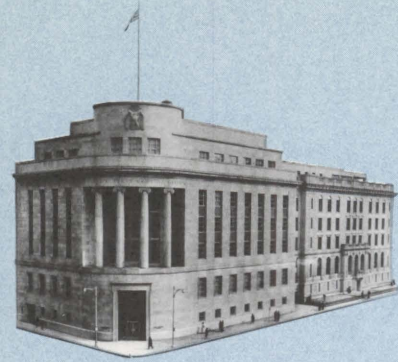


July/August 1973



FEDERAL RESERVE BANK OF BOSTON

NEW ENGLAND ECONOMIC REVIEW

A New Deflated Composite Index of Leading Indicators

A new index of leading indicators, deflated to eliminate price changes, suggests that the momentum of the economy's advance has already slowed. Since late 1972, most of the accelerating gains in the published index of leading indicators reflected inflation.

Interest-Rate Ceilings and the Treasury-Bill Market: Disintermediation and the Small Saver

This article describes how high interest rates paid on Treasury bills in 1969-70 affected small savers and financial institutions.

The New England Economic Review is produced in the Research Department. Mrs. Ruth Norr is the Editor. The authors will be glad to receive comments on their articles.

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A New Deflated Composite Index of Leading Indicators

CAROL S. GREENWALD*

THE large gains in the Commerce Department's composite index of leading indicators during the past year have overstated the economy's strength because much of the recent rise in that index reflects inflation. Since the current rate of inflation is the highest experienced in over 20 years, inflationary distortions have made the published index a less reliable signal of changes in real activity than in the past. Clearly, a deflated index of leading indicators is needed to eliminate the effect of price changes.

For this reason, a deflated composite index of leading indicators was constructed at the Federal Reserve Bank of Boston. A comparison of the Boston index of deflated leading indicators and the published Commerce Department index indicates first, that the acceleration in the rate of increase in the published index from November to March reflected inflation and secondly, that the rebound in the index in May was also largely due to price increases. The slowing rate of advance in the deflated index since the fourth quarter of 1972 presages a decline in the growth rate of real GNP.

This article will compare the performance of the undeflated index of leading indicators with the Boston index of deflated leading indicators both during the current expansion and over the past 20 years. A detailed technical appendix explains how the Boston index was calculated.

Updating the Published Commerce Department Index of Leading Indicators

Since the Boston index of deflated leading indicators was calculated from the latest data, which incorporated all the historical data revisions available through mid-July of this year, it was necessary to update the published Commerce Department index with these revisions to make comparisons between the two indexes meaningful. An updated, undeflated leading indicators index which includes all the series from the published Commerce Department index was, therefore, calculated for comparison with the Boston index of deflated leading indicators. This is the updated index referred to in the article. The Commerce Department does not immediately revise the leading indicators series historically when the component series have annual revisions.¹ Chart 1 compares this updated, undeflated leading indicators index with the published index.

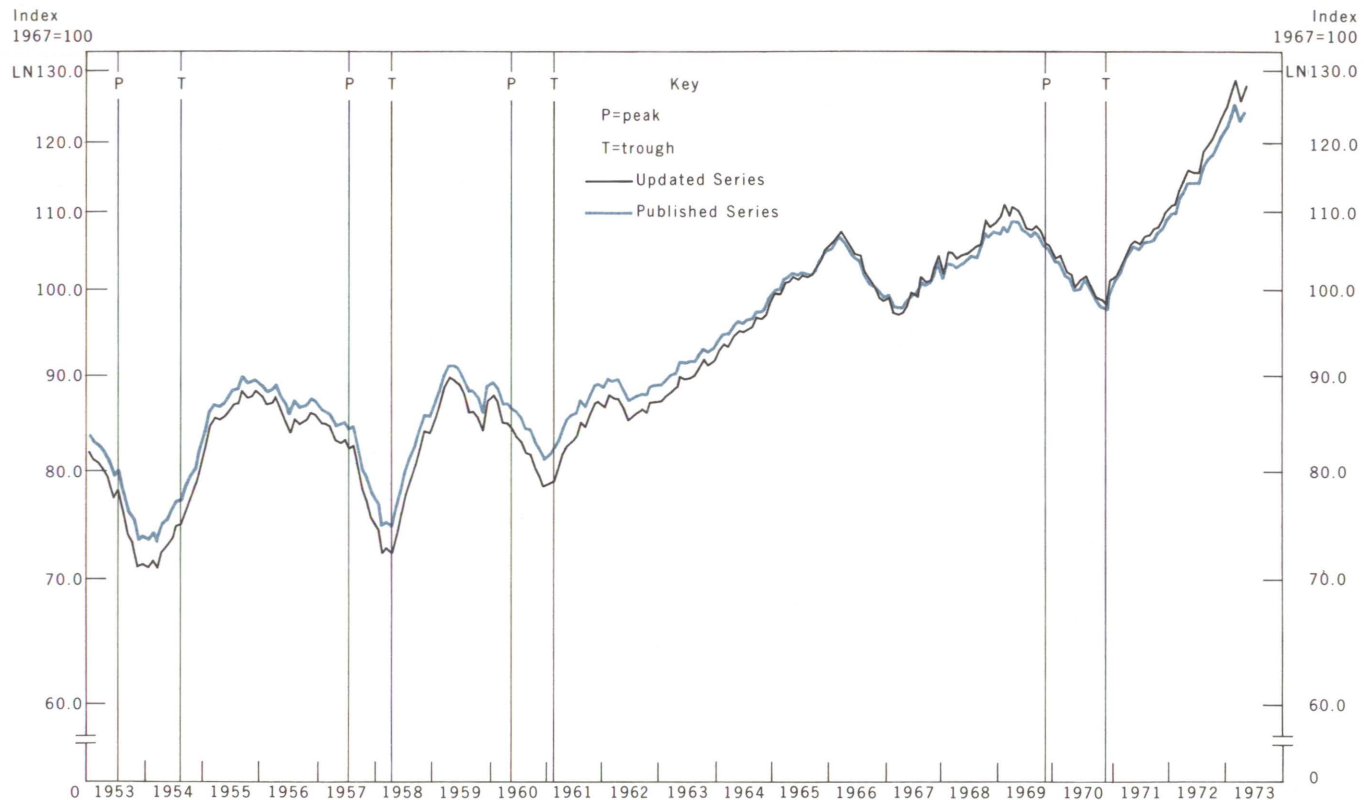
The updated index is compared with our new Boston index in Chart 2. Historical data

* Assistant Vice President and Economist.

¹ Periodically, the Commerce Department does revise the composite index to incorporate revised historical data for, and changes in the relative amplitudes of, the individual component series. The index was last revised in February 1971. A newly revised index was not available when this study was made but an updated index is expected to be published in the August issue of the *Business Conditions Digest*.

Chart 1

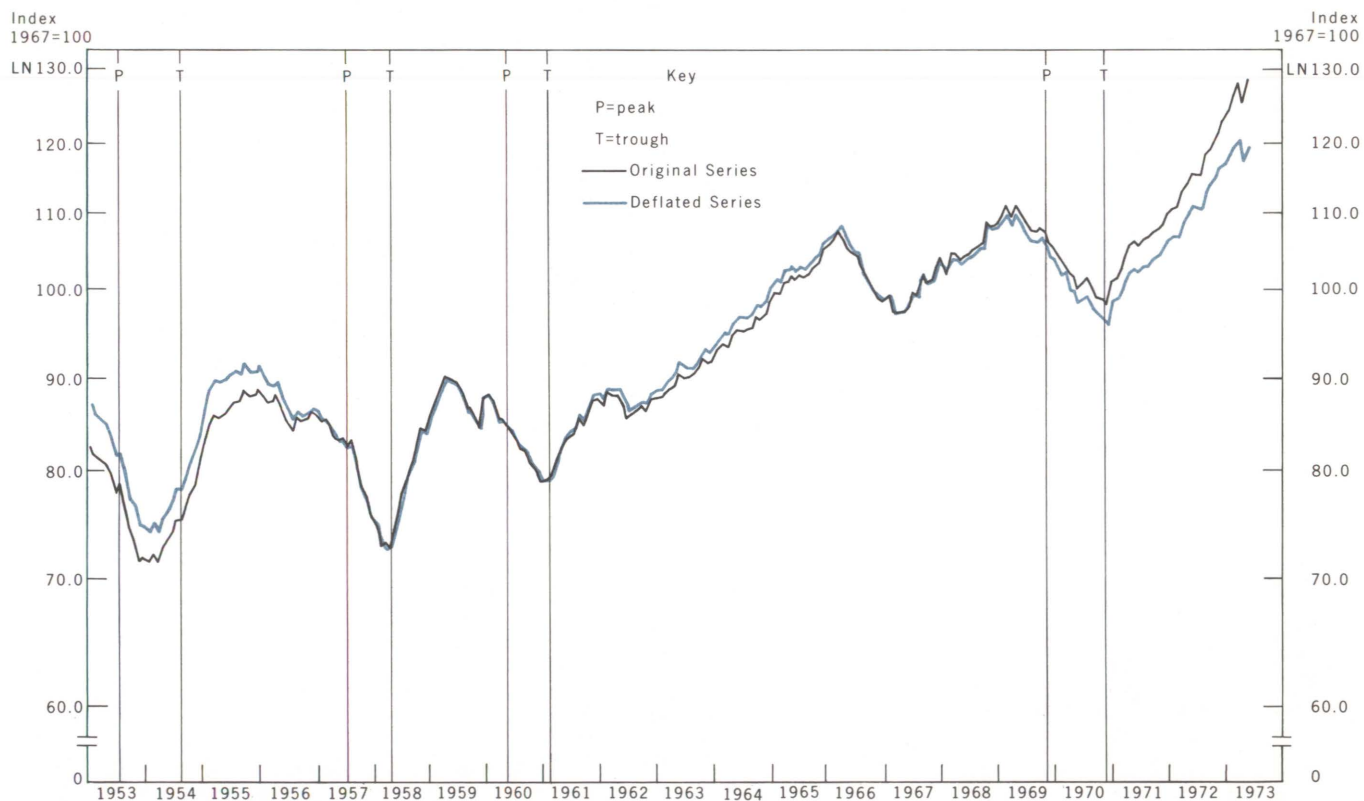
A COMPARISON OF THE PUBLISHED AND UPDATED INDEXES



