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# Historical U.S. Money Growth, Inflation, and Inflation Credibility*

William G. Dewald

## INTRODUCTION

Although many forces affect individual prices in the short run, the historical record shows that in the long run changes in the general level of prices, i.e., inflation, have been linked systematically to changes in the quantity of money. The Federal Reserve uses as its principal monetary policy target an overnight inter-bank interest rate, the federal funds rate, which it manipulates by open market operations that change its portfolio of government securities, which in turn influences monetary growth. Economists both inside and outside the Federal Reserve monitor a wide range of indicators so as to judge the appropriateness of a monetary policy target relative to the goals of achieving a stable price level and sustained real growth. For many years presidents of the Federal Reserve Bank of St. Louis and many of its economists have called attention to research showing that long-term growth of monetary aggregates is among the more important of these indicators. They also have championed the preeminence of price level stability as a monetary policy goal to provide the best environment for sustained economic growth in a market economy.

The historical data reveal a consistent correlation between long-term growth rates in broad monetary aggregates, spending, and inflation in the United States, but not between such nominal variables and real output. Data from the bond market show that, despite inflation being at its lowest level in decades, the Fed has not regained fully the inflation credibility that it lost in the 1960s and 1970s.

## NOMINAL AND REAL GROWTH, AND INFLATION

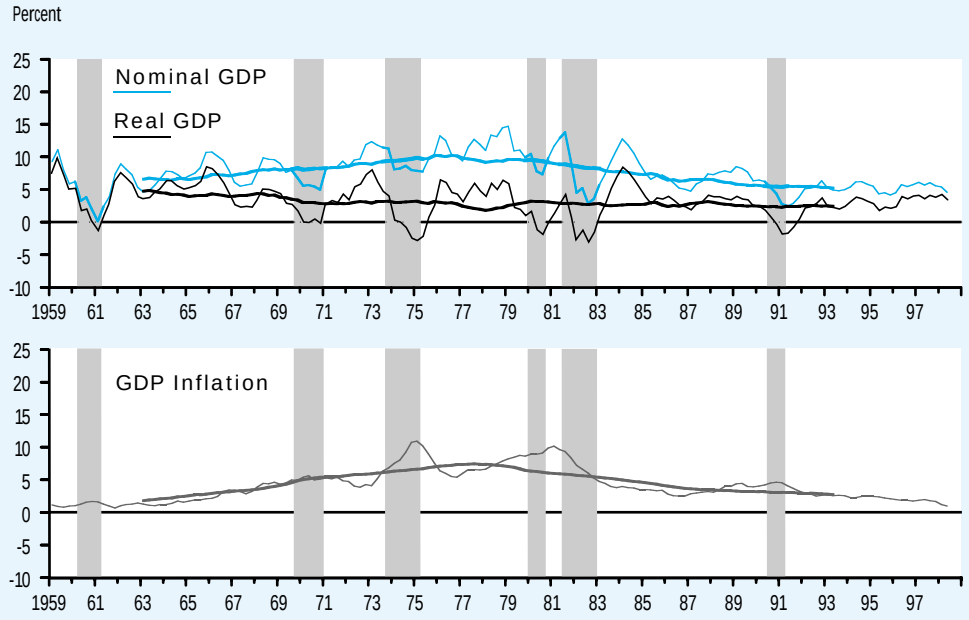
The financial press and the public often seem to believe that the way to contain inflation is to pursue policies that reduce real economic growth. The view that it necessarily takes lower real growth, or even a recession, to slow inflation is an improper reading of historical data. It fails to differentiate between the short run and the long run. Sustained real output growth depends on increases in the supply of labor and capital, and increases in the productivity of such inputs. Growth in demand for output certainly influences what is produced, but fundamental scarcities limit the aggregate amount of how much can be produced on a sustained basis. Furthermore, as the level and variability of inflation increase, price signals become fuzzier and decisions are distorted, which would tend to decrease real gross domestic product (GDP). Thus, one should not expect an increase in demand growth to increase real growth on a sustained basis, but if at all, only in the short run. An examination of the historical record supports this proposition.

Figure 1 is a plot of percentage changes over 1959-1997 in nominal GDP, real GDP, and the GDP price index. The chart includes year-over-year and 10-year moving averages. The four-quarter changes—the fine lines—remove the high frequency noise from the data. The 10-year changes—the heavy lines—remove the business cycle fluctuations as well. The gap between nominal and real GDP growth rates approximates inflation, as measured by percentage changes in the GDP price index, which are shown in the bottom panel of Figure 1.[1]

[1] With chain-weights, price indexes and quantity indexes are calculated separately for components of GDP and therefore the difference between nominal GDP and real GDP growth is only approximately equal to the change in the GDP price index. With fixed-weights, the GDP deflator is defined as the ratio of nominal to real GDP and hence the gap between nominal and real GDP growth rates is precisely equal to the growth rate in the GDP deflator.

