

## The Yield Curve

*The yield curve reflects the expectations of those who invest in the bond market. Their collective opinion can be wrong, but it may provide a useful tool in assessing the outlook for interest rates.*

A "yield curve" is the relationship of market interest rates at various maturities on the debt securities of a single issuer. In the United States, Treasury securities usually are shown with the interest rates plotted on the vertical axis and the maturities plotted on the horizontal axis.

In such a plot, the yield curve for a given date is almost invariably upward sloping in the initial portion of its range, *i.e.*, Treasury bills due in a few days time usually, but not always, yield less than those due in a few weeks.

This, presumably, reflects a great demand for very short-term interest-bearing instruments from large businesses and financial institutions that do not wish to tie up their funds for long, but find themselves with cash balances in excess of very short-term needs. In the instance of Treasury securities, which are seldom issued with maturities of less than 13 weeks, purchasers of very short maturities must buy from existing holders who would pay no sales commission if they held to maturity, and may therefore demand higher prices if they sell sooner.

However, after the usual upward segment at its very short end, a yield curve can assume various shapes. It may simply continue upward, with rates increasing with maturity. It may remain essentially flat, with rates on all maturities being roughly equal. It may be "humped," with the highest rates on an intermediate maturity, say, 5 years or so, with somewhat lower rates on the longer maturities. Yield curves may even become downward sloping throughout most of their range. All four yield curve shapes have been observed historically at different points in the business cycle, and an example of each is shown in Chart 1.

### Theory and Illusion

Most analysts believe that the yield curve is shaped by market participants' expectations of future interest rates. This theory is divided into two forms: the pure

or unbiased expectations theory and the biased expectations theory. The pure or unbiased form holds that the shape of the yield curve is determined only by investor expectations of future rates. For example the rate on, say, a 10-year note will be equal to what investors would expect, on average, from buying a 1-year bill and "rolling it over" 10 times. More generally, when investors expect rates to increase, they tend to bid up prices of short-term debt securities to avoid the losses from holding longer maturities that would result if rates increased. This lowers the yields of the shorter maturities and boosts longer-term rates. This behavior results in an upward sloping curve.

Oppositely, when investors expect rates to decrease, they tend to bid up longer issues to "lock in" high yields. The yield curve then becomes "inverted" or downward sloping. A flat curve suggests that investors expect rates to stay essentially unchanged.

The biased expectations theory says that the shape of the yield curve is determined by both expectations of future interest rates and the premium demanded by investors and borrowers for shifting from one maturity to another. The biased theory is in turn broken down into two variations: the liquidity premium theory and the preferred habitat theory.

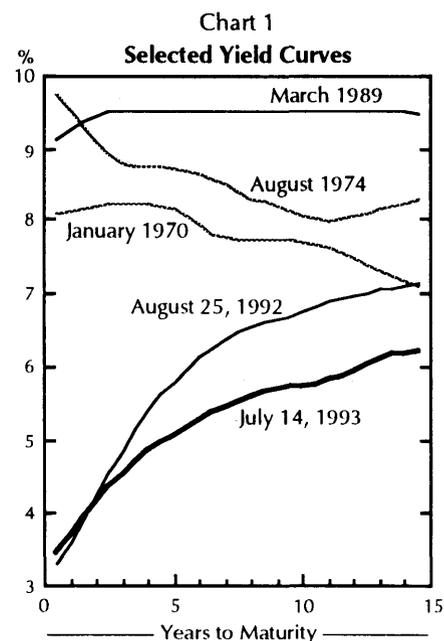
Liquidity premiums reflect the fact that the longer the maturity of a bond, the greater its price volatility. To induce investors to assume the greater risk of longer maturities, longer-term rates usually must include some premium. Thus even if investors expected rates to change little, the yield curve would still be slightly upward-sloping, because the longer-term issues would command higher rates to compensate for the *possibility* that rates could move upward. For this reason, an upward-sloping yield curve is sometimes called a "normal" yield curve.

In the experience of most investors, the yield curve has been upward sloping

during periods of relative calm in the financial markets and has only become flat or downward sloping during episodes of monetary stringency. During the later part of the 19th and early part of the 20th centuries, when the dollar was "as good as gold" and investors could assume that they would be repaid with equivalent value no matter how long they lent funds, the yield curve was typically flat (at a level of 3 to 4 percent) and became downward sloping during times of crisis, such as the panic of 1907.

The Federal Reserve can manipulate short-term rates, usually downward, for economic and political aims, but it has not yet found, to our knowledge, an effective way to manage long-term rates, despite its best efforts at market intervention and jawboning. An upward-sloping yield curve would seem to be "normal" only if one assumes that continuous inflating at unpredictable rates via a central bank is the "normal" state of monetary affairs.

The preferred habitat theory states that the premium for extending maturity reflects more than a liquidity premium; the premium also reflects the tendency of market participants to hold certain maturities unless they can be compensated for shifting to another maturity. For example, a pension fund may choose to hold a cer-



tain proportion of 5-year bonds so that cash flows at maturity match the fund's projected need to make payments to pensioners. Thus the fund may only switch to a different maturity for this portion of its portfolio if the premium outweighs the associated risks.

