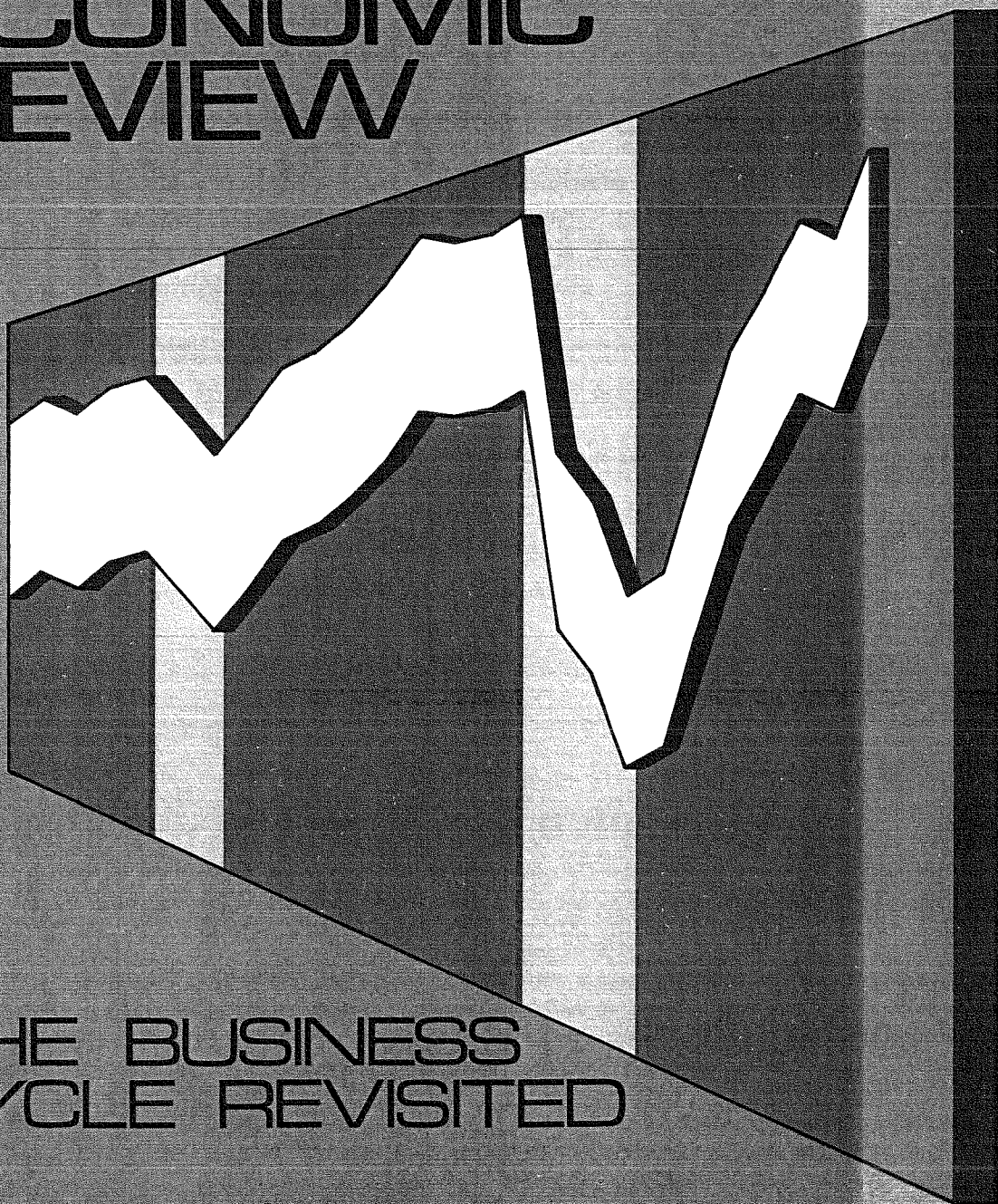


FEDERAL RESERVE BANK  
OF SAN FRANCISCO

# ECONOMIC REVIEW



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# Inflation and the Business Cycle

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This paper examines the characteristics of the five post-Korean War business cycles. We emphasize particularly the most recent recession, which was the severest of the group and was distinguished from the others by a high—and largely unanticipated—rate of inflation. Indeed, there is reason to believe that inflation contributed significantly to the severity of the 1973-75 recession. The magnitude and unexpectedness of this price upsurge led to changes in behavior that were most evident in consumption spending and inventory investment.