NOTE: Because at the time of this publication the U.S. Dept. of Commerce calculated its May 1973 index with only eight leading indicators, the updated index was limited to the same ones.

Chart 2

A COMPARISON OF THE UPDATED AND BOSTON DEFLATED INDEXES



The important factor is the growth rate of the deflated index, not whether it is above or below the level of the undeflated index. Both indexes have a base of 1967=100. Since prices have an upward trend, the use of this base means that the deflated series had to be divided by numbers lower than 100 before 1967, thus raising its absolute level relative to the undeflated series. That is why in all years prior to 1967, the level of the deflated series is higher than the undeflated index. This statistical effect does not affect the series' growth rates or turning points which are the important factors.

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Table 1

**SERIES USED TO CALCULATE
THE BOSTON INDEX OF DEFLATED LEADING INDICATORS**

Series Left Unchanged

1. Average workweek of production workers, manufacturing
2. Average weekly initial claims for unemployment insurance, state programs
3. Index of net business formation (1967=100)
4. Index of new private housing units authorized by local building permits (1967=100)
5. Index of stock prices, 500 common stocks (1941-43=10)

Series Deflated

1. Index of industrial materials prices (1967=100)
2. Corporate profits after taxes
3. Manufacturers' new orders, durable goods industries
4. Contracts and orders for plant and equipment
5. Ratio, price to unit labor cost index, mfg. (1967=100)
6. Net change in consumer instalment credit
 - a. Automobile paper
 - b. Other consumer goods paper
 - c. Repair and modernization loans
 - d. Personal loans
7. Change in book value of manufacturing and trade inventories, total
 - a. Manufactured goods
 1. Durable
 2. Nondurable
 - b. Retail goods
 1. Durable
 2. Nondurable
 - c. Merchant wholesale
 1. Durable
 2. Nondurable

Deflator Used

- Wholesale price index, all commodities
- A deflated series for corporate profits is published by the U.S. Department of Commerce.
- Wholesale price index for durable manufactured goods
- Implicit price deflator for nonresidential fixed investment
- Wholesale price index for manufactured goods and the consumer price index, all items
- Consumer price index for private transportation
- A combination of the consumer price indexes for apparel commodities and for housefurnishings
- The consumer price index for maintenance and repairs, a subcomponent of the consumer price index for housing
- Consumer price index for health and recreation
- Wholesale price index for durable manufactured goods
- Wholesale price index for nondurable manufactured goods
- Wholesale price index for consumer finished goods, durable
- A combination of two components of the wholesale price index for consumer finished goods: food and other nondurable goods
- Wholesale price index for durable raw or slightly processed goods
- Wholesale price index for nondurable raw or slightly processed goods

for both of these series are included in the technical appendix on page 17. The series used to eliminate price effects in the deflated Boston index are shown in Table 1.

The Current Expansion

During the last year, the gap between the deflated and undeflated indexes of leading indicators has increased markedly as the undeflated index continued to rise at accelerating rates while the Boston deflated index began to rise more slowly. As Table 2 shows, from November 1970 to November 1972, there was little difference in the average monthly change in the indexes. The undeflated updated index rose by .90 percent per month and the Boston deflated index rose by .82.

Table 2
GROWTH RATES IN
LEADING INDICATORS
(Average Monthly Compound Growth Rates)

	<i>Updated Index</i>	<i>Boston Deflated Index</i>
Nov. 1970-May 1972	.91	.83
May 1972-Nov. 1972	.87	.78
Nov. 1972-Mar. 1973	1.54	.87

In late 1972, the rapid upsurge in the wholesale prices of farm products and industrial materials began. Reflecting the inflation, from November to March 1973, the rate of increase in the undeflated series accelerated to 1.54 percent per month. The accelerated rate of increase in the leading indicators was widely hailed at the time as indicating continued strength in the boom. The *Wall Street Journal* noted in March that "Continued strong economic growth in the months ahead was signaled by a 1.8 percent jump in February in the

Table 3
INDEXES OF
LEADING INDICATORS

<i>Date</i>	<i>Published Index</i>	<i>Updated Index</i>	<i>Boston Deflated Index</i>
<i>1972</i>			
Jan.	109.9	110.9	107.1
Feb.	109.9	111.0	107.0
Mar.	112.2	113.2	109.1
Apr.	112.8	114.4	110.2
May	114.2	115.8	111.4
June	114.1	115.7	111.1
July	114.1	115.7	111.0
Aug.	116.5	118.6	113.4
Sept.	117.4	119.6	114.4
Oct.	118.1	120.4	115.4
Nov.	119.3	122.0	116.7
Dec.	120.9	123.7	117.1
<i>1973</i>			
Jan.	122.3	125.4	118.6
Feb.	124.1	127.8	120.0
Mar.	125.8	129.7	120.8
Apr.	123.2	126.6	117.5
May*	124.6	130.2	119.6

* Our indexes for May include a revision in new orders for manufacturers' durable goods and two series (change in consumer instalment debt and change in manufacturing and trade inventories) which the published index does not include. When we remove the May change in consumer debt and in manufacturing and trade inventories from our indexes, our updated and deflated index values are 128.6 and 118.3, respectively.

government's composite index of leading indicators."² In April, the *New York Times* quoted government economists who called the March increase in the overall index a "good sign" for future economic performance.³ The larger gains in the index, however, merely reflected price increases. As Table 2 shows, the

² *Wall Street Journal*, March 29, 1973, p. 3.

³ *New York Times*, April 27, 1973, p. 47.

rate of increase in the deflated series in this same period had remained essentially unchanged. The gap between the growth rates of the two series jumped to 67 basis points.

If the Boston index had been available in the first quarter, the enthusiasm with which the leading indicators data were greeted would have been considerably tempered because it

would have been clear that the rate of advance was not accelerating.

Percent changes in both the deflated and undeflated indexes are significant indicators of changes in the growth rate of real GNP. Regression analysis relating the growth rate of real GNP over the period 1953:1 to 1973:1 to percent changes in the Boston deflated index

Table 4
HISTORICAL EXPERIENCE:
AVERAGE MONTHLY COMPOUND GROWTH RATES

	<i>Date</i>	<i>Published Index</i>	<i>Updated Index</i>	<i>Boston Deflated Index</i>
T-P	3/54-9/55	1.13%	1.04%	1.20%
	3/54-12/55			
P-T	9/55-2/58	-0.59	-0.71	-0.82
	9/55-4/58			
	12/55-4/58			
T-P	2/58-4/59	1.50	1.81	1.56
	4/58-4/59			
	4/58-5/59			
P-T	4/59-12/60	-0.58	-0.66	-0.61
	5/59-12/60			
	4/59-1/61			
T-P	12/60-3/66	0.43	0.50	0.52
	1/61-3/66			
P-T	3/66-2/67	-0.68	-0.85	-0.99
	3/66-3/67			
	3/66-4/67			
T-P	2/67-4/69	0.45	0.58	0.48
	3/67-2/69			
	4/67-4/69			
P-T	2/69-11/70	-0.57	-0.58	-0.71
	4/69-11/70			

Note: P = peak in the series; T = trough in the series.

and the updated undeflated index (both lagged three quarters), gives an \bar{R}^2 of about .69 for both series.

As Table 3 shows, in April both series declined, with the decline in the Boston deflated index larger than that in the undeflated series. In May, the updated series rebounded 2.8 percent, while the Boston deflated index rose only 1.8 percent. Much of the May rise in the undeflated index, thus, represented price increases. The deflated index in May was below both its March peak and its February level, while the May rebound in the updated index set a new peak level for that series. Thus, it appears that the deflated index peaked two months earlier than the undeflated series.

Historical Comparison

As Chart 2 shows, the undeflated and deflated Boston indexes have generally moved together quite closely. Both series have estab-

lished turning points within one or two months of each other. As Table 4 indicates, the deflated series reached its peak level three months earlier in 1955. In establishing troughs, it led by two months in 1958 and by one month in 1967. It lagged the updated index by one month, however, in establishing a trough in 1960 and by two months in 1969 in reaching a peak.