Mathematical examples of how the pure expectations theory would work are possible. The observed yield curve can be used to construct expected rates for future dates. For example, the recent yield on a 3-year Government note was 4.40 percent. For a 1-year bill, the rate was 3.50 percent. An investor who now buys a 1-year bill to yield 3.50 percent and reinvests the proceeds at maturity in a 2-year note yielding 4.88 percent would receive precisely the same returns as an investor who now buys a 3-year note at 4.40 percent. Thus, the pure expectations theory suggests that the consensus of market participants is that a 2-year note will yield 4.88 percent 1 year from now, or 90 basis points (a "basis point" is  $1/100$  of a percentage point, in the jargon of the money and capital markets) more than the 3.98 percent that the 2-year note now yields.

#### False Precision

Such precision is, of course, a great oversimplification. In the example, there would appear to be as many investors who believe that the yields on 2-year Treasury notes will increase by 90 basis points or more over the next 12 months, and

who therefore now prefer the 1-year bill at 3.50 percent to the 3-year note at 4.40 percent, as there are investors who do not expect such an increase and want to "lock in" the higher yield now available on the 3-year note.

However, these clearly are not the only alternatives available. Treasury securities are available that mature every month for the next 5 years, and most months thereafter until the year 2023. There is a virtually unlimited number of comparisons of the type noted above, which will lead to a wide variety of "forecasts" (such as that of a 90 basis point increase in the rate on the 2-year note over the next 12 months). The most that can be said with confidence is that if relatively more investors come to believe that interest rates will increase, the yield curve will become steeper and *vice versa*.

Changes in the slope of the yield curve, and presumably of investor expectations, are indicated in the top panel of Chart 2, which shows the ratio of the rates on 20-30 year Treasury bonds to rates on 2-4 year issues. On this chart, a level of 1.00 would indicate a flat yield curve, values of less than one a downward-sloping curve and values greater than one an upward-sloping curve.

These data show that the yield curve has become exceptionally steep thus far during the 1990s, reaching a postwar record high about a year ago. It has since flattened somewhat, but remains steeper

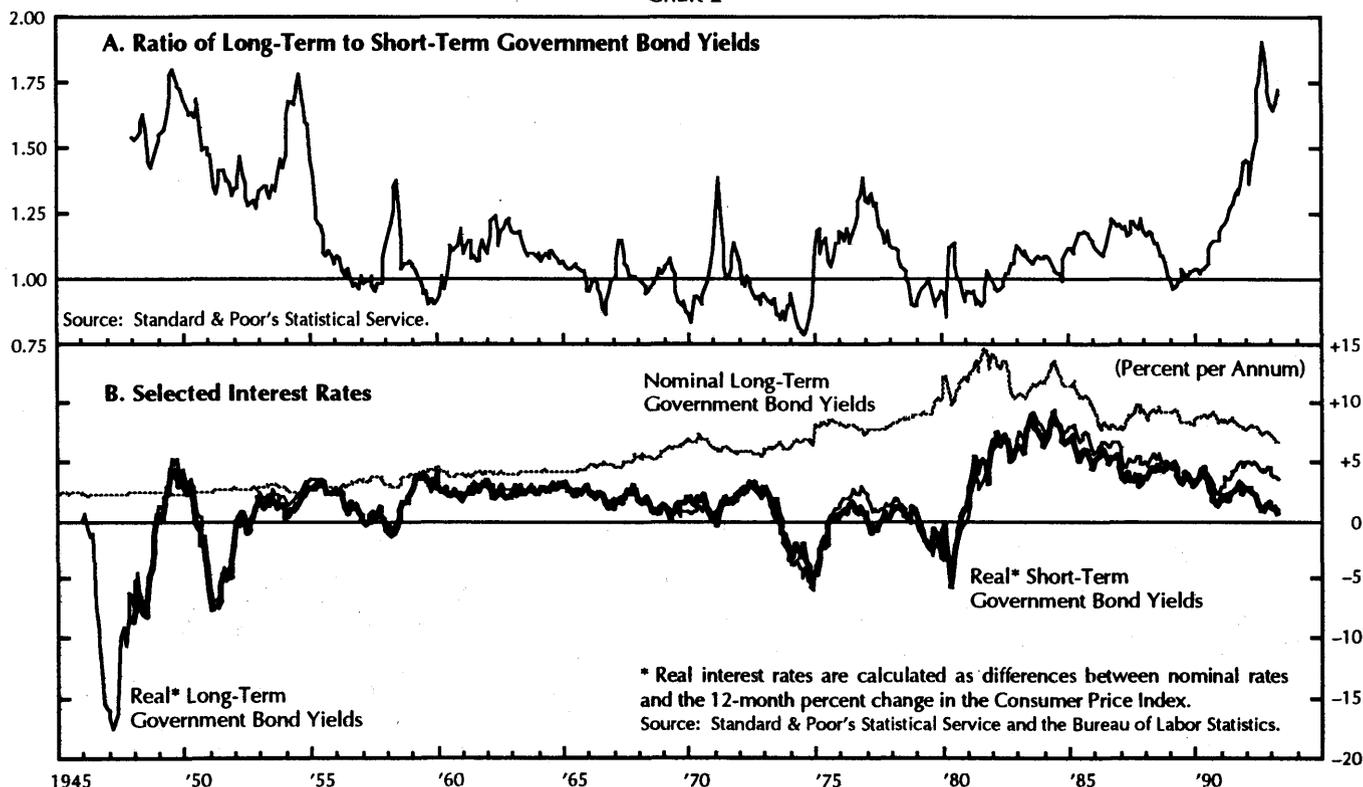
than at any time since 1955. Presumably, this flattening reflects an increased demand for longer maturities on the part of investors who, as recently as 3 years ago, were receiving 8 percent or so on short-term fixed-dollar investments, but who now are offered less than 3 percent. This demand has brought the long-term rate down to levels not seen since the early 1970s.