Our basic approach is to analyze the contribution of the major sectors of the economy to fluctuations in real output, as measured by gross national product in 1972 dollars.<sup>1</sup> Essentially, we analyze the cycle by identifying the sectors that contribute to cyclical turning points. Additionally, we note the common characteristics of the observed recessions and recoveries of the past

two decades. The recessions have been short in length, while the recoveries have shown considerable regularity in their pattern of growth—but not their duration, which has varied substantially over time.

Our central thesis is that consumption spending and inventory investment were distorted from their usual pattern of behavior in the 1973-75 period, as the high rate of inflation altered the expectations and responses of consumers and businessmen in the recession phase of the cycle. Consumers reacted to the uncertainty introduced by a large and unanticipated inflation rate by restraining expenditures and increasing savings, despite continued increases in income and employment prior to the cyclical peak. Conversely, businessmen reacted to accelerating price increases of materials by increasing their stocks of such goods, despite the decline in real output.

## I. Characteristics of Recoveries

The similarities of the five post-Korean cyclical recoveries can be seen by comparing the cumulative growth of real output for each of those periods (Chart 1). Eight quarters after the cyclical trough, the average annual growth rates ranged between roughly 5 and 6 percent. (For those recoveries which lasted at least twelve quarters, the growth range narrowed somewhat, to about 4 to 5 percent.)

Strong early growth is no particular guarantee of the longevity of recovery (and vice versa), since the first two years of the great 1961-69 expansion represented one of the weakest of all recoveries. Yet that recovery became the longest cyclical expansion in the 123-year annals of the

National Bureau of Economic Research. The current recovery has been at or close to the top of the growth range for its first eight quarters. It should be remembered, however, that that recovery was preceded by the most severe post-Korean recession—and that rapid recovery does not always imply a sustainable recovery.

In all cyclical recovery periods, personal consumption expenditures have constituted the largest share of the increase in total output, varying between 48 percent and 65 percent in individual cycles (Table 1). This magnitude is to be expected, since consumption expenditures generally account for nearly two-thirds of total spending in the economy. Yet despite its size, consumption spending is not the most active sector in promoting the expansion of total output. Consumption

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spending is constrained by income, which in turn equals the total value of the components of output, as described in the usual definitional equation of income determination.

$$Y = C + I + X + G$$

when

Y = income (i.e., market value of output)

C = consumption spending

I = investment spending

X = net exports

G = government spending

Thus, all of the major sectors of the economy contribute to total income, varying in degree from recovery to recovery. But the relation of consumption to income is a special one, with its level determined by the level of income. This relationship—the consumption function—is us-