Figure 1

Inflation and Real Growth (Year/Year and 10-Year Averages)




NOTE: The bold lines are centered 10 year moving averages of the respective series.

Figure 1 reveals several regular patterns:

- Inflation trended up through about 1980, and down since then.
- Annual growth rates in nominal GDP and real GDP went up and down together.
- Annual growth rates in nominal and real GDP were also more volatile than annual inflation rates.
- Recessions—marked by the shaded bars—occurred more frequently from the late 1960s through the early 1980s when inflation was high and rising than since the early eighties when it trended down.
- Inflation typically accelerated before cyclical peaks, but then decelerated beginning in recessions and extending into the early phase of recoveries.
- In recent years inflation has been its lowest and most stable since the late 1950s and early 1960s, and, atypically, it has continued to decelerate in the seventh year of the expansion.

The year-over-year movements in nominal and real GDP are matched closely in the short run, an observation seemingly suggesting that policies to increase nominal GDP growth would increase real GDP growth, too. That short–run relationship, however, does not hold up in the long run. From the 1960s through the early 1980s the increase in 10-year average nominal GDP growth was associated with a matching increase in 10-year average inflation, but, if anything, a decrease in 10-year average real GDP growth. Thus, increased average nominal GDP growth in the long run was not associated with increased real GDP growth, but only with inflation.

International evidence supports this finding that inflation harms long-run growth.

Studies of other countries have identified a small negative effect of even moderate inflation on real growth.[2] Small differences amount to a lot over long periods because of compounding. Thus, it may not be an accident of history that the most highly industrialized economies with the highest per capita income today have had comparatively low inflation over extended periods. With respect to countries that have experienced inflation of 40 percent a year or more, the evidence is unambiguous: High inflation reduces real growth.[3]

High inflation also has been linked to cyclical instability. There was a deep recession in 1981 and 1982. This recession was associated with a genuinely restrictive monetary policy and interest rates at unprecedented levels. The rate of unemployment built up to more than 10 percent and inflation fell far more sharply than most forecasters had expected. Despite some relapse in the late 1980s, inflation has trended down since the early 1980s, and real GDP growth has averaged somewhat less than it did in the 1960s, but this is because of lower productivity growth and not because of recessions and unemployment. In fact, the U.S. economy has performed very well relative to its potential and better than ever in terms of cyclical stability. The 29-quarter expansion from 1991:Q1 through 1998:Q2 had not yet lasted as long as the record 34-quarter expansion of the 1960s. However, as inflation decreased from the end of the recession in 1982:Q4 through 1998:Q2, there were 63 expansion quarters and only three contraction quarters, an unprecedented era of cyclical stability in U.S. history. It surpassed the record of 1961:Q1 through 1973:Q4, which included 47 positive growth quarters and four contraction quarters. The record was not too shabby in either case, but there was a difference. The 1960s and early 1970s were a period of accelerating inflation, which laid a foundation for the instabilities that followed. The 1980s and so far the 1990s have been a period of decelerating inflation, which has lain a foundation for stable price level credibility and efficient resource utilization. The next figures bring monetary growth into the picture.

## MONETARY GROWTH AND INFLATION

M2 is a measure of money that Milton Friedman and Anna Schwartz trace in their *Monetary History of the United States*.[4] It is a broad measure made up of assets having a common characteristic: Each is either issued by the monetary authorities, for example, currency and coin, or is an obligation of a depository institution legally convertible into such standard monetary units. M2 assets can be divided into M1 and non-M1 categories. M1 components can be used to make payments directly (currency, travelers checks, and checking accounts). Non-M1 components, which can be readily turned into M1 assets, include savings deposits, money-market mutual fund balances, and short-term time deposits. Such non-M1 components of M2 have become increasingly accessible to depositors for payments in recent years. M2, as a broad monetary aggregate, represents the essence of "liquidity," i.e., a way station between income receipts and expenditures for both households and non-financial businesses, and, as such, a variable that would be expected to be related to total national spending in current dollar terms, i.e., nominal GDP.