The average monthly changes over the cycle in Boston's deflated index have not differed appreciably from the changes in the updated index, but the movements in both of these indexes are larger than in the published index. It is not surprising that historically there has been little difference between growth rates in the deflated and undeflated series. For much of the time, prices rose very slowly. Moreover, in the past, the rate of price increase has tended to move in the same direction as real activity. The current period may prove an exception, in which case the deflated index may be particularly useful.

TECHNICAL APPENDIX

Carol Greenwald, Carol Jennings, Judith Liss

None of the three indexes used in this article—the published, updated or Boston—has been reverse-trend adjusted. The reverse-trend adjustment adds the difference between the trend in the leading and coincident indicators to the leading indicators. The purpose of the adjustment is to facilitate comparison of the two indexes. It has the effect of adding about +0.4 percentage points to the monthly change in the leading indicators. It, therefore, shortens the lead of the index at cyclical peaks because the index may continue rising simply because of the trend adjustment. It does, however, make the index more reliable at upper turning points because the underlying series must have declined strongly to cause the reverse trend adjusted series to drop at all. At cyclical troughs, the trend adjustment makes the index turn up sooner than otherwise, but makes such an upturn less reliable. Since we are presently concerned with locating a cyclical peak, we have not added the reverse-trend adjustment.

Deflated Index

Series Unchanged

Four of the components do not represent dollar values and were therefore left unchanged. The length of the average workweek is measured in hours. Initial claims for unemployment insurance represent the number of claims filed. The index of net business formation is based on the number of firms in operation, and the building permits index is based on the number of new housing units authorized.

The index of 500 stock prices was also left unchanged. While the prices do represent dollar values, the stock market index indicates public expectations and the value of the index as a leading economic indicator is similar to a confidence index. Moreover, fluctuations in the stock market are complex and do not necessarily move with the prices of the gross national product or any of its components. In the current period, for example, inflationary pressures on the economy are depressing stock prices. Deflating the index by some price measure would lower the stock index even more, when in fact, it probably would have been higher had inflation been more moderate.

Series Deflated

Industrial Materials Prices

The series, industrial materials prices, has been deflated by the unadjusted wholesale price index, all items. Although eliminating the series was considered, it was felt that this would remove from the Boston index the important expectational component of the industrial prices series.¹ As Chart 3 shows, the deflated series continues to show cyclical sensitivity.

Corporate Profits

The U.S. Department of Commerce publishes a deflated series for corporate profits after taxes. In its series, the components of profits (dividends and undistributed profits) are deflated separately. The deflator used for net corporate dividend payments is the implicit price deflator for personal consumption expenditures. For undistributed profits, the implicit price deflator for nonresidential fixed investment is used. To convert the quarterly series into a monthly series, this Bank centered the data in the quarter and used straight-line interpolation to estimate the other months. This is the method used by the Commerce Department to interpolate corporate profits in current dollars for their published composite index of leading indicators.

New Orders for Durable Goods

The method used by the Commerce Department in developing the series for new orders for durable goods has been integrated with our deflating procedure. The new orders series is calculated by adding shipments to the change in unfilled orders. Shipments and unfilled orders for a given month were deflated by the average of the seasonally adjusted wholesale price index (WPI) for durable manufactured goods for that month and the five previous months. In short-term contracts, prices are generally fixed at the time the orders are placed and the shipments or unfilled orders for any one month are usually valued in prices established anytime from the current month to a year ago. A six-month average was chosen in order to include some of the mixture of prices without endangering the cyclical movement of the series. Shipments and unfilled orders were deflated separately. Then the change in the deflated unfilled orders was added to the deflated shipments series. Chart 4, which compares the deflated and undeflated series, shows that the deflator did not alter turning points in the series.

Contracts and Orders

Contracts and orders for plant and equipment were divided by the implicit price deflator for nonresidential fixed investment. These two series, contracts and orders for plant and equipment and expenditures for nonresidential fixed investment, were regressed to assure that they moved together so that using the implicit deflator of the latter to deflate the former would not be distorting. The R^2 was .97. (See also Chart 5.) The quarterly deflator was interpolated using the method described above. (See corporate profits.) Chart 6 compares the deflated and undeflated series.

¹ We are indebted to Arthur F. Burns, Chairman of the Board of Governors of the Federal Reserve System, for suggesting that industrial prices be retained, deflated by the wholesale price index.

Price per Unit Labor Cost

Deflating the index of price per unit labor cost is theoretically more difficult because it changes what is being measured. Since the index is a measure of profit margins rather than prices, it cannot be excluded.

$$\text{Price per unit labor cost} = \frac{\text{WPI for mfg. compensation}}{\text{industrial production}}$$

This is equivalent to:

$$\frac{\text{WPI for mfg.}}{\text{consumer price index (CPI)} \times \text{real wages}} \div \text{industrial production}$$

To remove the price effect, the first step was to divide the price per unit labor cost by the wholesale price index of manufactured goods (not seasonally adjusted). Next, the index was multiplied by the seasonally adjusted CPI. This leaves:

$$\frac{1}{\text{real compensation}} \div \text{industrial production} = \frac{\text{industrial production}}{\text{real compensation}}$$

While this is an indicator of how profits move exclusive of price changes, it is also a measure of real production costs. The two indexes of price per unit labor cost (deflated and undeflated) moved together until 1967 when the deflated index continued to rise. (See Chart 7.) For this reason, if a new index of leading indicators in constant dollars were developed, it might be preferable to find a substitute for the price per unit labor cost series which would continue to lead the economy in periods of combined inflation and recession.

Consumer Instalment Credit

The change in consumer instalment credit was deflated by first deflating extensions and repayments individually and then taking the difference of the deflated numbers. (See Chart 8.) Credit extensions represent money spent in the current month. Repayments, however, are comprised of a mix of purchases, some made more than 20 months prior to the current month, others made only one month before. Extensions have been deflated by a price index from the current month and repayments by a price index from

a month which would better represent when the commitment was made. (See below.) For all our calculations, total credit was separated into the four types of credit: automobile paper, other consumer goods paper, repair and modernization loans, and personal loans.

Calculating Lag Structure for Repayments

To determine the appropriate lag for repayments of each type of credit, average maturity lengths were calculated over the time period, 1952 to the present. The following formula provides an average maturity in months. If

$$R = \frac{\text{repayments}}{\text{instalment credit outstanding (beginning of month)}}$$

then the average maturity is (2/R)-1. If, for example, the length to maturity of auto loans were 24 months in December 1965 from this formula, it has been assumed that all the auto instalment debt outstanding in December 1965 was incurred in December 1964 and is thus halfway to maturity in the time period under consideration.²

Deflators by Type of Credit

All the deflators for consumer credit were components of the consumer price index: for automobile paper, the consumer price index for private transportation; for other consumer goods paper, a combination of the CPI indexes for apparel commodities and for housefurnishings; for repair and modernization loans, the housing CPI for maintenance and repairs; and for personal loans, the CPI for health and recreation.

The CPI for private transportation was available monthly and seasonally adjusted for the entire time period covered.

The index for apparel commodities was only available quarterly until 1956. This series was interpolated for 1951-1955 to form a monthly series and combined with the published monthly series for housefurnishings from 1951 until the present. The method of combination which is used at the BLS consists of weighting the percent changes in each of the indexes, taking account of the weight revisions made in 1963 and in 1965.³ The index was then rebased to 1967=100 and seasonally adjusted. To calculate seasonal factors for this series, only the period for which a monthly series for apparel commodities

² For a discussion of the merits of this formula, see Board of Governors of the Federal Reserve System, *Supplement to Banking and Monetary Statistics*, section 16 (new), "Consumer Credit," September 1965, p. 7.

³ For instance, to calculate an index for March 1964, one would use the weights developed in the revision of December 1963 and the index for December 1963=100. The combined apparel commodities (A) and housefurnishing (H) index for March 1964, is

$$100 \left(\frac{\text{A weight as of 12/63} \left(\frac{\text{A index 3/64}}{\text{A index 12/63}} \right) + \text{H weight 12/63} \left(\frac{\text{H index 3/64}}{\text{H index 12/63}} \right)}{\text{A weight 12/63} + \text{H weight 12/63}} \right)$$

For January, 1966 (or any month following a new weight revision) this would become,

$$\frac{\text{A weight 12/65} \left(\frac{\text{A index 1/66}}{\text{A index 12/65}} \right) + \text{H weight 12/65} \left(\frac{\text{H index 1/66}}{\text{H index 12/65}} \right)}{\text{A weight 12/65} + \text{H weight 12/65}} \times \left(\text{index calculated for A+H 12/65} \right)$$

New England Economic Review

is published was included. The interpolation of the apparel series prior to 1956 would bias the seasonal factors. The 1956 seasonal factors were used for the period from 1951-1955.