#### Risks

Going for the higher rates might seem to be a rational response to current conditions, but we believe few investors understand the risks they are assuming. An increase of only 50 basis points or so in the yields on intermediate-term issues over the next 12 months would cause their market prices to decrease sufficiently to offset their current interest advantage over short-term instruments. An increase of 125 basis points would wipe out all of their first year's income! The risks are even greater on longer maturities: it would take only a 50 basis point increase in the 30-year bond yield to wipe out all of the income during the next 12 months.

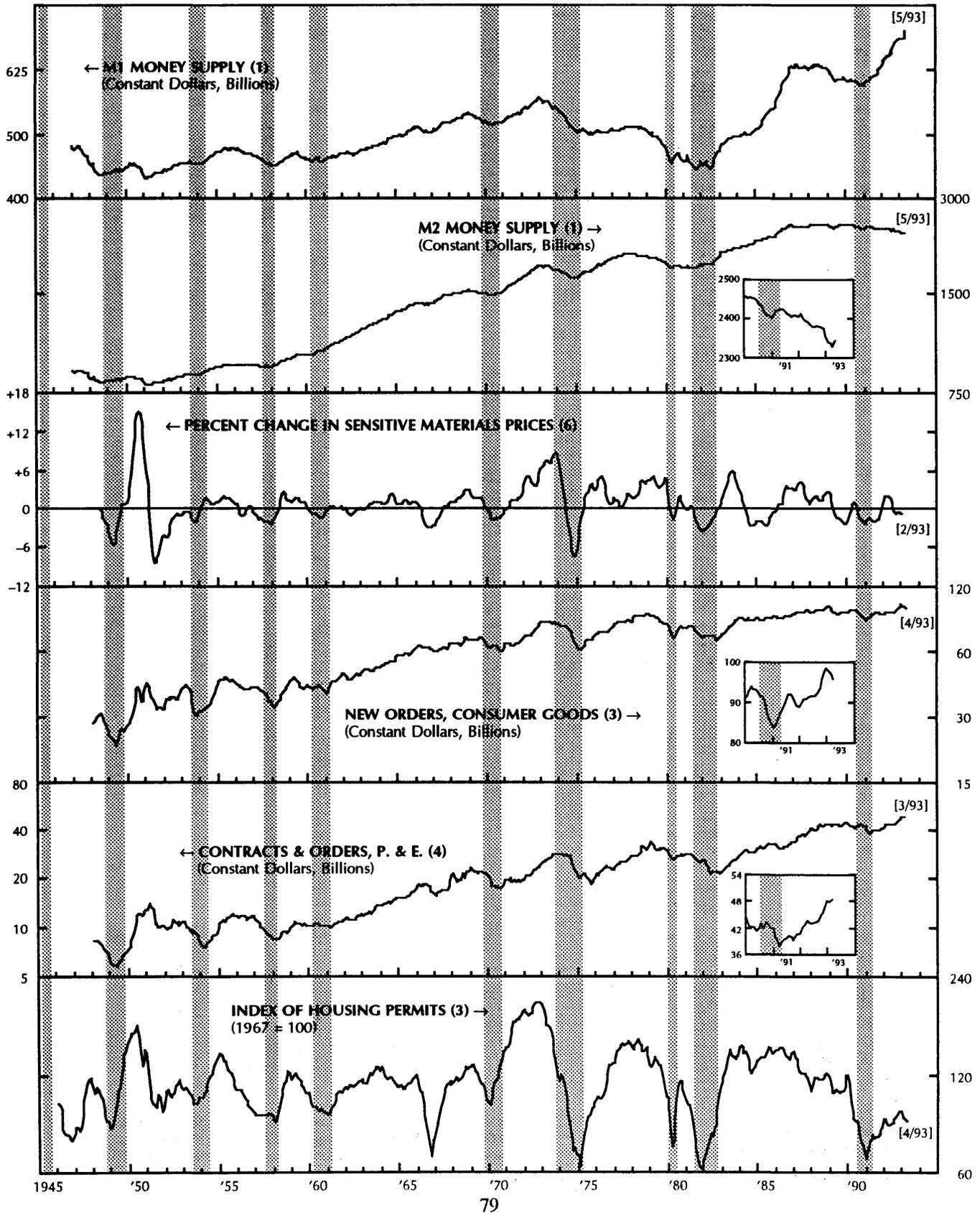
As indicated in the bottom panel of Chart 2, moves of 50 or 125 basis points would not be unusual during the next 12 months — rates have fluctuated in a much larger range over the years. Indeed, with nominal interest rates now at their lowest levels of the past 20 years or so, and with "real" returns heading into negative terri-