Figure 2 plots growth rates in M2, nominal GDP, and the GDP price index. It reveals some regular short-term patterns in the year-over-year data:[5]

- M2 and nominal GDP growth rates slow before and during the initial stages of a recession.
- M2 growth turned down many more times than the number of cyclical peaks.
- M2 growth turned up during each recession and early recovery except during the most recent instance when it continued to slow.
- M2 and nominal GDP have been growing at similar rates between 1995 and 1998.

[2] See Barro (1996) and Eijffinger, Schaling, and Hoeberichts (1998).

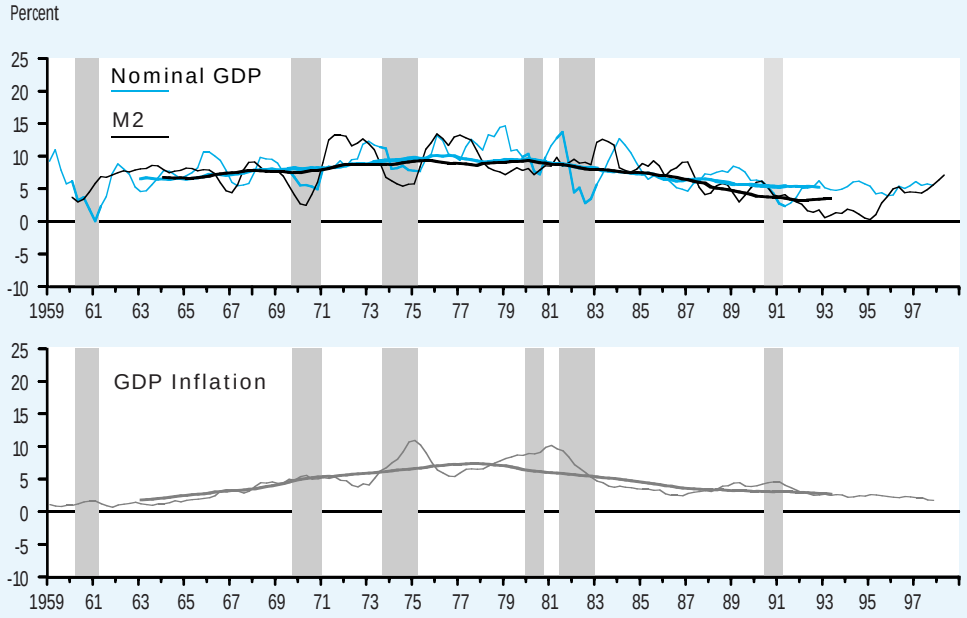
[3] See Bruno and Easterly (1996).

[4] See Friedman and Schwartz (1963).

[5] Despite M2's imperfections as a cyclical indicator, the Conference Board's monthly Leading Indicators Index includes M2 relative to the price level as one of its 10 components.

Figure 2

M2 and Nominal GDP Growth, and Inflation
(Year/Year and 10-Year Averages)




NOTE: The bold lines are centered 10–year moving averages of the respective series.

This figure reveals the major reason why M2 has been discredited as an indicator of the stance of monetary policy in recent years—in the short run, movements in the monetary aggregates, nominal GDP, and inflation sometimes appear to be unrelated. For example, whereas M2 growth slowed dramatically between 1992 and 94, nominal GDP growth accelerated. That discrepancy produced the largest and most persistent deviation between the growth rates in M2 and nominal GDP in many years. This deviation has led the Federal Open Market Committee (FOMC) and the public to place less emphasis on the money supply targets.