The CPI for maintenance and repairs was available from December 1952 until December 1968 on a quarterly basis (end of quarter) and from January 1969 until the present on a monthly basis. Straight-line interpolation from December 1952 through December 1968 was used to get the intervening months. Because of the long maturity of repair and modernization loans, CPI data for 1951 and 1952 were necessary to deflate the repayments series and were extrapolated from the quarterly series. This Bank ran a seasonal program for the quarterly and for the monthly series. Since the quarterly series showed no evidence of stable seasonality, unadjusted data were used for the entire period.

For personal loans, the CPI for health and recreation was used. This series was available from 1953 monthly. About six months of data for 1952 were necessary to complete the deflation of the repayments series. This was obtained by extrapolating from the January 1953 index using average percent changes for the two components of health and recreation, which were available for 1952, medical care, and reading and recreation. The health and recreation index exhibits no seasonal patterns.

Change in Manufacturing and Trade Inventories Deflators Used

Manufacturing and trade inventories were deflated by the procedure used at the Commerce Department to calculate total nonfarm stocks in 1958 dollars for the national income accounts. This procedure was necessarily simplified since the detailed breakdown of stocks which is available to the Commerce Department is not published on a monthly basis for manufacturing and trade inventories. However, the breakdown of stocks by durability of product and by the three subcategories, manufacturing, retail, and merchant wholesale, was used. For each of these six categories, a different wholesale price index was chosen: for durable manufacturing, the WPI for durable manufactured goods; for nondurable manufacturing, the WPI for nondurable manufactured goods; for durable retail inventories, the WPI for consumer durable finished goods; for nondurable retail, a weighted average of the components of the WPIs for consumer finished goods, other nondurable goods, and foods; for durable merchant wholesale inventories, the WPI for durable raw or slightly processed goods; and for nondurable merchant wholesale, the WPI for nondurable raw or slightly processed goods. In all cases the indexes were seasonally adjusted.

Calculation of the Deflated Series

The method used to combine the components of the wholesale price index for consumer finished goods, other nondurable goods and foods is that followed by the Bureau of Labor Statistics. For a

description of the method, see the explanation of consumer credit above and footnote 3 on page 11. The combined index was seasonally adjusted.

In the calculation of the monthly inventory valuation adjustment (IVA), it has been assumed that durable items were included in inventories during the current month or the previous four months, and non-durable items were included during the current month or the previous two months. Therefore, five-month averages of the wholesale price indexes for durable goods and three-month averages for non-durable goods were calculated. It has also been assumed that 20 percent of all stocks are valued on a last-in-first-out (LIFO) basis with the remaining 80 percent on a first-in-first-out (FIFO) basis. The LIFO portion of the inventory has been ignored in calculating the IVA.⁴ This assumption is subject to error when prices are falling. The percent changes in the five-month and in the three-month averages were calculated for each month.

As an example, the percent change in the five-month average of the WPI for durable manufactured goods is multiplied by 80 percent (i.e., the FIFO portion) of the book value of manufacturing durable inventories at the beginning of the period (or end of the previous month). This is the IVA for durable manufacturing. (The IVA is negative when prices are rising.) The change in book value of durable manufacturing inventories (LIFO plus FIFO) is calculated, and the IVA is added to it. This change is deflated by the WPI for durable manufactured goods for the current month. This same procedure is followed for the other breakdowns, and the resulting changes are summed to get a deflated change in manufacturing and trade inventories. Chart 9 shows the deflated and undeflated changes.

Discrepancy Between Updated and Published Indexes

The published index was last revised substantially in 1970. In contrast, our updated index includes data revisions through 1972 in both indexes and standardization factors. One other source of discrepancy is the inclusion of data from 1948-1952 in the calculation of the standardization factor for the weighted averages of the published index. Because some deflators are not available before 1952, the years 1948-1952 were omitted in both of our indexes for comparability.

Our standardization factor for the weighted averages is .50 whereas the U.S. Department of Commerce uses .579. This can account for the discrepancy between the growth rates in the published and the updated indexes in many months.

Chart 1 compares the updated index with the published index.

⁴ Both the five- and three-month periods used to calculate inventory price changes and the 80 and 20 percent figures for FIFO and LIFO were suggested by the section at the Bureau of Economic Analysis which prepares the inventory data for the national income accounts.

Chart 3

INDEX OF INDUSTRIAL MATERIALS PRICES:
ORIGINAL AND DEFLATED

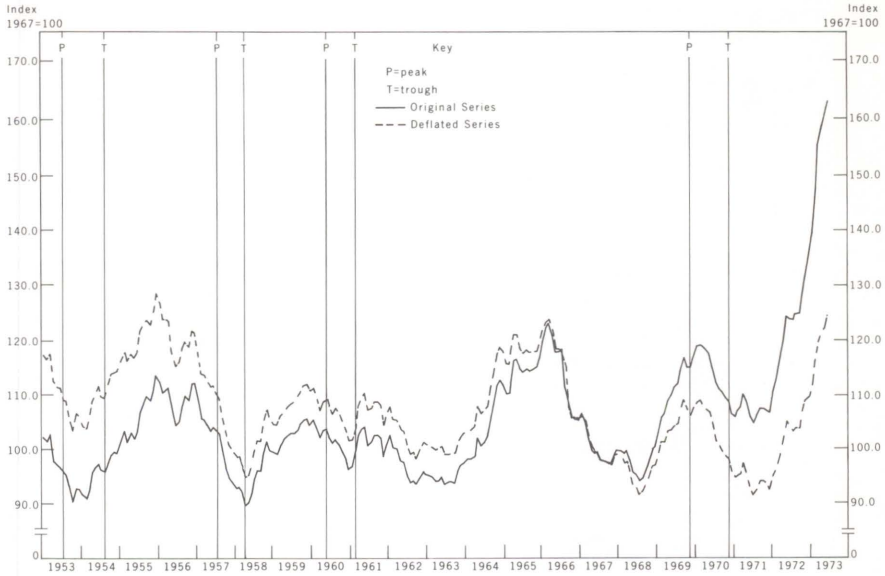


Chart 4

MANUFACTURERS' NEW ORDERS, DURABLE GOODS INDUSTRIES:
ORIGINAL AND DEFLATED

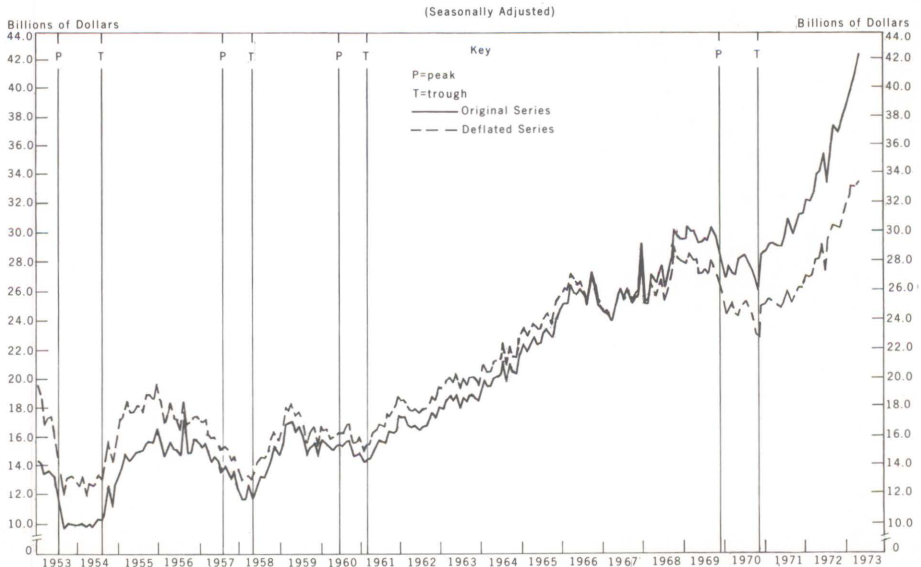


Chart 5
A COMPARISON OF INVESTMENT SERIES
 (Seasonally Adjusted)

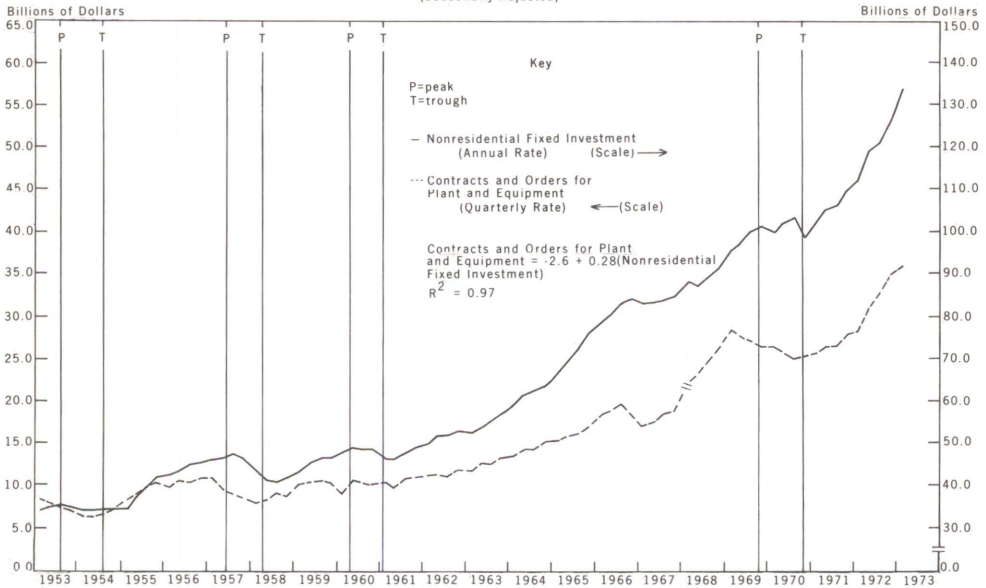


Chart 6
CONTRACTS AND ORDERS FOR PLANT AND EQUIPMENT:
ORIGINAL AND DEFLATED
 (Seasonally Adjusted)