Chart 2

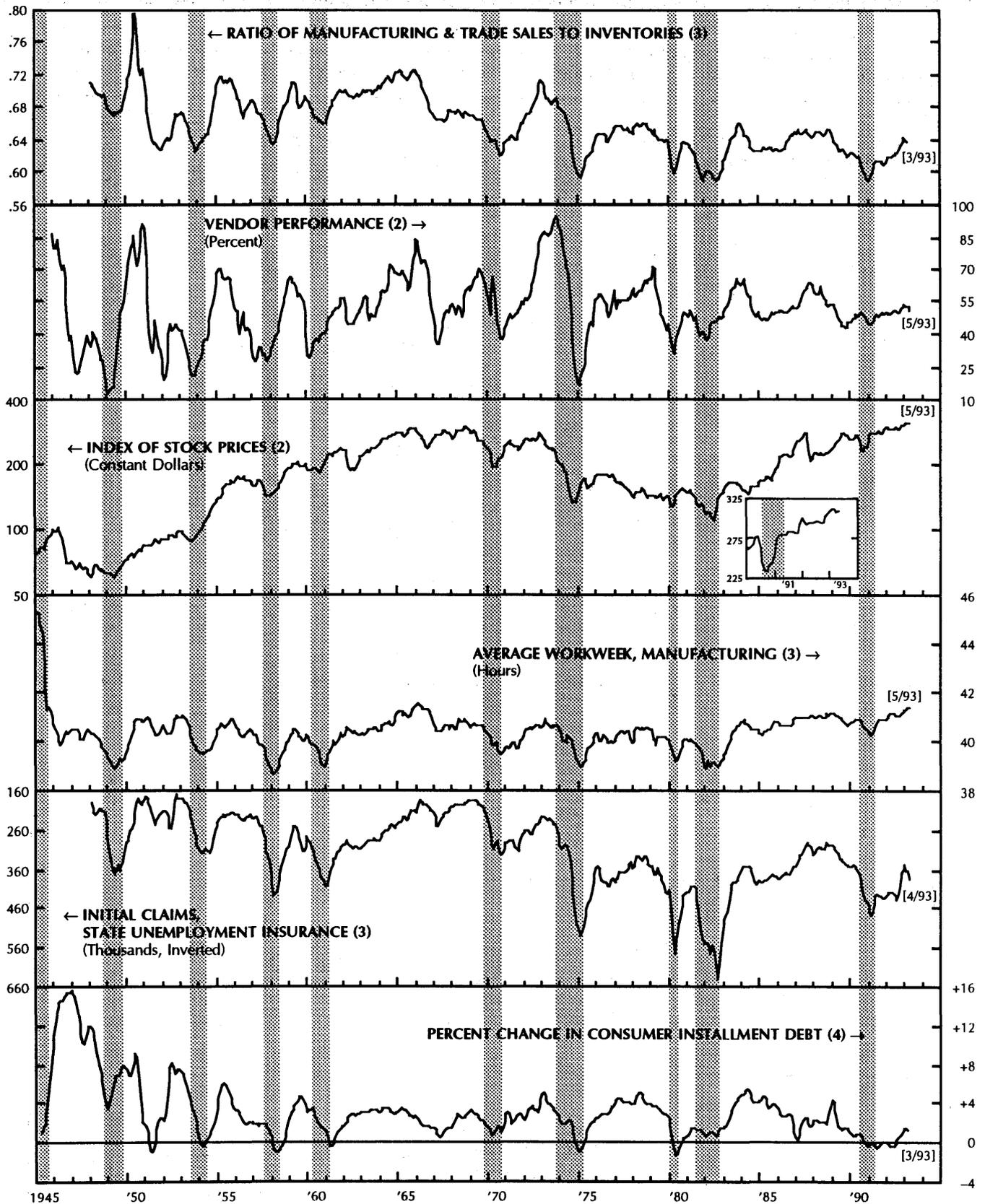


# PRIMARY LEADING INDICATORS

*The cyclical statuses of six of the 12 leading indicators deteriorated in our latest appraisal. The widespread downturn raises some fears of renewed recession, but the three-quarters of the leaders still expanding suggest that continued expansion is more likely.*