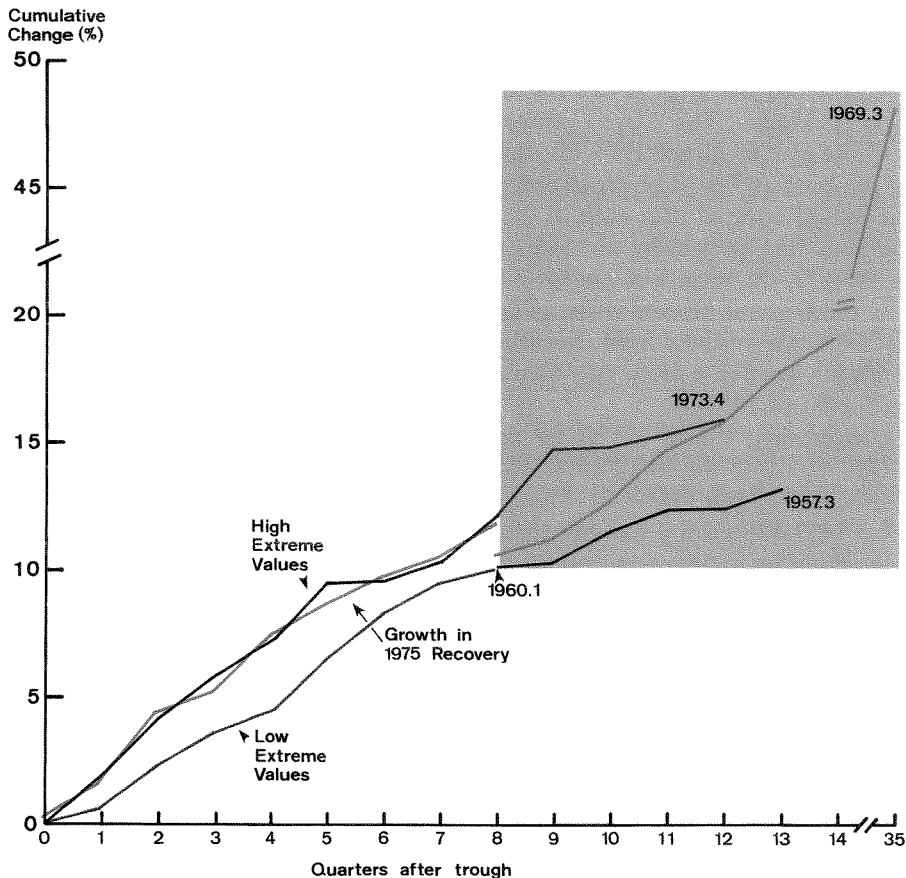
ually defined as

$$C = f(Y_D)$$

where  $Y_D$  is disposable (after tax) income. The relationship is highly stable in the long run but less so in the short run. Changes in fiscal policy may alter after-tax income and hence consumption. Individuals may choose to save rather than consume. Yet short-term shifts in the savings rate are compatible with a stable long-term savings rate in the context of permanent income.<sup>2</sup> (Permanent income is a theoretical concept wherein the individual is regarded as allocating his income over his lifetime rather than limiting its disposition to the year in which it is earned. That is to say, this year's consumption or saving decisions are usually made with an eye to lifetime income.)

Chart 1

CUMULATIVE CHANGE IN REAL OUTPUT IN CYCLICAL RECOVERIES



**Table 1**  
**Cumulative Changes in Major GNP Sectors in**  
**Five Recovery Periods**

(Percent of Change in Real GNP)

	Recovery Period					Average Share
	1954.2- 1956.2	1958.1- 1960.1	1960.4- 1962.4	1970.4- 1972.4	1975.1- 1977.1	
Cumulative change Real GNP	100.0	100.0	100.0	100.0	100.0	100.0
Consumption	61.1	48.3	49.7	64.9	64.6	57.7
Residential Construction	4.9	12.3	7.3	15.6	12.2	10.5
Business Fixed Invest.	16.8	7.1	8.3	12.9	5.5	10.1
Inventory Invest.	15.5	26.3	11.7	5.7	18.7	15.6
Net Exports	4.0	-0.5	-3.4	-1.3	-5.9	-1.4
Government	-2.3	6.5	26.4	2.2	4.9	7.5
<b>Addendum:</b>						
Change in Real GNP (Billions of 1972 dollars)	61.9	77.3	73.9	130.8	135.7	95.9

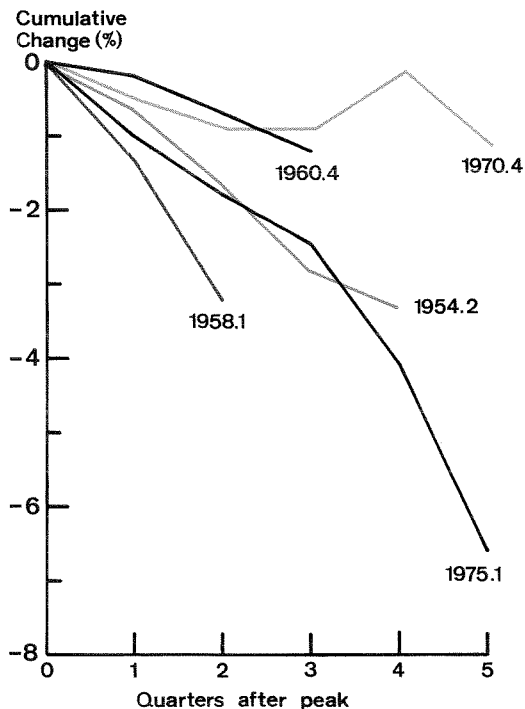
## II. Characteristics of Recessions

A common characteristic of recessions is their relatively short duration—from two to five quarters (Chart 2). And unlike the situation in recoveries, the paths of contraction of real output tend to diverge as recessions continue. The brief 1957-58 recession was the most severe for any two-quarter period. The two longest recessions—those of 1969-70 and 1973-75—were respectively the least and most severe in overall terms of the period covered. Yet each of these lengthy recessions was marked by some unique features. In 1969-70, the recession tended to be prolonged by the General Motors strike of late 1970. In 1973-75, the initially mild downturn culminated after a year in a steep two-quarter decline reminiscent of 1957-58.