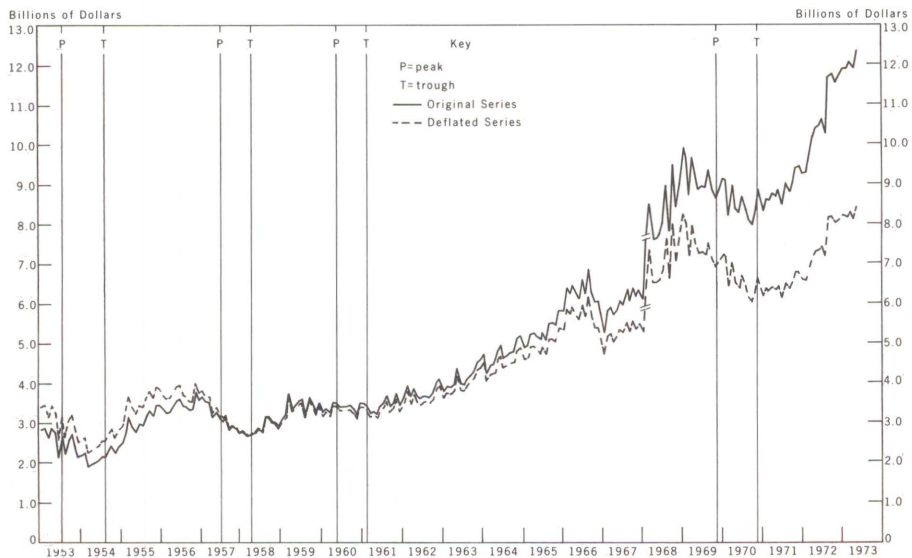


Chart 7
RATIO, PRICE TO UNIT LABOR COST INDEX, MANUFACTURING:
ORIGINAL AND DEFLATED
 (Seasonally Adjusted)

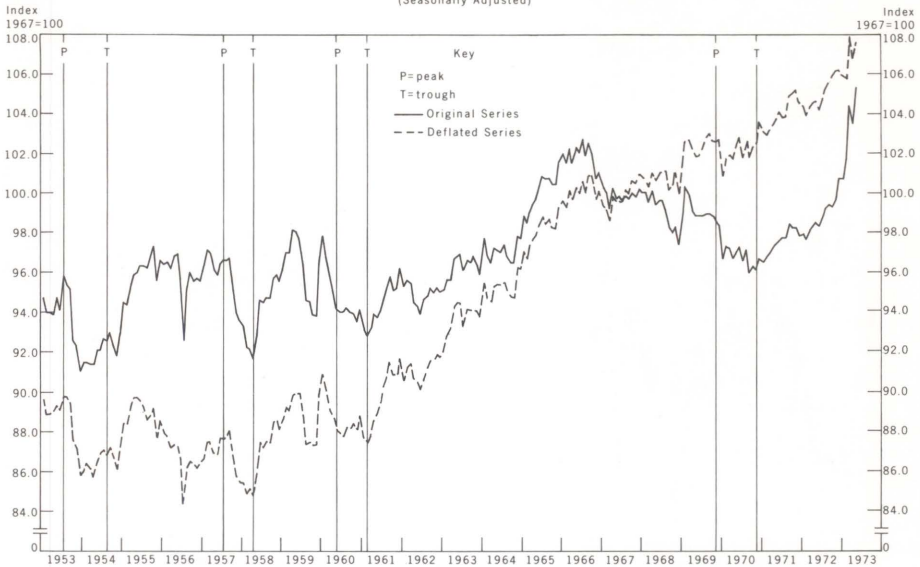


Chart 8
NET CHANGE IN CONSUMER INSTALMENT DEBT:
ORIGINAL AND DEFLATED
 (Seasonally Adjusted)

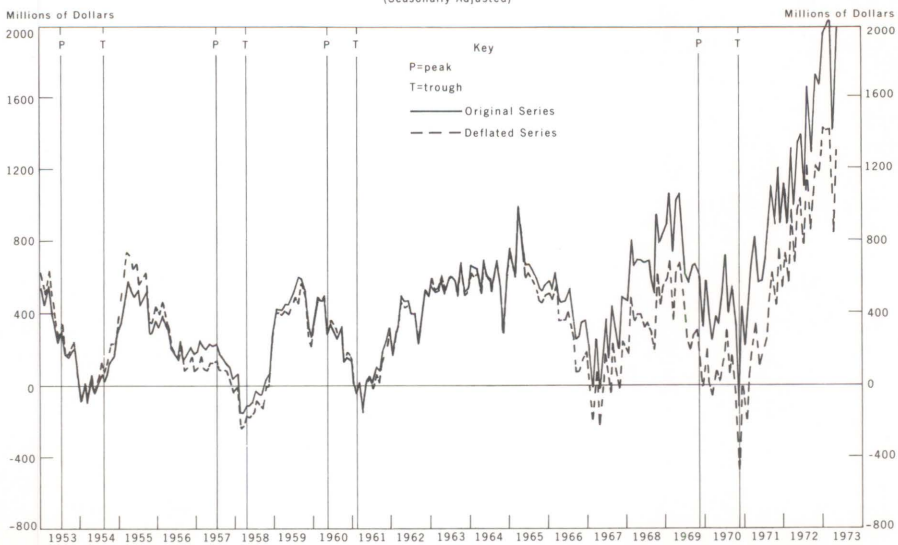
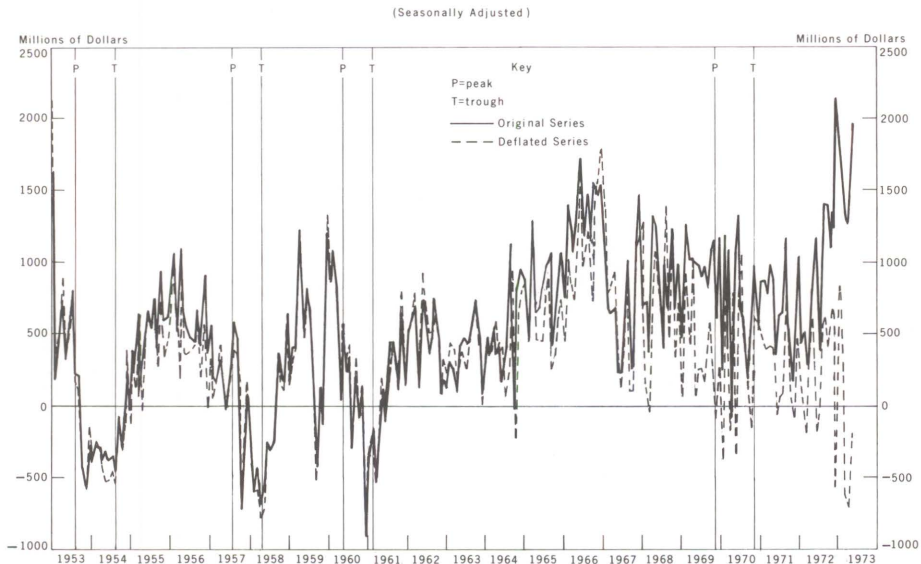