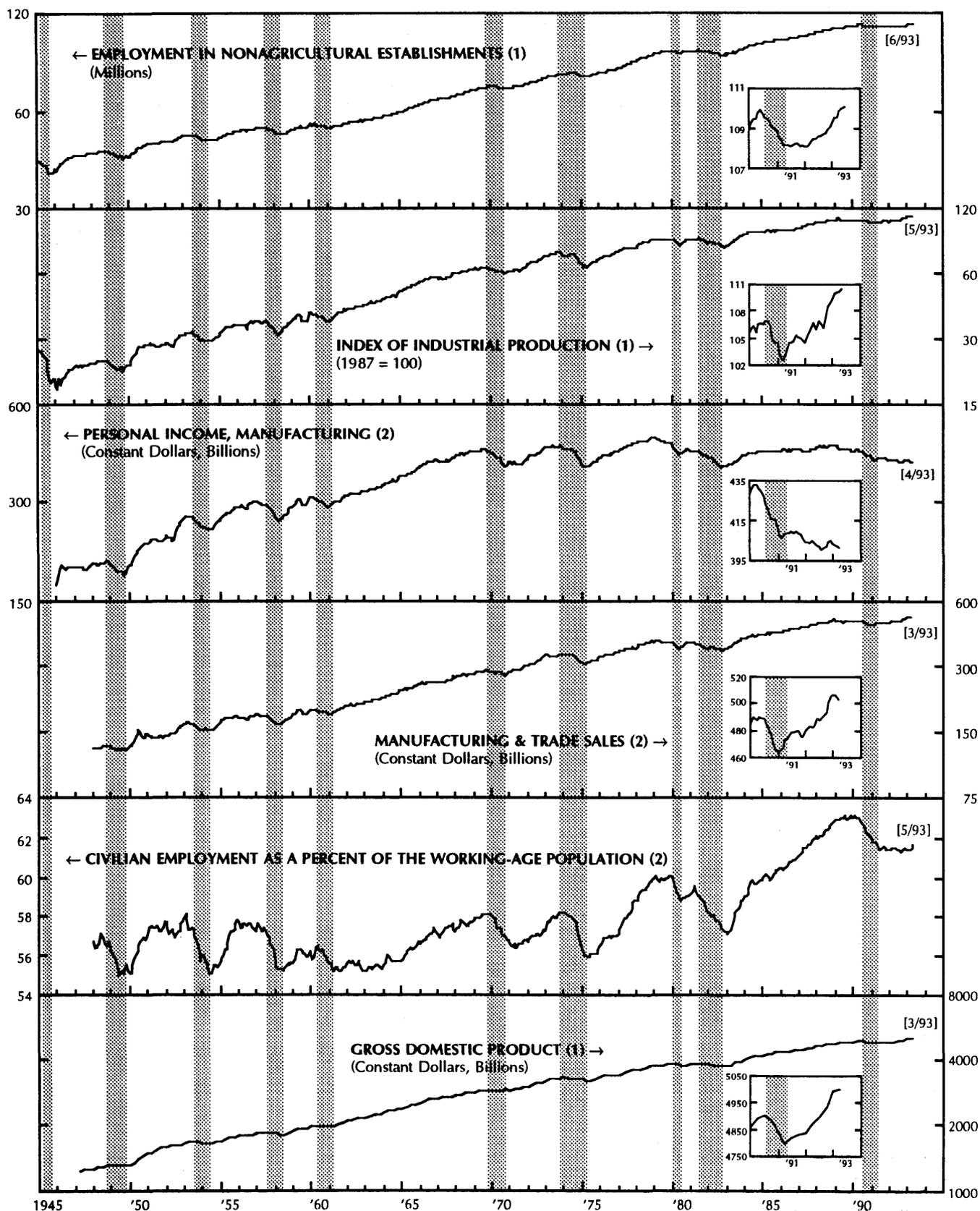
PRIMARY LEADING INDICATORS (Continued)



Notes: The number in parentheses next to the name of a series is an estimate of the minimum number of months over which cyclical movements of a series are greater than irregular fluctuations. That number is the span of each series' moving average, or MCD (months for cyclical dominance), used to smooth out irregular fluctuations. The data plotted in the charts are those MCDs and not the base data. The number in brackets is the latest month for which the moving average is plotted. The insets in selected charts show recent trends more clearly. These insets have arithmetic scales, even when the main chart is plotted on a ratio scale.