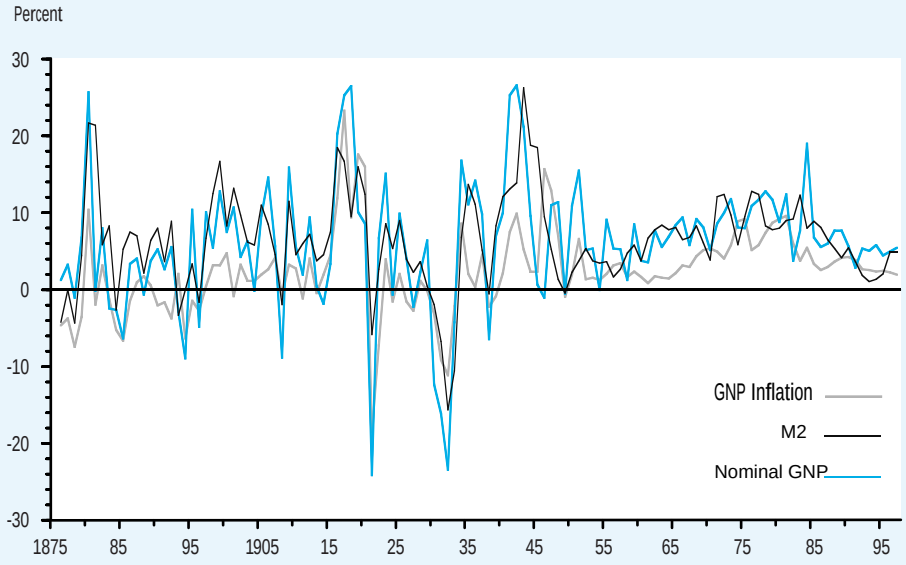
Nevertheless, giving up on the aggregates might be a mistake. The reason is that there has been a close *long-term* fit between M2 growth and nominal GDP growth and, in turn, inflation. Figure 2 shows the general upward trend in 10-year average M2 growth, nominal GDP growth, and inflation during the 1960s and 1970s, and the general downward trend in these 10-year averages during the 1980s and so far in the 1990s. Such a longer-term historical relationship is presumably a reason why M2 is one of the monetary variables for which the Federal Reserve continues to announce a target range in the Congressional Humphrey-Hawkins hearings twice a year. In his Humphrey-Hawkins testimony in February 1998, and again in July, Chairman Alan Greenspan noted that M2 growth might be back on track as an indicator of nominal GDP growth and inflation, after it appeared to have been off track earlier in the expansion.

Observations about M2, nominal GDP growth, and inflation over the long run support Milton Friedman's dictum that "inflation is always and everywhere a monetary phenomenon." The looseness of the short-term association supports his dictum that "lags are long and variable." Figures 3 and 4 makes these points with data going back to 1875.

Figure 3 shows that short-run, year-over-year changes in these historical series

Figure 3

M2, Nominal GNP Growth, and Inflation (Annually)




are very noisy. Yet, even on a year-over-year basis, the association of large movements in M2 with large movements in nominal gross national product (GNP) and inflation is apparent, (for example, the contraction of monetary growth and nominal GDP growth in the early 1930s and the associated deflation). In less turbulent times such as recent decades, however, there is no clearly discernable systematic short-run association between broad money growth, nominal GNP growth, and inflation. Of course, a change in the price level over a year or two is not really what is meant by inflation unless it is substantial enough to change the price level a lot.

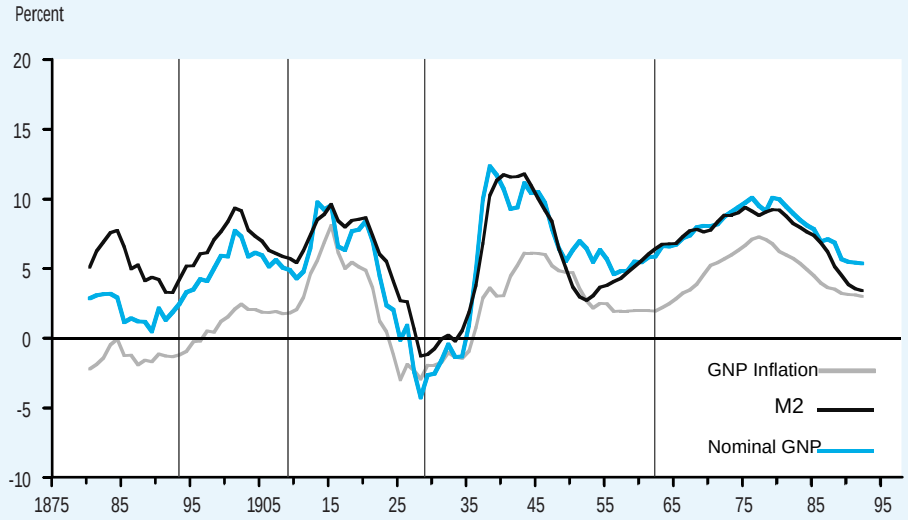
Figure 4 shows that over the past 35 years the long upward and downward cycle in M2 and nominal GNP growth rates and inflation is only one of a series of comparable long cycles in U.S. history. Following a period of low M2 growth and deflation in the 1870s and 1880s, there have been four long inflation-disinflation cycles. They are marked on the figure by troughs in centered 10-year average inflation in 1893, 1909, 1928, and 1962. In 1998, it is not known yet whether the last 10-year average plotted was a trough.