Inventory investment stands out as far and away the major factor in the cumulative recession declines in real output (Table 2). The sole exception was 1953-54, when a massive reduction in government spending occurred in the wake of the Korean War demobilization. In contrast, consumption spending has generally contributed least to cyclical downturns, declining only in the 1957-58 and 1973-75 recessions. In both instances, this was due to a fall in durable-goods purchases—chiefly autos, the most volatile portion of consumer spending. In each of these cases, the decline in consumer spending followed a period of exceptionally strong auto sales.

Chart 2

**CUMULATIVE CHANGE IN REAL OUTPUT  
IN CYCLICAL RECESSIONS**



Consumption spending holds up in a recession because the so-called automatic stabilizers—such as unemployment insurance and reduced tax liabilities—cushion the decline in disposable income. But consumption spending, although not declining, does slow down, and the effect is seen in an accumulation of business inventories in excess of their desired levels. In consequence, businessmen do not re-order goods until stocks are reduced and brought into line with their current expectations of sales. This effect is pervasive, for inventories must be reduced at all levels from retailers' shelves to manufacturers' warehouses. As new orders are reduced, production falls and unemployment rises.

This response of inventory investment to changes in consumer spending—the “acceleration principle”—is expressed in functional terms as

$$\Delta I_t = f(S_t - S_{t-1})$$

where current inventory investment ( $\Delta I_t$ ) is governed by sales in the current period ( $S_t$ ) relative to sales in the previous period ( $S_{t-1}$ ). Even when consumption spending is growing, if it grows more slowly than in the past, the change in inventories ( $\Delta I_t$ ) will decline.<sup>3</sup> And it is important to remember, it is the *change* (not the level) of inventories which enters the GNP accounts. The acceleration principle is symmetrical; in the typical recovery, inventory investment is second only to consumption in contributing to the overall expansion of output (Table 1), and as

noted above it accounts for the bulk of recession declines. In recessions, as businessmen's anticipations of rising sales become disappointed, inventory accumulation becomes involuntary, and forces businessmen to reduce stocks.

In the typical recession, a decline in business fixed investment ranks second only to inventory liquidation as a contributor to declining output. The acceleration principle applies to business capital spending as it does to inventory investment, though the time horizon of anticipated sales must be extended. Inventory adjustment is a function of current sales, while capacity-expanding investment in plant and equipment is a function of expected future sales. The expansion of capacity takes time, perhaps as long as a year after funds have been appropriated.<sup>4</sup> However, when excess capacity exists (or increases), expansion plans will be shelved or projects stretched out until the sales outlook improves. The result is a significant reduction in business capital spending.

Largely because of differences in reaction time, consumption spending—not investment—tends to be the leader in each recovery. Consumption decisions may be constrained by income, but investment decisions are conditioned by businessmen's assessment of future demand and the facilities required to meet that demand. Thus, businessmen may not react as quickly as consumers to recovery prospects at the bottom of a recession.

**Table 2**  
**Cumulative Changes in Major GNP Sectors in**  
**Five Recession Periods**  
(Percent of Change in Real GNP)

	Recession Period					Average Share
	1953.2- 1954.2	1957.3- 1958.1	1960.1- 1960.4	1969.3- 1970.4	1973.4- 1975.1	
Cumulative change	-100.0	-100.0	-100.0	-100.0	-100.0	-100.0
Real GNP						
Personal Consumption	+ 8.7	- 18.8	+ 57.6	+ 93.3	- 13.9	+ 25.4
Residential Construction	+ 4.4	- 2.7	- 56.5	+ 4.2	- 22.8	- 14.7
Business Fixed Invest.	- 4.9	- 26.5	- 17.6	- 76.7	- 22.1	- 29.5
Inventory Invest.	- 45.1	- 47.1	-202.3	- 83.3	- 56.3	- 86.8
Net Exports	+ 13.6	- 21.1	+ 45.9	+ 7.5	+ 8.8	+ 10.9
Government	- 76.7	+ 16.2	+ 72.9	- 45.0	+ 6.3	- 5.3
Addendum:						
Change in Real GNP (Billions of 1972 dollars)	- 20.6	- 22.3	- 8.5	- 12.0	- 81.5	- 29.0