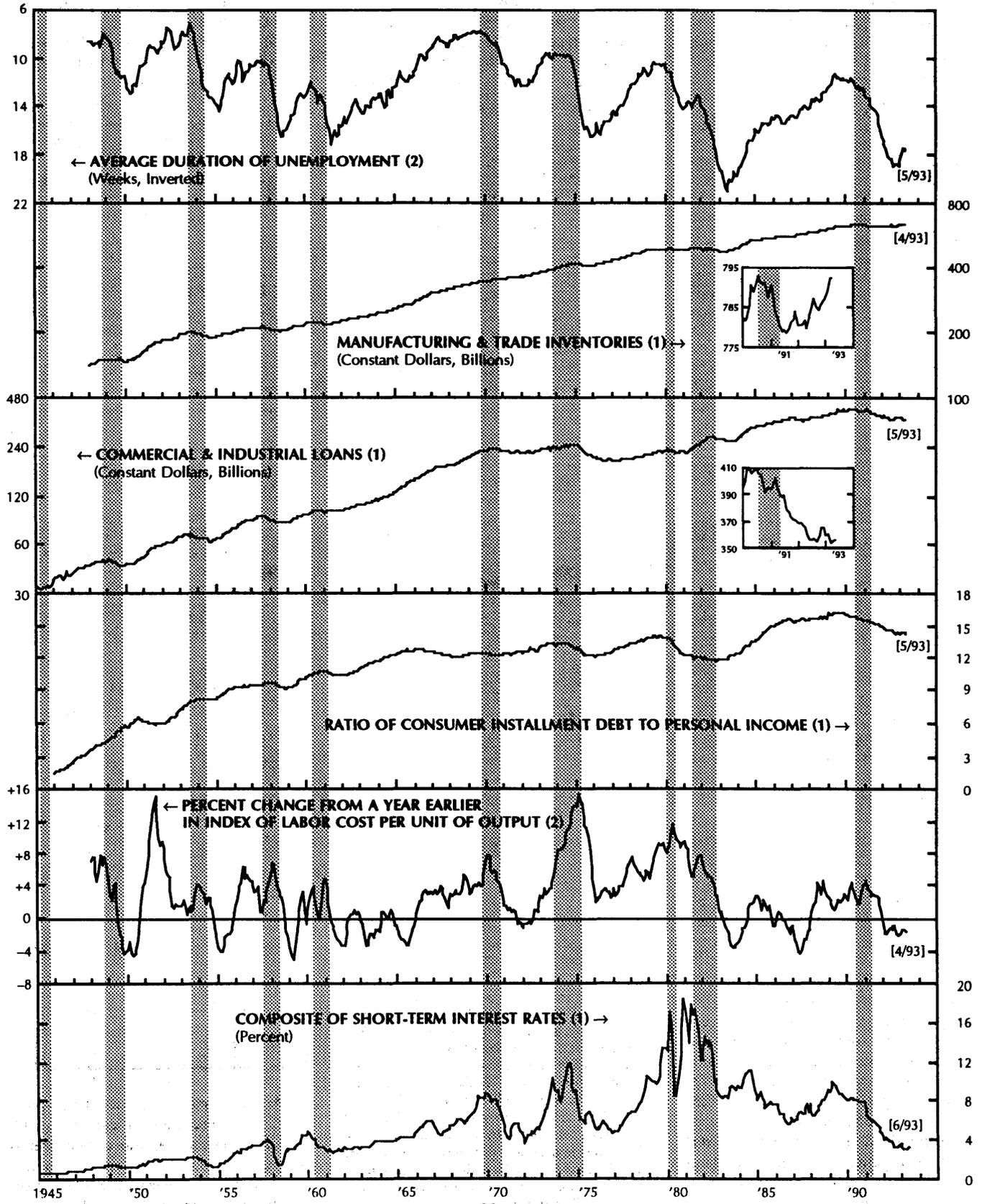
## PRIMARY ROUGHLY COINCIDENT INDICATORS

*The coincident indicators continue to expand, but their current rates of growth are noticeably slower than the rates observed late in 1992 and early this year. The slowdown, most evident in nonagricultural employment, industrial production, and manufacturing and trade sales, is consistent with the deterioration among the leading indicators.*



## PRIMARY LAGGING INDICATORS

The percentage of lagging indicators expanding has been rising for much of this year. The latest increase, to 75 percent, would contribute to fears of recession except that the expansions of the individual series have been unusually sluggish. The imbalances associated with incipient recession usually are reflected in rapid increases in these series.



tory (they already would seem to be there for most taxable holders of short-term instruments), the stage may be set for another great fleecing of bondholders, who are now once again highly vulnerable to any upsurge in price inflation. Not only would such an upsurge reduce the value of fixed-dollar claims, but the nominal value of longer-term holdings would sink as interest rates rose.

Given the unappetizing prospect of being locked in to a modest yielding instrument in a period of rising rates, it is difficult to understand the logic of advisors who are pushing investors into intermediate maturities in an effort to increase the yield on their portfolios. It only makes sense if one believes that the gap between

short and long-term rates will be closed to more normal levels by a decline in long-term rates.\*

Some economists at leading brokerage houses actually have forecast a low-inflation, slow-growth, improved-productivity scenario in which investors come to realize the error of their inflationary expectations and accept the inevitability of lower rates. So far as we can see, these

\* Series EE U.S. Savings Bonds are perhaps the best way for those with smaller portfolios (purchases are limited to \$15,000 per year per account) to "reach" for higher yields from "riskless" Government obligations. The rates on EE bonds fluctuate with those on 5-year Treasury issues, but there is no "interest rate risk" — they can always be cashed in for more than you paid for them.

## BUSINESS-CYCLE CONDITIONS

*Widespread deterioration now is evident among the leading indicators, while the revival of the lagging indicators continues. The rates of growth of the coincident indicators have slowed. If these trends persist, they could be the first signs of the next recession, but at present no such forecast is warranted. Continued expansion remains more probable than not.*

The cyclical statuses of six of the 12 primary leading indicators of business-cycle changes have deteriorated since our last review. The 3-month *change in sensitive materials prices* reached an 18-month low in May, extending to 10 months the downward trend in its 6-month moving average. The decrease finally established the cyclical nature of the trend in this volatile indicator. Appraised as cyclically indeterminate for the past 7 months, the change in sensitive materials prices now is probably contracting.