Chart 9
CHANGE IN MANUFACTURING AND TRADE INVENTORIES:
ORIGINAL AND DEFLATED



HISTORICAL DATA — UPDATED INDEX

<i>Year</i>	<i>Jan.</i>	<i>Feb.</i>	<i>Mar.</i>	<i>Apr.</i>	<i>May</i>	<i>June</i>	<i>July</i>	<i>Aug.</i>	<i>Sept.</i>	<i>Oct.</i>	<i>Nov.</i>	<i>Dec.</i>
1953	81.9	81.2	80.8	80.2	79.3	77.5	78.1	76.3	74.0	73.2	71.2	71.3
1954	71.2	71.7	71.1	72.4	72.9	73.7	74.7	74.8	76.1	77.4	78.3	79.9
1955	82.5	84.6	85.5	85.2	85.6	86.2	86.9	87.0	88.3	87.6	87.7	88.3
1956	87.5	86.9	87.0	87.7	86.2	85.1	83.9	85.3	84.8	85.2	85.9	85.7
1957	84.7	84.7	84.5	83.0	82.8	83.0	82.3	82.5	80.4	78.2	77.1	75.5
1958	74.5	72.4	72.7	72.3	74.0	75.9	77.7	79.1	80.5	82.1	84.0	83.8
1959	85.4	86.7	88.7	89.7	89.4	89.0	87.9	86.1	86.1	85.4	84.1	87.1
1960	87.7	87.1	84.9	84.8	84.4	83.5	83.0	81.9	81.6	80.4	79.6	78.6
1961	78.7	79.2	80.5	81.6	82.5	83.0	83.5	85.0	84.4	85.7	86.9	87.2
1962	86.7	87.8	87.5	87.5	86.5	85.2	85.6	85.9	86.3	86.0	87.0	87.1
1963	87.2	87.7	88.1	88.6	89.9	89.5	89.6	89.9	90.7	91.8	91.3	91.5
1964	92.8	93.5	93.3	94.5	95.2	95.0	95.2	95.5	96.7	96.6	97.1	98.5
1965	99.8	99.6	101.0	101.2	101.8	101.5	102.0	101.7	102.1	103.0	103.7	105.3
1966	106.1	106.6	107.7	106.4	105.5	104.7	104.5	102.5	101.3	100.2	99.1	98.8
1967	99.3	97.3	97.2	97.4	98.2	99.8	99.5	101.7	101.1	101.3	102.9	104.3
1968	102.1	104.8	104.7	104.0	104.5	104.8	105.2	105.7	106.0	109.0	108.3	108.6
1969	109.8	111.1	109.7	110.9	110.3	109.1	108.0	107.8	108.3	107.7	106.1	105.8
1970	104.2	104.4	102.3	102.0	100.5	101.1	101.8	100.5	99.4	98.9	98.4	101.2
1971	101.7	102.9	104.4	105.8	106.3	105.9	106.8	107.0	107.8	108.1	109.0	110.1
1972	110.9	111.0	113.2	114.4	115.8	115.7	115.7	118.6	119.6	120.4	122.0	123.7
1973	125.4	127.8	129.7	126.6	130.2							

HISTORICAL DATA — BOSTON DEFLATED INDEX

<i>Year</i>	<i>Jan.</i>	<i>Feb.</i>	<i>Mar.</i>	<i>Apr.</i>	<i>May</i>	<i>June</i>	<i>July</i>	<i>Aug.</i>	<i>Sept.</i>	<i>Oct.</i>	<i>Nov.</i>	<i>Dec.</i>
1953	86.6	85.5	84.9	84.3	83.2	81.1	81.1	79.5	76.8	76.5	74.3	74.3
1954	73.8	74.6	73.7	75.1	75.7	76.7	77.8	77.8	79.3	80.7	81.7	83.3
1955	86.1	88.4	89.5	89.2	89.5	89.9	90.4	90.0	91.3	90.3	90.3	91.0
1956	89.8	88.9	88.7	89.3	87.4	86.2	85.0	85.9	85.4	85.8	86.2	85.9
1957	84.8	84.7	84.4	83.1	82.8	83.0	82.1	82.2	80.2	78.0	76.7	75.1
1958	74.1	72.0	72.2	72.3	73.6	75.7	77.4	78.9	80.4	82.1	83.8	83.5
1959	85.3	86.5	88.3	89.4	89.1	88.7	87.7	85.7	85.9	85.4	84.0	87.3
1960	87.7	87.1	84.7	84.8	84.4	83.6	82.9	81.9	81.7	80.5	79.6	78.7
1961	78.7	79.1	80.5	81.8	82.9	83.5	83.9	85.5	84.9	86.3	87.6	87.7
1962	87.0	88.3	88.2	88.2	87.2	85.9	86.2	86.6	86.8	86.7	87.9	88.0
1963	88.2	88.8	89.4	89.9	91.1	90.6	90.6	91.1	91.9	93.0	92.4	92.8
1964	94.0	94.8	94.7	96.0	96.7	96.6	96.7	97.0	98.3	98.1	98.6	100.1
1965	101.3	101.1	102.5	102.7	103.2	102.6	103.1	102.8	103.2	104.0	104.6	106.1
1966	106.9	107.3	108.4	107.1	106.0	105.1	104.6	102.4	101.1	100.3	99.2	99.0
1967	99.4	97.2	97.3	97.5	98.3	99.7	99.4	101.8	101.0	101.3	102.8	104.2
1968	102.2	104.2	104.0	103.3	104.0	104.3	104.8	105.5	105.5	108.7	107.8	108.1
1969	109.0	110.0	108.5	110.0	108.7	107.5	106.4	106.4	106.9	105.9	104.3	103.9
1970	102.0	102.3	100.3	100.1	98.6	99.0	99.5	98.3	97.0	96.5	96.0	99.0
1971	99.1	99.9	101.4	102.5	102.8	102.5	103.1	103.2	104.2	104.6	105.7	106.5
1972	107.1	107.0	109.1	110.2	111.4	111.1	111.0	113.4	114.4	115.4	116.7	117.1
1973	118.6	120.0	120.8	117.5	119.6							

July/August 1973

FEDERAL RESERVE BANK OF BOSTON

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Interest-Rate Ceilings and the Treasury-Bill Market: Disintermediation and the Small Saver

DONALD J. MULLINEAUX*

AS deposit rates at commercial banks and savings institutions bump against permissible regulatory ceilings and as market interest rates continue to climb in an expanding economy, the growth of deposits will no doubt slow as savers begin to place increasing amounts of both new and old savings directly in securities markets. This process, often termed disintermediation, typically slows housing construction as mortgage funds become increasingly scarce and thus more expensive. Policymakers face the dilemma of responding in a manner which eases the burden on this socially sensitive sector of the economy without frustrating the attainment of other economic goals such as high employment and low rates of inflation.

This article describes historically one facet of disintermediation—how small savers purchased U.S. Treasury bills rather than continuing to place their savings in financial institutions. The 1969-70 episode is particularly relevant because it demonstrates the futility of dealing with the symptoms of disintermediation rather than attacking the basic causes.

Disintermediation and the Small Saver

Disintermediation is induced when marketable securities offer a sufficiently high interest rate compared with deposits to offset the costs associated with trading in securities markets.

These costs may include brokerage fees, the expense of acquiring information about various securities, and a charge for risk bearing against the possibility that the loan is not repaid as well as against a change in the market value of the security purchased.

While economists have made general studies of the disintermediation phenomenon,¹ not much is known about the behavior of specific classes of investors during such periods. The behavior of small savers,² for instance, is particularly relevant since the bulk of intermediary accounts falls within this range.

For a number of reasons, small savers find it more difficult to profitably place funds in securities markets than their wealthier counterparts whenever market interest rates rise. First, the choice of securities available to small savers is severely limited by the institutional setup of these markets. For example, dealers typically

* This article was based on a study made with the aid of a research grant by this Bank while the author was a graduate student at Boston College. Mr. Mullineaux is now Senior Economist at the Federal Reserve Bank of Philadelphia.

¹ For general discussions of the disintermediation periods of 1959 and 1966, see John J. Arena, "The Outlook for Financial Disintermediation," *New England Business Review* (December, 1967), and Donald Hester, "Financial Disintermediation and Policy," *Journal of Money, Credit and Banking*, I (1969).

² We arbitrarily define "small savers" as those with liquid savings of less than \$10,000.

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will not accept orders for less than \$100,000 of commercial paper, and some require at least \$200,000. Purchases of finance company paper and bankers' acceptances typically require at least \$25,000-\$50,000, while *new issues* of U.S. Treasury bills are currently available in a \$10,000 denomination. The second factor discouraging small saver purchases of marketable securities is the additional brokerage fees assessed for small orders ("odd-lots"). These charges typically take the form of fixed commission charges ("odd-lot ticket fees") or price adjustments to quoted dealer spreads ("odd-lot differentials") which increase prices for small buyers of securities and lower prices for those selling in small amounts. These ticket fees can amount to \$20 or more, which is greater than the amount earned on a \$1000 security held for three months (assuming interest rates of less than 8 percent).

These considerations mean that the short-term investments available for small savers are currently limited for the most part to the deposit-type liabilities of financial institutions. Before March 1970, however, small savers were able to purchase *new issues* of U.S. Treasury bills in \$1,000 and \$5,000 denominations. In most of the postwar period, yields on new Treasury bills were either below or only slightly above yields on savings deposits so that Treasury bills were not an attractive investment. In 1969-70, however, a significant differential between bill yields and deposit rates opened up (see the table), setting off considerable disintermediation of small deposits.