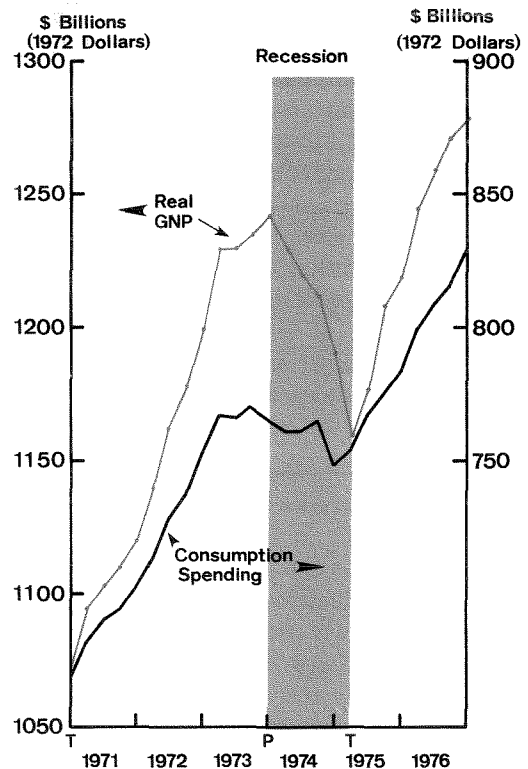
### III. The Different Recession

Business cycles vary because of contemporary forces which determine the length and vigor of expansion and the severity of recessions. Nonetheless, all of the cycles before the 1973-75 recession had certain common elements. Inventory liquidation occurred early in each recession and increased most in each recovery. But the 1973-75 recession was different; inventory liquidation came late in the downturn and consumption spending declined even before the 1973 peak was reached.

This recession was not only the most severe of the post-World War II period, but the inflation which accompanied (and preceded) it was unparalleled since the price upsurge of 1946-47, caused by the unleashing of pent-up wartime demand and the easing of price controls. Prices generally remained stable through most of the next two decades, and then the inflation rate edged up to the range of 4½-5 percent from 1968-1972. In 1973, the U.S. experienced the world-wide inflation that was raging and which peaked domestically at nearly 14 percent late in 1974. As a result, consumers were doubly punished during the recession, by an inflation-caused reduction in real income and then by increasing unemployment.

Consumption spending, which had been a firm source of support in the expansion that began in 1971, faltered in mid-1973 (Chart 3). It levelled off in the late stages of the expansion, and peaked in the third quarter of the year—one quarter ahead of real output. It was not until

Chart 3  
REAL GNP AND CONSUMPTION SPENDING



1975.3, eight quarters later, that the 1973.3 level of real consumer spending was again reached and surpassed. As in the 1953-54 and 1957-58 cycles, consumer spending for goods (not services) bore the brunt of the decline in spending.<sup>5</sup>

### IV. Consumption: Inflation and Savings

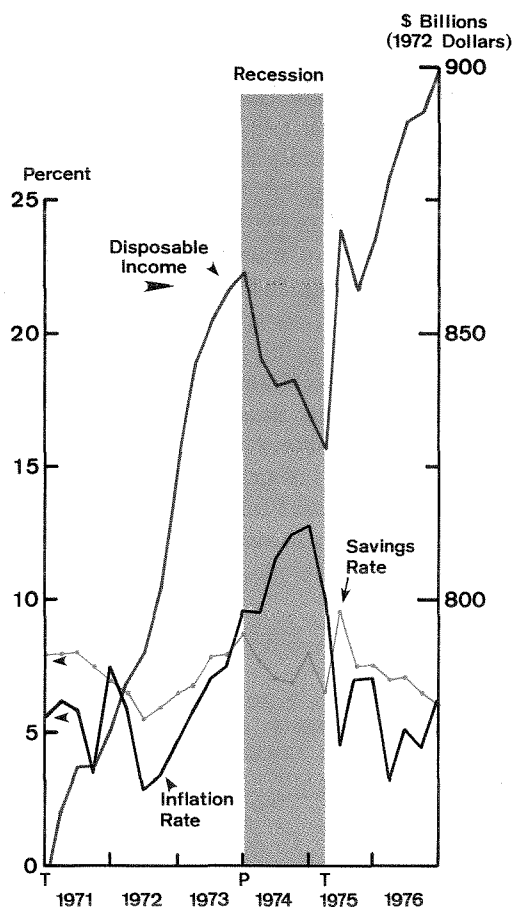
In making their consumption and saving decisions, consumers were at least as sensitive to the inflation rate as they were to changes in real income during the 1971-76 period (Chart 4). In reviewing this period, Joseph Bisignano has noted that individuals tend to react to unanticipated inflation by increasing their rate of saving.<sup>6</sup> Savings generally declined in 1971-72 as inflation decelerated, and then rose in 1972-73 as inflation accelerated. The parallel was not exact; in fact, the savings rate dipped in 1974 when the inflation rate peaked, as the decline in real disposable income indicated that there are limits