Because M2 growth tracks all previous inflation-disinflation cycles, it goes a long way to avert the suspicion that the relationship between monetary growth and inflation is spurious. Monetary historians such as Milton Friedman and Anna Schwartz have recognized that the mere association of monetary growth with inflation does not establish the direction of causality. To confirm that monetary growth causes inflation, they cite the evidence that the long-term relationship between monetary growth and inflation has remained much the same throughout history, including periods when we know that monetary growth resulted from supply-side factors. For example, when monetary growth accelerated in the 1890s, as engineering advances increased gold output, there was an associated inflation. Gold was then a standard into which currencies could be converted. When monetary growth collapsed in the early 1930s because of bank failures, there was an associated deflation.

The historical record also includes episodes when demand pressures led the Fed to support monetary increases. In both World Wars I and II, Fed policies to

Figure 4

M2, Nominal GNP Growth, and Inflation
(10-Year Averages)




help the government finance its debt stimulated monetary growth. What followed were substantial increases in inflation. Nevertheless, even in wartime, there is reason to think that the Fed could have kept a damper on inflation. When federal deficits rose in the 1980s, but the rate of monetary growth fell, inflation did not rise. It fell. The historical evidence is that when the Fed has held interest rates down in the face of demand pressures by stimulating monetary growth, inflation has accelerated. However, in periods such as the 1980s, when monetary growth has not accelerated, inflation has not accelerated.

Every major acceleration in M2 growth has been associated with a major acceleration in inflation. Likewise, every major deceleration in M2 growth has been associated with a major deceleration in inflation. Accordingly, policy makers might be making a serious mistake if the noisy short-term movements in M2 and inflation persuaded them that money does not matter anymore. At a minimum, policy makers and the public might be wise to monitor monetary growth, mindful that inflationary demand pressures do not cause money growth unless the monetary authorities passively allow that to happen. Since the long run consists of an accumulation of short runs, it follows that sustained shifts in M2 growth are worth noting when formulating monetary policy. Keeping longer-term average M2 growth and nominal GDP growth in the neighborhood of longer-term real growth remains a practical guide for achieving a stable price level environment.

## INFLATION AND INTEREST RATES

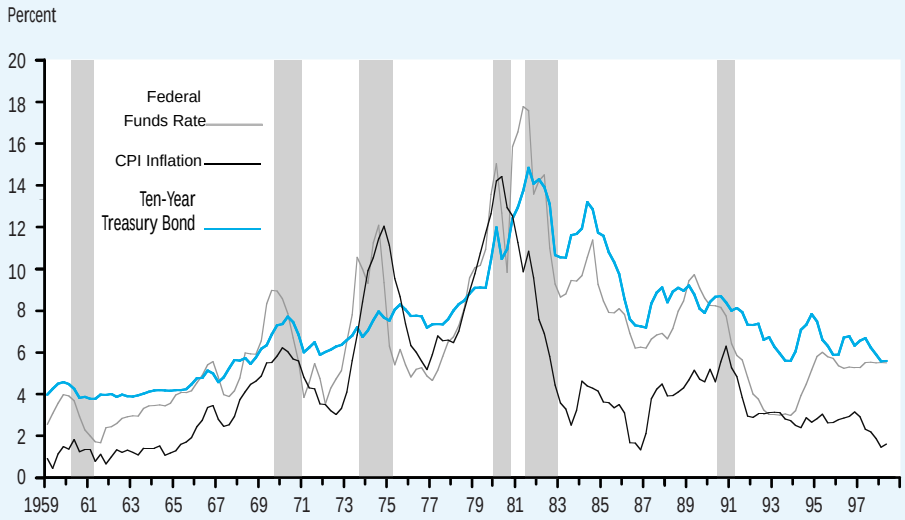
Readers might be surprised that monetary policy has been discussed to this point without much reference to interest rates. This approach was not an oversight.

Interest rates compensate lenders for giving up current purchasing power and taking some risk. One risk is that borrowers might default. Another is that what they pay back might have less purchasing power than what was lent.

Despite the conventional wisdom to the contrary, interest rates often have not been a good measure of the thrust of mon-

Figure 5

Inflation and Selected Interest Rates




etary policy on demand growth and inflation.[6] Because increases in expected inflation would tend to raise rates, rising nominal interest rates do not necessarily signal an anti-inflationary (tighter) monetary policy. Correspondingly, falling nominal interest rates are not necessarily a measure of a more inflationary (easier) monetary policy.

Nominal interest rates are highly sensitive to inflation and inflationary expectations. High inflation expectations lead lenders to demand compensation for the expected depreciation in the purchasing power of the money they lend, and borrowers are forced to add an inflation premium to the interest rates they pay.