The increasing spread between yields on marketable securities and rates on savings deposits reflected the combination of a tight monetary policy engineered to combat inflation and the maintenance of ceiling rates on savings deposits.³ In 1969 the authorities were reluctant to increase maximum permissible rates at com-

mercial banks because they feared that funds would be drained from the politically sensitive housing sector and fuel an undesirable expansion in bank credit. They reasoned that banks were in a better position to increase deposit rates than nonbank intermediaries because bank assets have considerably shorter average maturities than those of the specialized mortgage lending institutions. Thus, in a period of rising

Table

**AVERAGE DIFFERENTIAL BETWEEN
TREASURY-BILL RATES* AND
SAVINGS-DEPOSIT CEILING RATE AT
COMMERCIAL BANKS, 1966-71**

	3-Month Bill	6-Month Bill
January-December, 1966	0.95%	1.15%
January-December, 1967	0.38	0.69
January-December, 1968	1.41	1.55
January-June, 1969	2.36	2.59
July-December, 1969	3.38	3.78
January-February, 1970	3.62	3.89
March-December, 1970	1.90	2.13
January-December, 1971	0.04	0.24

* Treasury-bill discount yields converted to bond-equivalent basis (see footnote 5).

rates the average return on banks' investment portfolios increases more rapidly than those of the savings institutions whose portfolios are heavily weighted with outstanding mortgages earning unchanged rates of return. Ceiling rates were also imposed on deposits at thrift

³ The Board of Governors of the Federal Reserve System sets ceiling rates for member commercial banks; the Federal Deposit Insurance Corporation sets ceilings for insured nonmember commercial banks and mutual savings banks; the Federal Home Loan Bank Board sets ceilings for member savings and loan associations; in Massachusetts the Bank Commissioner sets ceilings for nonfederally insured mutual savings banks and cooperative banks.

institutions because authorities feared that aggressive rate competition would endanger the weaker institutions. While these rate ceilings no doubt prevent some reshuffling of funds among banks and savings institutions, the principal result was that both types of institutions lost funds to the open market, where rates were unconstrained. In the final analysis, therefore, the ceilings provided little help for housing. As explained below, in the case of the deposits of small savers, most disintermediation was directed towards the new issues market for Treasury bills.

Small Savers and the New-Issues Bill Market

Because Treasury bills were available in small denominations before 1970 and because they could be obtained without commission or brokerage charges at a Federal Reserve Bank, they became particularly attractive investments for small savers in 1969-70. New issues of three-month and six-month bills are sold in an auction held each Monday (except holidays) while bills with a maturity of approximately one year⁴ are offered on a monthly basis. The auctions are conducted at each of the 12 Federal Reserve Banks and their branches which act as fiscal agents for the Treasury. Offers to buy (tenders) may be submitted either on forms provided by the banks or in a letter, but not by telephone.

Most bidders in these auctions submit *competitive bids*, specifying the amount they desire to buy and their offering price. Bills are sold at a discount so that their interest earnings consist of the difference between the discount cost and the par value at maturity. Bid prices are recorded as percentages of par to three decimal places, like 98.500. (For a three-month bill, such a bid price represents a return

of 1.5 percent for three months, or an annual yield of about 6 percent.) Competitive bidders have to be quite skilled, or else have good advisors, in order to make a proper bid. If the bid is too low, it fails, so the bidder must then find another investment, probably at a lower yield than the average of the bill auction. On the other hand, if the bid is too high, the bidder gets his bills but his yield will be lower than the average so he again suffers.

In recognition of the difficulty of making competitive bids, the Treasury provides small bidders, those bidding for \$200,000 or less of bills, the opportunity of entering a *noncompetitive tender*. All noncompetitive tenders are automatically accepted at the weighted average auction price⁵ which is really a good deal for small bidders. They are certain to get the amount of bills they want and the yield is the average for all successful bidders; that is, the small bidders' yield is more than that of some of the large, skilled bidders, whose bids were accepted.

Bills are issued and final payment is required on the Thursday after the auction unless a holiday occurs, in which case the issue date is Friday. All payments must be made either in cash or in bills maturing on the payment date, or in some other form that can be converted into cash at the Federal Reserve bank or branch by the payment date.

⁴ Before November 1972 nine-month bills were also auctioned on a monthly basis.

⁵ The Treasury's acceptance procedure for bills is to sum all noncompetitive bids and deduct this amount from the total offering. The remainder is then allocated to competitive bidders at their *bid* prices in descending order; i.e., the highest price is accepted first. The lowest acceptable price is usually termed the "stop-out price." The average price charged to noncompetitive bidders is established within the range of accepted bids and is weighted by the volume of tenders accepted at each bid price.

The Volume of Noncompetitive Bidding

The chief competitive bidders in bill auctions are government securities dealers, large commercial banks, insurance companies, the Federal Reserve System, foreign and Treasury accounts, other financial institutions, and large business corporations. Noncompetitive bidders include not only small savers but, unfortunately, small banks, small businesses, and wealthy individuals. Thus the volume of noncompetitive bids may reflect not only the activity of small savers but of these other groups as well.

To determine if the volume of noncompetitive bidding was a fairly accurate indication of the entrance of small savers into the bill auction, a special tabulation was made of raw data in the Treasury Department. The *number* of \$1,000 and \$5,000 bills sold in the auction was compiled for 1969 and early 1970 and expressed as a ratio to the total *number* of bills sold. This ratio was compared with the ratio of the *dollar amount* of noncompetitive tenders to the *total dollar amount* of bills sold. In the first quarter of 1969, the number of \$1,000 and \$5,000 bills in the three-month auction was 45 percent of the total number of bills sold, while the dollar amount of noncompetitive tenders in that auction was 16 percent of total sales. (See Chart 1a.) These levels apparently are fairly normal. But as 1969 progressed, both ratios rose rather steadily. Then, in early 1970, both spurted sharply until the small denominations were eliminated. The ratio of the number of small bills to total sold then fell to zero, of course, while the ratio of noncompetitive tenders to total bill sales fell back near its "normal" level of early 1969. Thus these comparisons suggest that the ratio of noncompetitive tenders to total bill sales is a fairly good indicator of the activity of small savers in the bill market.

Data on total noncompetitive bidding were used for statistical analysis of behavior of small investors.⁶ The volume of noncompetitive bidding in each maturity range was presumed to depend upon the difference in expected yields on Treasury bills and the yields on competing assets such as time deposits and commercial paper, as well as dealer transactions charges and investors' wealth. Since most small investors were probably unaware of the suitability of new Treasury bills as an investment medium and of the procedures for purchasing these instruments, a "learning" process may also have affected the number of noncompetitive bids submitted. Numerous articles in the press as well as word of mouth communication undoubtedly contributed to this learning process.

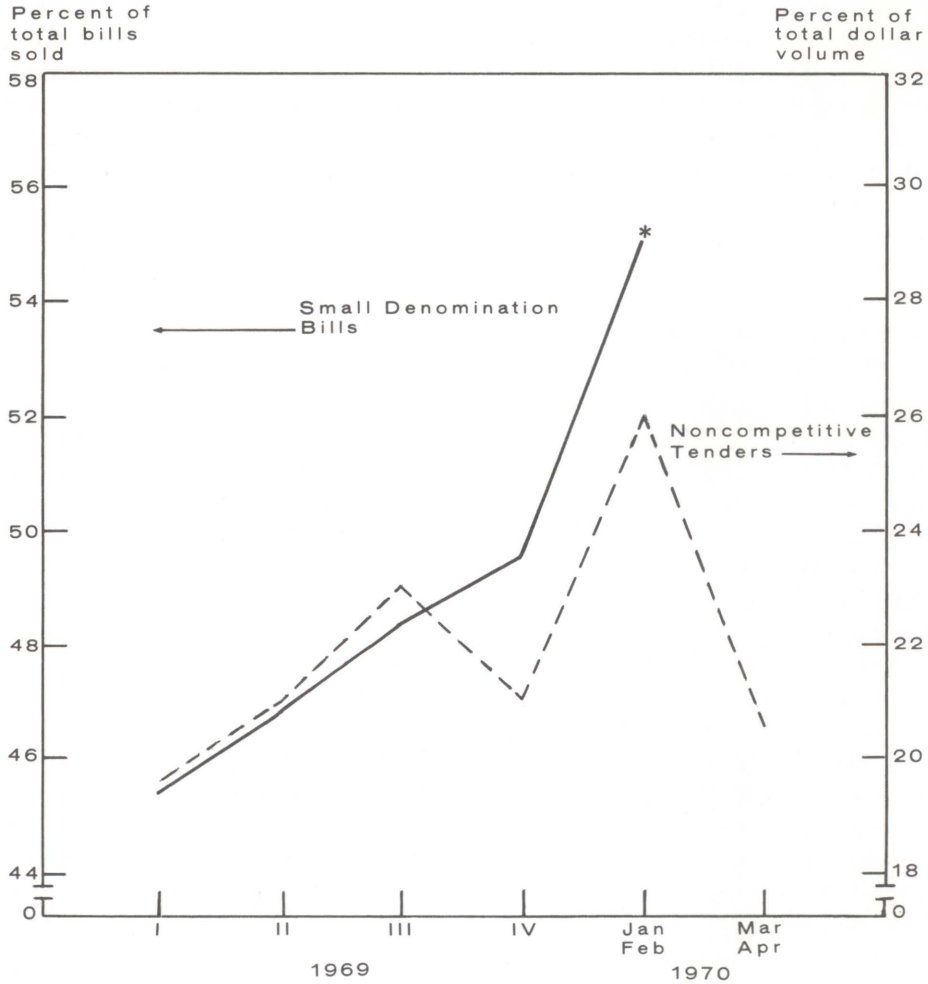
Perhaps the most interesting finding of the statistical analysis was that, as the differential between bills and savings deposits widened in the second half of 1969, each additional basis point of increase in the differential had an increasing impact on noncompetitive bidding. Thus, in 1966, when the differential averaged only about 1.0 percentage point, a widening of the differential by one basis point would have induced only an estimated \$7½ million more noncompetitive bidding for six-month bills in each auction. But in 1969-70, when the differential averaged almost 4.0 percent, a single basis point more would have induced an additional \$43 million of noncompetitive bidding, or almost six times as much as in 1966. It seems that disintermediation into bills begins to increase significantly when the differential grows to about 2.00 percentage points.