to the displacement of consumption by saving. But then the relationship was re-established in 1975, as the inflation rate and the savings rate declined together.

The general consumer response to inflation of the unanticipated magnitude of 1973-75 was an evident decision to reduce spending and increase saving. Even in 1973, despite rising employment and disposable income, real consumption recorded a slight decline. Moreover, consumers responded, then and later, to the differential impact of inflation on different sectors of consumption. From peak to trough, real purchases

Chart 4

INCOME, INFLATION and the SAVINGS RATE



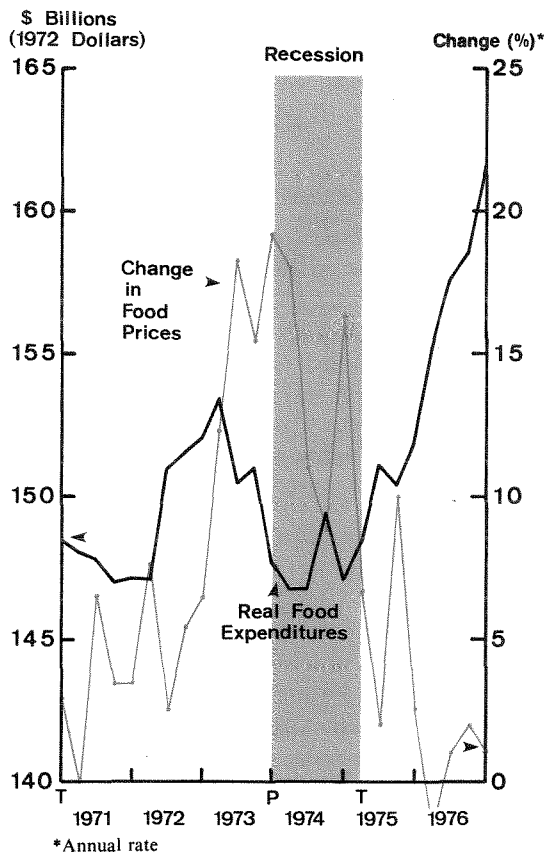
of durable goods declined by more than 15 percent, while purchases of nondurable goods fell more than 3 percent. At the same time, despite sharply rising prices of services, expenditures in that category rose 4½ percent, with housing services rising by 9½ percent.

This pattern reflects the ability of consumers to seek and respond to possible substitutes. Durable goods by their nature are deferrable. In addition, there is a high degree of substitutability

in food expenditures. The demand for food as such is highly inelastic at some point, since it is necessary to sustain life. Yet real expenditures for food declined early in 1973 in the face of a 12 percent (annual rate) rise in food prices, and spending remained depressed for three years (Chart 5). Consumers were quick to adjust the contents of their market baskets on the basis of relative prices, reducing their consumption of meat and processed foods and increasing their consumption of fresh fruits and vegetables.<sup>7</sup> In contrast, there was less possibility for substitution in housing, because of market rigidities and transaction costs, such as leases and costs of search and moving.

Chart 5

REAL FOOD EXPENDITURES AND CHANGES IN FOOD PRICES



## V. Inventories: Inflation Factor

Unlike consumers, businessmen in the 1973-75 period generally did not restrict their expenditures and increase their savings in the face of inflation. Inventory investment, which typically turns down early in each recession, did not do so in this case until real output bottomed out, and liquidation of stocks continued through the first three quarters of the recovery (Chart 6). Quite atypically, the inventory sector eased the rate of decline in real output in 1974, and then held down the rate of growth in the early stages of recovery. The continued inventory build-up of 1974, in the face of declining consumption and real output, might be explained in terms of such factors as involuntary accumulation of stocks. However, special mention should be made of the

inflation expectations of businessmen engendered by a rapid run-up in materials prices.

