with just-in-time arrivals of materials for production lines.

The behavior of real interest rates may have influenced inventory investment. High real rates increase the costs of maintaining high levels of inventories. A sudden increase in real rates corresponds closely with our break points: real rates rose sharply from historically low (in fact, predominantly negative) levels during the late 1970s to historically high levels in the early 1980s. Although attempts to incorporate real interest rates into regression equations like equation 4 have generally been unsuccessful, it is still plausible that real rates have exerted an indirect effect by encouraging cost-saving innovations such as just-in-time.

Finally, the abrupt reversals of the parameters for retail trade reported by the rolling regressions could be due to the change in the structure of the industry in the mid-1980s. In recent years, the market

share of big warehouse discount and specialty stores increased at the expense of traditional department stores. These newer stores have eliminated wholesalers by keeping large amounts of stock on the shelves and, therefore, may maintain higher inventory-sales ratios and adjust their inventory levels less rapidly to changes in retail sales.

Table 3

Variance Results for Inventory Investment

SECTOR	VARIANCE IN SUB-PERIOD 1	VARIANCE IN SUB-PERIOD 2	F-STATISTIC	SIGNIFICANCE LEVEL
MANUFACTURING: MATERIALS AND WORK IN PROGRESS	3.759	4.848	1.698	0.0328
MANUFACTURING: FINISHED GOODS	0.831	1.813	2.874	0.000136
RETAIL TRADE	2.519	8.149	3.303	0.0000275
WHOLESALE TRADE	1.690	2.979	1.763	0.0253

APPENDIX

TIMING OF THE PERIOD SHIFT

Selecting the best place to "break" the data into earlier and later periods proved difficult. Lacking one predominant theory, we used purely statistical tests and criteria to select the break point.

The break points that we ultimately chose maximized the adjusted coefficients of determination (R-Bar Squared) and minimized the standard errors of the estimators for both periods. Our tests indicated, however, that, within a span of about four years, the precise timing of the period shift did not alter the basic results. That is, moving the break point forward or backward by several quarters led to only marginal changes in standard errors and the values of the key parameters (see Tables A1 and A2).

Our statistical criteria led us to choose a different break point for manufacturers' inventories than for trade inventories. Besides being justified statistically, different break points seemed logical because even though manufacturing and trade were probably influenced by common economy-wide developments, they might have had different forces driving the timing of their period shifts.

We tested our choices of break points by adding dummy variables to the basic equation and using a Chow test to determine whether and where there was a structural shift:

(5) $II_t = a' + b \cdot S_t - s \cdot KI_{t-1} - c \cdot \Delta S_t + d \cdot D_t$
$+ e \cdot (D_t \cdot S_t) + f \cdot (D_t \cdot KI_{t-1}) + g \cdot (D_t \cdot \Delta S_t)$

where D_t = the dummy variable = 0 before the break point; = 1 after the break point. We ran the equation 5 regression repeatedly for each of the four categories of inventories, using a different break point each time from 1973 through 1987.

At the break points chosen, the F-statistics for equation 5 regressions were significant (indicating a structural shift) at the 1 percent level for both manufacturing sectors and retail trade. The F-statistic for wholesale trade, however, was not significant at the 5 percent level.[17]

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[17] The F-statistic for the wholesale trade sector has a significance level of 0.32. A discussion of why we picked this break point given these results follows later in the section.

Table A1

Selected Estimation Results for Equations with Break Point at 1979:1

SECTOR	MARGINAL DESIRED INVENTORY-SALES RATIO		SPEED OF ADJUSTMENT		R-BAR SQUARED	
	1967:2-1978:4	1979:1-1991:2	1967:2-1978:4	1979:1-1991:2	1967:2-1978:4	1979:1-1991:2
MANUFACTURING: MATERIALS AND WORK IN PROGRESS	1.74	0.66	0.121	0.369	0.60	0.57
MANUFACTURING: FINISHED GOODS	0.43	0.09	0.056	0.554	0.15	0.23
RETAIL TRADE	1.63	1.84	0.305	0.481	0.42	0.39
WHOLESALE TRADE	1.51	1.19	0.133	0.198	0.18	0.20

Table A2

Selected Estimation Results for Equations with Break Point at 1983:1

SECTOR	MARGINAL DESIRED INVENTORY-SALES RATIO		SPEED OF ADJUSTMENT		R-BAR SQUARED	
	1967:2-1982:4	1983:1-1991:2	1967:2-1982:4	1983:1-1991:2	1967:2-1982:4	1983:1-1991:2
MANUFACTURING: MATERIALS AND WORK IN PROGRESS	1.63	0.10	0.148	0.358	0.69	0.53
MANUFACTURING: FINISHED GOODS	0.47	0.12	0.098	0.356	0.21	0.13
RETAIL TRADE	1.51	1.82	0.330	0.464	0.34	0.35
WHOLESALE TRADE	1.32	1.17	0.149	0.240	0.17	0.21

For each of the two categories of manufacturers' inventories, the chosen break point yielded a local maximum of the F-statistic, but not a global maximum. However, none of the break points yielding higher F-statistics produced estimates with smaller standard errors and larger adjusted coefficients of determination for both periods when used to re-estimate equation 4. Further, the estimates of the key parameters were only marginally changed.

A third-quarter 1979 break point maximizes the F-statistic for retail trade. For wholesale trade, no break point within the period 1978 through 1982 yields a significant F-statistic at the 5 percent level. This confirms our analysis from text Tables 1 and 2 that the changes in the key parameters for the wholesale sector, while in the right direction, are not large enough to indicate any structural change.[18] In sum, the techniques that we used to select break points indicated that our choices were at least as good as any of the alternatives.

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[18] The F-statistic for wholesale trade *is* significant for a range of values of the break points from 1975:4 through 1977:2. The regression results for the equations with the break point at the global maximum (1976:2) do yield substantially lower standard errors and higher adjusted coefficients of determination. However, they also confirm the lack of economically significant structural change (the marginal desired inventory-sales ratio decreases from 1.134 to 1.130 and the speed of adjustment increases from 18.7 percent to 21.4 percent).

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