The latest reports show continued deterioration in *new orders for consumer goods* (new orders and all other dollar-denominated series are reported in constant dollars), the *ratio of manufacturing and trade sales to inventories*, and *initial claims for unemployment insurance* (an inverted series). These series reached cyclical highs in January and have decreased since then. Appraised as probably expanding last month, all three now are cyclically indeterminate.

The cyclical status of the *index of 500 common stocks prices* also deteriorated. Despite recent increases in the base data, the 2-month moving average failed for a third month to surpass its February high. This failure raised some doubts about the ongoing expansion of the series. Similarly, a decline in the moving average of the 3-month *change in consumer installment debt* generated some uncertainty about the continued expansion of that series. The change in consumer debt fell in

May, contributing to the first decrease in 9 months in the 4-month moving average of the series. The moving average provides the basis for our appraisal. Much of the decline was attributable to unusual factors rather than to a drop in lending,\* but the rate of change in consumer debt excluding the unusual factors still would have fallen enough to produce a decline in the moving average. Appraised as clearly expanding last month, the stock price index and the change in consumer debt now are probably expanding.

In the midst of the negative developments described above, three of the leading indicators reached new highs for the cycle: the *M1 money supply*, the *average workweek in manufacturing*, and *contracts and orders for plant and equipment*. All three series are clearly expanding. The May increase in M1 was particularly sharp; it produced a concomitant rise in the *M2 money supply*, which includes all the components of M1 plus savings deposits, which also rose sharply in May,

\* The Federal Reserve Board's measure of the volume of consumer installment debt outstanding fell just under \$1 billion in May to \$753.9 billion. The decline reflected sales of roughly \$3 billion of outstanding loans to creditors outside of the survey universe regularly covered by the Fed's *Consumer Installment Credit* release. Although the release did not identify the buyers of the loans, pension funds, investment companies, brokerage houses, and insurance companies are all likely candidates. Excluding these loan sales, total consumer debt outstanding increased more than \$2 billion in May.

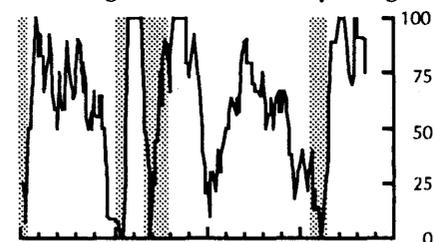
analysts are making the common error of projecting the latest trends into the future. They are using current price disinflation trends, which are typical of a period such as this in the early recovery stages at the end of a recession, and projecting them into the future.

They have completely overlooked the broad historical context that suggests today's low price inflation, while welcome, is more likely a relatively brief respite from the long-term degradation of fiat money. It can be expected to pass, either when the business-cycle recovery takes firmer root or when all those dollars and debts printed by the Government start flowing from financial assets to consumption and real assets. □

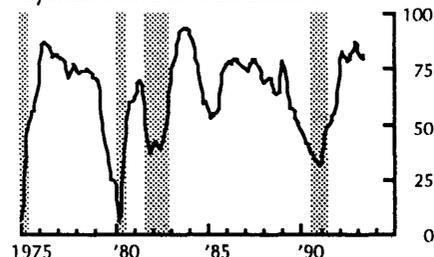
and other components. The increase in M2 raised some doubts about the downward trend it has taken throughout most of the current expansion. Appraised as clearly contracting last month, M2 now is probably contracting.

Overall, 75 percent (6 out of 8) of the leaders for which a trend is evident are expanding, down from 90 percent (9 out of 10) last month. The base data for only five of the 12 leading series increased in the latest reports. Despite these setbacks, our experimental cyclical score increased to 82 from the score of 80 reported last month, mostly on the strength of the increase in M2. The charts that follow show the recent histories of these two summary measures of the overall status of the leaders:

Percentage of AIER Leaders Expanding



Cyclical Score of AIER Leaders



As the top panel suggests, the 15-point drop in the percentage of leaders expanding is worrisome. If the current trends among the leaders continue for a few months more, those series will be signaling the next recession. It is hazardous,

however, to extrapolate from the movements of the most recent 2 or 3 months. Last August, for example, the percentage of leaders expanding fell from 89 to 73 (and subsequently dipped as low as 70) without portending recession. On the other hand, that decrease was the result of changes in just two series' appraisals. The current episode may justify more concern because the cyclical statuses of half of the leading indicators deteriorated in the latest appraisal.

Another important difference between last summer's drop in the percentage of leaders expanding and the current episode is the trend of the percentage of lagging indicators expanding. Last August, none of the laggings for which a trend was evident was expanding, whereas 75 percent currently are expanding. That percentage has risen steadily in recent months. A high percentage of laggings expanding combined with a falling trend in the percentage of leaders expanding is a "classic" signal of impending recession. As we discuss below, the percentage of laggings expanding may not be high enough to warrant concern, and it is clearly premature to say that the current trends amount to a recessionary signal. If they persist, however, they will warrant concern.