The sharp rise in wholesale prices in 1974 helps explain much of the behavior of inventories at that time, reflecting the fact that changes in stocks of materials and work in progress are three times as volatile as changes in stocks of finished durable goods.<sup>8</sup> Durable goods producers responded to the inflationary rise in the wholesale prices of materials—which reached rates of 30-40 percent in late 1974—by increasing their inventories of materials relative to stocks of finished goods, possibly in anticipation of further price increases (Chart 7). This took place a year after consumer demand had softened and while total real output was already declining. Thus, expectations of price inflation apparently had a more significant impact than business sales expectations upon inventory investment policy in the most recent cycle.

Chart 6

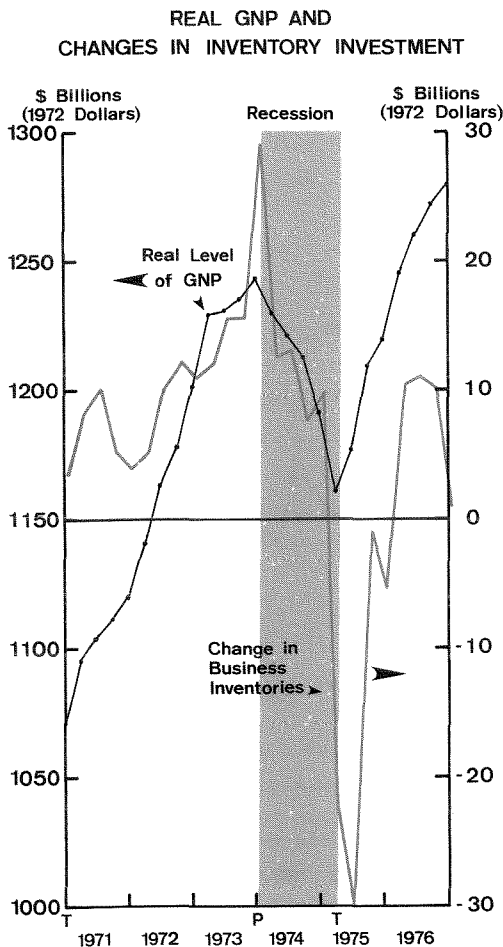
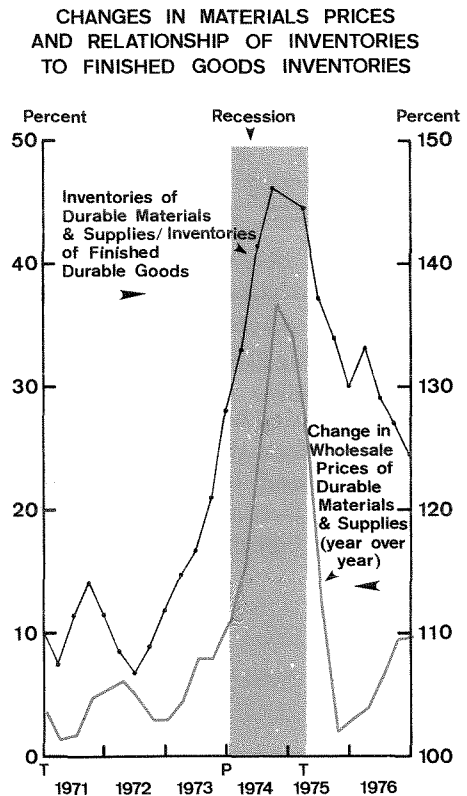


Chart 7





## VI. Summary and Conclusions

A high and unanticipated rate of inflation significantly altered the profile of the most recent business cycle, causing it to differ from the average of other recent cycles. This is clearly apparent from an examination of consumption spending, which normally dominates most recession movements.

The recent behavior of consumers suggests that they may exert a considerable amount of autonomous control over their aggregate level of spending in the short run. This is not inconsistent with the view that consumption in the long run is endogenous to the system and is a stable function of income. However, the mood of the consumer—whether optimistic, cautious, or just plain uncertain—can generate major changes in the savings rate.