Apart from default and inflation risk premiums, real (inflation adjusted) interest rates depend largely on underlying real factors such as domestic saving and investment and international capital flows, not on monetary growth and inflation. Thus, regardless of monetary growth and inflation, higher real interest rates generally reflect increased investment opportunities or decreased saving. That real interest rates reflect underlying real factors is another reason why interest rates are not a reliable measure of the stance of monetary policy.

In this regard, technological change in the 1990s, coupled with the long expansion, may have increased the return to capital investment in the U.S. economy, and hence the demand for capital relative to historical experience, which would tend to increase real interest rates. In such circumstances, there is a monetary policy risk in underestimating the upward pressures on real interest rates that result from an increase in real investment demand. Any attempt to attenuate such pressures by stimulating monetary growth would risk a build up of inflationary pressures.

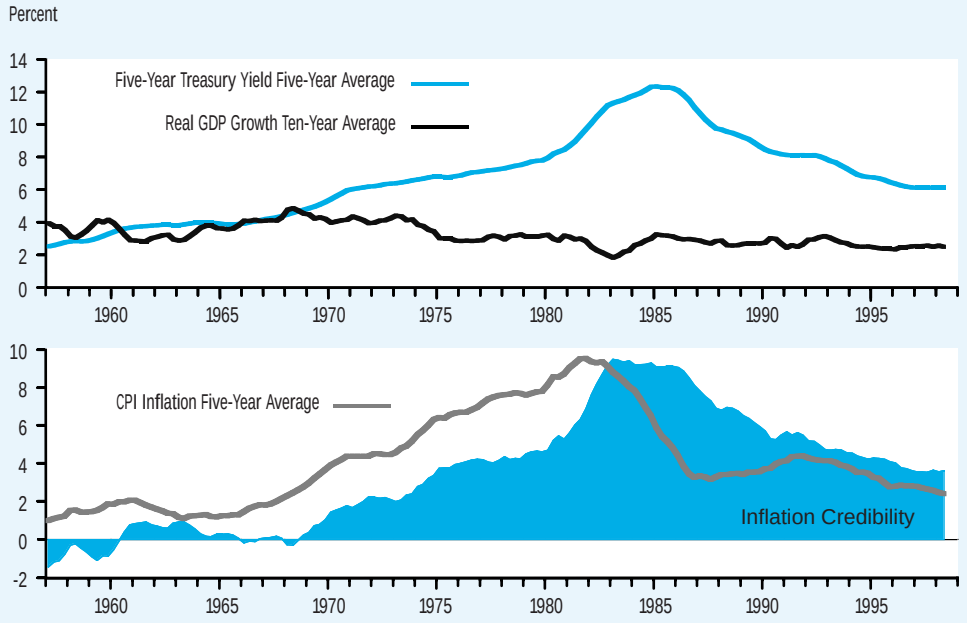
Fundamentally, monetary policy is tighter or easier not in terms of whether nominal *or* real interest rates are rising or falling, but in terms of whether inflationary pressures are falling or rising. As the historical figures have demonstrated, inflation in a longer-term sense is associated with high monetary growth. Figure 5 shows that increases and decreases in inflation trends are reflected in major increases and decreases in nominal interest rate levels.

Figure 5 plots the federal funds rate, the 10-year Treasury bond rate, and annual changes in the Consumer Price Index. When inflation held in the range of $1\frac{1}{2}$ to 2 percent

[6] The faultiness of interest rates as measures of monetary policy in a non-inflationary environment was evaluated in Dewald (1963).

Figure 6

Long-Term Yields, Real Growth, and Bond Market Inflation Credibility




during the late 1950s and early 1960s, 10-year Treasury bonds yielded about 4 percent. From the mid-1960s through the early 1980s, inflation trended up and so did both short- and long-term nominal interest rates. Since then, inflation has trended down and so have both short- and long-term nominal interest rates. Thus, the events of recent decades tend to confirm that high inflation is associated with high nominal interest rates and low inflation with low nominal interest rates. As a corollary, Federal Reserve policies that increase the growth of the monetary aggregates, and thereby inflation, would in due course also increase nominal interest rates, despite the myopic view that expansionary monetary policies lower nominal interest rates. Federal Reserve policies cannot lower nominal interest rates permanently except by actions that lower inflation.