Among the primary roughly coincident indicators, four series reached new highs for the cycle and are clearly expanding: *nonagricultural employment*, the *index of industrial production*, the *civilian employment to population ratio* (appraised last month as probably expanding), and *gross domestic product* (GDP). *Manufacturing and trade sales* also remains clearly expanding despite a 1-month decrease in its moving average. The decrease in manufacturing and trade sales is not the only sign of weakness among the four coinciders that show long upward trends. The latest rates of increase in non-agricultural employment, industrial production, and GDP all fell well below the paces those series set last year.

Overall, 100 percent (5 out of 5) of the roughly coincident indicators for which a trend is evident are expanding, unchanged from last month. In one respect the coinciders look stronger than they did last month, because the cyclical status of the employment to population ratio improved. In other respects, signs of weakness prevail: the latest base data for three of the six coinciders, including the employment to population ratio, decreased, while the increases in the three series noted above were unusually small. These signs of weakness affirm the potential gravity of the deterioration among the leading indicators, although it is too early to deter-

mine whether the slowdown will develop into an outright downturn.

The revival that began this spring among the primary lagging indicators continues. *Commercial and industrial loans* posted an increase in May and the April estimate for the series was revised from a decrease to an increase. The 2 months of increase now evident warranted upgrading the cyclical status of the loans series from clearly contracting to indeterminate. Similarly, our *composite of short-term interest rates* increased in June and showed no change in May. That the series has decreased in only 1 of the past 4 months raised some doubts about its ongoing contraction. Appraised as clearly contracting last month, the interest rate composite now is probably contracting.

These two changes brought the percentage of laggings expanding for which a

trend is evident to 75 (3 out of 4), up from 60 percent (3 out of 5) last month. There clearly has been some improvement among these indicators, but perhaps not as much as the 15-point increase in the percentage expanding suggests. Among the three series appraised as probably or clearly expanding, the latest base data show two series falling and one unchanged. The decrease in the *ratio of consumer installment debt to personal income* was attributable to an anomaly in the consumer debt data (see footnote on page 83), but even after discounting the anomaly the debt-to-income ratio still would have decreased. As was the case with the coincident indicators during 1991, the contraction among the laggings is mostly finished, but the expansion lacks the vigor usually evident just after cyclical turning points. □

### THE STATISTICAL INDICATORS

	Direction of Change in Base Data				— Cyclical Status —		
	Mar.	Apr.	May	Jun.	5/93	6/93	7/93
<i>Primary Leading</i>							
M1 money supply†	+	+	+		+	+	+
M2 money supply†	-	-	+		-	-	-?
Chg. in sensitive mat. prices	-	-	-		?	?	-?
New orders, cons. goodst	-	+	-		+	+?	?
Contracts & orders, p. & e.†	-	-	+		+	+	+
Housing permits	-	+	+		+?	?	?
Mfg. & trade sales/inv.†	-	-	-		+	+?	?
Vendor performance	-	+	-	-	+	+?	+?
Stock prices†	+	-	+	+	+	+	+?
Average workweek, mfg.	-	+	-	-	+	+	+
Initial claims, unempl. ins.*	-	+	-		+?	+?	?
Chg. in cons. instal. debt	-	-	-		+	+	+?
Percent expanding cyclically					91	90	75
<i>Primary Roughly Coincident</i>							
Nonagr. employment	+	+	+	+	+	+	+
Industrial production	+?	+	+		+	+	+
Personal income, mfg.†	-	-	-		?	?	?
Mfg. & trade sales†	-	-	-		+	+	+
Employment/population ratio	nc	-	+	-	?	+?	+
Gross domestic productq	+	+	+	+	+	+	+
Percent expanding cyclically					100	100	100
<i>Primary Lagging</i>							
Avg. duration of unempl.*	+	+	-	nc	+?	+?	+?
Mfg. & trade inventories†	+	-	-		+	+	+
Com'l. & industrial loanst	-	+?	+		-	-	?
Cons. instal. debt/pers. inc.	-	+	-		?	+?	+?
Chg. in labor cost/output	+	-	-		-?	?	?
Short-term interest rates	+	-	nc	+	-	-	-?
Percent expanding cyclically					40	60	75

† In constant dollars. \* Inverted. q Quarterly. nc No change. † Revised.

Note: Under "Direction of Change in Base Data," plus and minus signs indicate, respectively, increases or decreases in monthly or quarterly data from the previous month or quarter, blank spaces indicate data not yet available. Under "Cyclical Status," plus and minus signs indicate expansions or contractions of each series as currently appraised; question marks indicate doubtful status when shown with another sign or indeterminate status when standing alone.

### PRICE OF GOLD

	1991	1992	— 1993 —	
	Jul. 18	Jul. 16	Jul. 8	Jul. 15
Final fixing in London	\$369.00	\$353.00	\$395.20	\$392.70

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