Consumers, faced with much greater than expected inflation in the early 1970's, became uncertain and reacted by spending less and saving more, even before real output and employment had started to decline. Businessmen, on the other hand, continued to add to their inventories after output and consumption had turned down, accumulating stocks in anticipa-

tion of continued materials price increases. To some extent, then, the inflation that caused the consumer to pull in his horns and restrict his spending also induced the businessman to spend more, in response to inflation rather than demonstrated final demand.

The principal lesson for the future is that inflation cannot be lightly regarded as a factor in the business cycle, particularly when that inflation is unanticipated. Because of inflation, the profile of the last cycle was substantially altered from the typical cycle sequence. Reduced consumer spending reduced the rate of growth prior to the cyclical peak. Conversely, continued inventory investment during most of the recession cushioned the decline in real output. However, when the inventory adjustment came, it was swift and severe. In the ensuing recovery, inventory policy has been fairly conservative while the consumer savings rate has receded, reflecting the reduced rate of inflation. Yet, since the severe and unexpected inflation of the 1973-74 period apparently contributed to the distortions evident in the most recent cycle, future episodes of this type should not be ruled out.

### FOOTNOTES

1. The reference cycle turning points are determined by the National Bureau on the basis of the behavior of economic indicators representing all sectors of the economy, such as employment, prices, costs and profits and other measures that range beyond production and income as represented by real gross national product. Many of these series are monthly series, and the reference turning points are designated on a monthly basis. Suppose that a series which coincides with cyclical movements, such as the index of industrial production, bottoms out in April and then starts to rise. April may then be the reference trough date, but since output will be rising in May and June, real GNP may rise in the second quarter, making the first quarter the trough for real GNP.

See Victor Zarnowitz and Charlotte Boschan, "Cyclical Indicators: An Evaluation and New Leading Indexes," **Business Cycle Digest**, U.S. Department of Commerce, May 1975, pp. v-xiv; **Cyclical Analysis of Time Series; Selected Procedures in Computer Programs**, Gerhard Bry and Charlotte Boschan, Technical Paper 20, National Bureau of Economic Research, New York: 1971, Chapter 3.

2. Albert Ando and Franco Modigliani, "The Life Cycle Hypothesis of Saving: Aggregate Implications and Tests," **American Economic Review**, LIII, March 1963, pp. 79-80. The authors state that when income declines, the savings rate will also fall. This happened in recessions prior to 1969-70 and 1973-75; in which the savings rate rose in the recession. See also Bert G. Hickman, **Growth and Stability in the Postwar Economy**, Brookings Institution, Washington: 1960, pp. 259-261.

3. Michael K. Evans, **Macroeconomic Activity**, Harper & Row, New York: 1969, pp. 373-375.

4. Shirley Almon, "Lags Between Investment Decisions and their Causes," **Review of Economics and Statistics**, vol. 50, 1968, pp. 193-206.

5. **Economic Report of the President**, 1955, p. 15; 1959, p. 12.

6. J.R. Bisignano, "The Effect of Inflation on Savings Behavior," **Economic Review**, Federal Reserve Bank of San Francisco, December 1975, pp. 25-26.

7. **Agricultural Statistics 1976**. U.S. Department of Agriculture, U.S. Government Printing Office, Washington: 1976, p. 561.

8. Feldstein and Auerbach have recently taken issue with the "conventional wisdom" regarding inventory policy. Heretofore, inventory changes—especially in durable-goods manufacturing—have been considered to be a lagged response to corporate sales expectations, as expressed in new orders or unfilled orders. According to this reasoning, if sales expectations are disappointed, the increase in finished-goods inventories reflects both the shortfall in sales and the original intended increase in inventories. Feldstein and Auerbach question this theory of lagged response; they contend that the adjustment process is much more immediate, taking place largely within the current quarter, but also incorporating a longer-term period of adjustment to a "desired" level of inventories. The short lags in this model would lead us to expect a prompt response to inflation of the 1973-74 type. Martin Feldstein and Alan Auerbach, "Inventory Behavior in Durable-Goods Manufacturing: The Target-Adjustment Model," **Brookings Papers on Economic Activity**, 1976, pp. 351-392. D.A. Belsley, **Industrial Production Behavior: The Order-Stock Distinction**, North-Holland Publishing Company, Amsterdam, 1969, pp. 18-27, pp. 43-47.