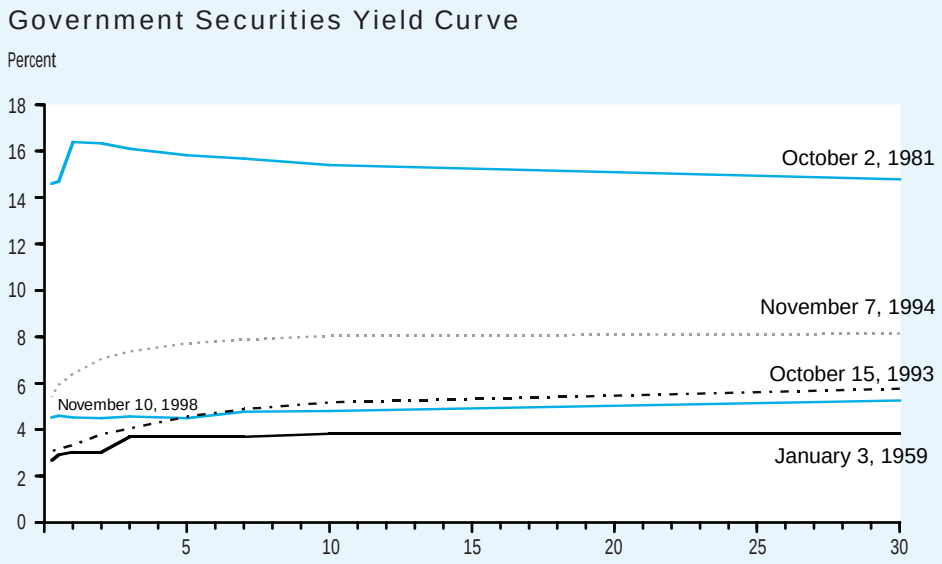
## INFLATION CREDIBILITY AND INTEREST RATES

Given the propensity to save, average real (inflation-adjusted) interest rates would tend to rise with an increase in trend real GDP growth. The reason is that measured real GDP growth is associated with increased real rates of return on investment. Average nominal interest rates tend to deviate from the real rate of return on investment by an amount that reflects expectations of inflation and inflation risks. The greater the gap between nominal interest rates and real rates of return, the lower the Fed's credibility is for keeping inflation low. Thus, the difference between nominal interest rates and trend real growth provides a crude measure of inflation expectations in the bond market, i.e., inflation credibility.[7]

Real GDP growth (averaged over 10 years to remove business cycle movements) drifted down from about 4 percent during the 1950s and early 1960s to about 2 percent during the late 1970s and early 1980s. It then rose back up to about 2.5 percent so far during the 1990s. Five-year average inflation drifted up from about 1 to 2 percent during the 1950s and early 1960s to nearly 10 percent in 1980, then back down to about 3 percent during the 1990s. The

[7] The analysis rests on the assumption that the real rate of interest equals the rate of growth of real GDP, when both series are averaged over a moderately long period of time. This condition arises in theoretical models in which consumers are Ricardian and the rate of time preference is zero. The condition that the real interest rate is equal to the real output growth rate arises in theory since real GDP growth is acting as a proxy for an equilibrium rate of return on investment. It would be appropriately expressed in per capita terms. Per capita GDP growth has slowed more than overall GDP growth over the period plotted on Figure 6. Therefore, current inflation credibility would have fallen even more relative to its level in the late 1950s and early 1960s than indicated on Figure 6, if per capita real GDP growth had been used to proxy the equilibrium rate of return on investment.

Figure 7




five-year average of the five-year Treasury security yield rose from 2 percent during the 1950s to 12 percent during the early 1980s; but it then fell back to about 6 percent in the 1990s. Since bond yields rose when inflation accelerated, but real GDP growth slowed, the influence of inflation outweighed the influence of real GDP growth on bond yields. Correspondingly, when inflation decelerated, bond yields fell even though real GDP remained stable.

The difference between the five-year average of the five-year Treasury security yield and the 10-year average of real GDP growth is an estimate of the bond market's five-year inflation forecast, adjusted for inflation risk. It is the height of the shaded area in the lower panel of Figure 6. This measure of inflation credibility roughly lagged inflation, indicating that bond yields have not been very forward looking in forecasting inflation. The measure of inflation credibility hovered close to zero during the 1950s and early 1960s, which was credibly a zero-inflation-expectations period. It under forecast inflation from the late 1960s until the early 1980s when inflation was rising. It over forecast inflation in the 1980s and so far in the 1990s as inflation has fallen. It peaked at about 10 percent in the early 1980s, but fell to about 4 percent in recent years.