These results suggest that the amount of noncompetitive bidding for six-month bills in 1969

⁶ For a full discussion of this study, see Donald J. Mullineaux, "Deposit-Rate Ceilings and Noncompetitive Bidding for U.S. Treasury Bills," *Journal of Money, Credit, and Banking*, 5 (February, 1973).

Chart 1a

NUMBER OF SMALL DENOMINATION
TREASURY BILLS SOLD AND DOLLAR VOLUME OF
NONCOMPETITIVE TENDERS: 3-MONTH TREASURY BILLS



*The Treasury discontinued sales of small denomination bills with the March 5, 1970 Auction.

Note: Small denomination Treasury bills. Include \$1,000 and \$5,000 bills. A noncompetitive tender may be made up to \$200,000.

would have decreased by almost \$50 million in each auction if the allowable rates on savings deposits had been raised by 1 percentage point. If these funds came from thrift institutions, such a rise in savings rates would have augmented available funds of these mortgage-lending institutions by \$2.5 billion on an annual basis, an improvement of around 20 percent.

However, the regulatory agencies did not see fit to raise allowable rates. Disintermediation into the bill market kept rising as 1970 progressed until finally the Treasury decided to take action to stop the "drain."

The Treasury's Action to Increase the Minimum Transactions Size

The governmental response to the continued outflow of deposits into new Treasury bills was to eliminate the \$1,000 and \$5,000 bill denominations, making the minimum denomination \$10,000, effective March 5, 1970. In its press release describing this action, the Treasury asserted: "The extraordinary volume of *small individual transactions* (author's italics), which provides neither an important nor a dependable source of funds to the Treasury, is beginning to overtax existing market facilities to the point where the effectiveness of this basic source of Treasury finance [large blocks of institutional funds] could be impaired." Other elements of the Treasury's rationale for the change included the problems of high processing costs, the unsuitability of unregistered instruments for consumer investment, and the increasing difficulties experienced by mortgage-lending institutions and the construction industry. It seems likely that the last reasons, namely the difficulties of thrift institutions and of the construction industry, were the most important because processing problems could

have been overcome by streamlining the procedures for handling noncompetitive bids. In any case, the Treasury's action discriminated against small savers in the same way as did low ceiling rates on savings deposits.⁷

The proportion of bills sold to noncompetitive bidders declined precipitously⁸ in March following the Treasury's action, particularly in the case of six-month bills. (See Chart 1b.) In subsequent months, however, the percentage of bills sold noncompetitively began to trend upwards once again, as some small savers no doubt began to pool funds informally in order to satisfy the minimum transactions requirement. By the second quarter of 1970, however, Treasury bill rates declined sharply with the onset of recession and these rates continued to move down throughout the year. As a result, small savers left the bill market and returned their funds into savings deposits. The disintermediation problem of 1969-70 was solved, not so much by governmental action, as by market developments.

Conclusions

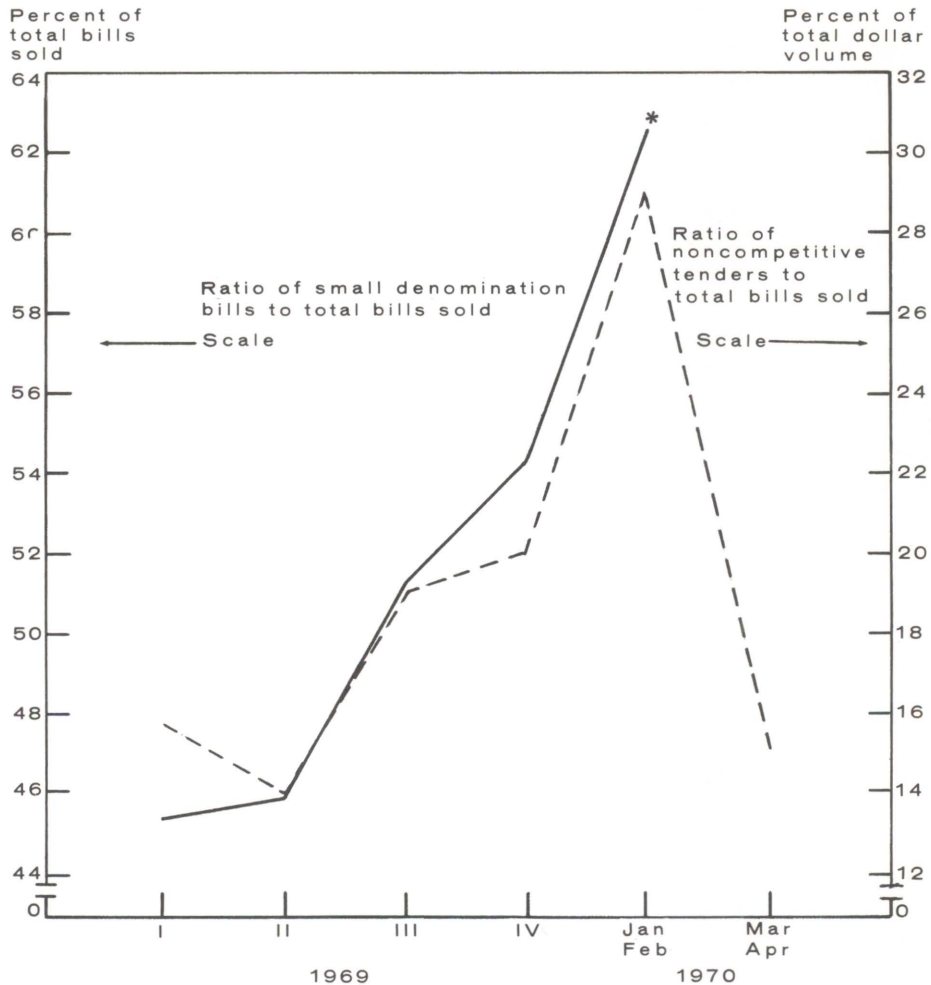
Like the boy with his finger in the dike, the Federal government attempted to solve the disintermediation crisis with stop-gap remedies. First, ceilings were imposed on interest-rates paid on deposits at commercial banks and thrift institutions. When this remedy failed to solve the problem, the minimum denomination of U.S. Treasury bills was increased from \$1,000

⁷ See Edward J. Kane, "Short-Changing the Smaller Saver: Federal Government Discrimination Against Small Savers During the Vietnam War," *Journal of Money, Credit, and Banking*, 2 (1970), 513-22.

⁸ Some investors apparently anticipated the Treasury's action as there was a sharp increase in non-competitive sales of *nine-month* and *one-year* bills in the January 1970 auction. Until that time, there was little evidence of small saver interest in bills of these maturities.

Chart 1b

NUMBER OF SMALL DENOMINATION
TREASURY BILLS SOLD AND DOLLAR VOLUME OF
NONCOMPETITIVE TENDERS: 6-MONTH TREASURY BILLS



* The Treasury discontinued sales of small denomination bills with the March 5, 1970 Auction.

Note: Small denomination Treasury bills. Include \$1,000 and \$5,000 bills. A noncompetitive tender may be made up to \$200,000.

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to \$10,000 in early 1970. This measure had some temporary impact. But before its longer-run effectiveness could be judged, short-term interest rates declined rapidly, eliminating the disintermediation crisis.

Both of these actions were inequitable to small savers. In addition, in the future they are unlikely to have much impact unless more holes in the dike are plugged. For example, in 1970 several large corporations including A.T. & T. and Sears Roebuck announced plans to sell small denomination notes to their customers. While the decline in market interest rates postponed implementation of these plans, their potential for disintermediation remains obvious.

Financial disintermediation will remain a problem until action is taken to eliminate its causes rather than treating its symptoms. While some have been hesitant to recommend removal of the ceilings for fear of adverse cyclical

consequences in the housing sector, the latter problem could be alleviated by undertaking additional institutional reforms such as increased balance-sheet flexibility for savings intermediaries and the use of variable-rate mortgages.⁹ Recent recommendations from the President's Commission on Financial Structure and Regulation (The Hunt Commission) included all of these proposals. It is to be hoped that the housing sector and the U.S. economy in general will not have to suffer another knockout bout with disintermediation to make clear the lessons of the past.

⁹ For a discussion of the impact of various alternatives for reform of the housing finance industry, see Paul S. Anderson and Robert W. Eisenmenger, "Impact of the Proposed New Financial Structure on Mortgage Markets," *Policies for a More Competitive Financial System*, Federal Reserve Bank of Boston Conference Series, No. 8, 149-72. These authors argue that widespread use of variable-rate mortgages constitutes the most effective means of reforming the market for housing finance.