The bond market inflation forecast (or inflation premium) over the past five years represents a substantial gain in credibility compared with the early 1980s, but a substantial loss compared with the 1950s and early 1960s. In that earlier period, actual inflation was about 2 percent, but the bond market forecast a rate close to zero. In recent years, inflation has averaged about 3 percent, but the bond market has forecast about 4 percent inflation inclusive of an inflation risk premium. Thus, despite recent inflation being the lowest and most stable in decades, bond markets have seemingly not yet been convinced that inflation is down to stay. If the inflation premium were eliminated, bond yields could fall to match trend real growth, as was the pattern in the 1950s and early 1960s. That is about 3 percent, which is considerably lower than the approximately 5 to $5\frac{1}{2}$ percent bond yields observed in mid 1998.

Double-digit inflation and inflationary expectations are what explain the all time peak in security yields in October 1981 as plotted in Figure 7. Since then, the entire yield curve has shifted down by roughly

10 percentage points, undoubtedly a reflection of the decline in inflation and inflationary expectations. Although markets do not expect double-digit inflation today, they do not expect price stability either. During the 1950s and early 1960s inflation was low and generally expected to stay low, a condition that was reflected in long-term rates hovering in the 3 to 4 percent range as represented by the January 3, 1959, yield curve on the figure. Despite the historical record of an unstable price level in the short run, there really was widespread expectation of longer-term price stability until inflation took off in the mid-1960s. In fact, never before the 1960s had the U.S. federal government borrowed long term at more than a $4\frac{1}{4}$ percent rate.

During the expansion that began in 1991, the yield curve touched a cyclical low on October 15, 1993. It then shifted up to a cyclical peak on November 7, 1994. Three-month bill rates had increased from 3 percent to 5.4 percent and 30-year bond rates, from 5.8 to 8.2 percent. The latter was presumably an illustration of increases in long-term interest rates indicative of rising inflationary expectations in the bond market. Although inflation, in fact, did not increase much during the 1990s expansion, bond markets may well have been anticipating a repeat of the experience of inflation accelerating as had typically occurred in the past. Historically, monetary policy often has lagged behind market interest rates in expansions and thereby added to, rather than damped, inflationary pressures. By comparison, the record during the 1990s expansion has been very good: An extended period of positive real growth with inflation held in check. Yet, with bond rates still above the real growth trend, the bond markets seemingly continue to reflect the fear that inflation will rise again.

## HOW TO GET AND KEEP INFLATION CREDIBILITY

What could the Federal Reserve do to enhance its inflation credibility, and thereby allow long-term interest rates to stay low and prospectively fall further? Most important, the Fed should continue to keep inflation low by limiting the rate of monetary growth. A practical goal would be to get back to the low inflation and low interest rates of the late 1950s and early 1960s. One way to persuade markets that low inflation is here to stay is for the FOMC to focus more sharply on the desired outcome for inflation by following several other countries that have legislated specific low inflation targets for their central banks. This list includes Australia, Canada, New Zealand, and the United Kingdom, as well as Portugal, Spain, and Sweden. Whether or not such efforts are directly responsible, the fact is that these countries have had considerable success in bringing inflation down and keeping it down.

A second proposal comes from economists who have argued that credibility would be enhanced if there were an announced policy rule (with respect to the federal funds rate or monetary growth) and the Fed acted on the basis of that rule. The advantage of a rule is that markets would know in advance how the Fed would react to deviations of nominal spending, inflation, or other variables from specified targets.

A third proposal made by Dewald (1988) is that federal budget offices base their budget projections over a 5- to 10-year horizon not on their own inflation assumptions, but on longer-term inflation forecasts from the Federal Reserve. Since the Fed has the power to influence inflation over the long term, why not relieve the budget offices of the responsibility for making an independent assessment of future inflation as they make their budget projections? Not only could the budget offices benefit, but also every business, state and local government, and household could benefit from having confidence that the Fed would act to keep inflation as low as it had forecast. Lars Svensson (1996) has proposed that the Fed make its own announced inflation forecasts an explicit policy target. By using a forecast as a guide to policy, the Fed would be focused on this objective, but not blind to other things going on in the economy that influence inflation.

An environment of credible price stability has a high payoff in a market economy. The historical evidence examined in this article supports the conclusion that risks of starting another costly inflation-disinflation cycle could be avoided by monitoring M2 monetary growth and maintaining a sufficiently tight monetary policy to keep a damper on inflation. Having achieved the lowest and most stable inflation environment in many decades, the Federal Reserve has an unusual opportunity to persuade markets that it will continue to keep inflation low and, in principle, eliminate it. An environment of credible price stability would allow the economy to function unfettered by inflationary distortions—which is all that can be reasonably expected of monetary policy, but precisely what should be expected of it.

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