Volume Title: Inflation: Causes and Effects

Volume Author/Editor: Robert E. Hall

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-31323-9

Volume URL: http://www.nber.org/books/hall82-1

Publication Date: 1982

Chapter Title: United States Inflation and the Choice of Monetary Standard

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Chapter URL: http://www.nber.org/chapters/c11453

Chapter pages in book: (p. 99 - 110)

3 United States Inflation and the Choice of Monetary Standard

Robert J. Barro

3.1 The Association among Money, Prices, and Nominal Interest Rates

In analyzing recent United States inflation it is natural—at least for me—to begin with Milton Friedman's famous statement, "Inflation is always and everywhere a monetary phenomenon."[1] This proposition receives a lot of support from evidence across countries, over long periods of time within a variety of individual countries, and from some extreme inflationary experiences. As examples, one can note the rapid inflations in several Latin American countries—all of which were accompanied by excessive monetary growth—the long-period association between money and prices in the United States under differing monetary environments, and the parallel between monetary and price movements during extreme hyperinflations, such as that in post–World War I Germany. At present I want to focus on the accuracy of Friedman's proposition for the United States experience since World War II and, especially, for developments in recent years. As will be seen, it is important particularly at the present time to recognize that the phrase "monetary phenomenon" refers not only to movements in the quantity of money but also to factors that influence the public's willingness to hold money—that is, the demand for money.

The association between inflation and growth of monetary aggregates seems to be a close one over periods of more than a few years. For example, for the 1948 to 1979 period in the United States, the average inflation rate—as measured by changes in the deflator for the gross national product, which is a broad index with desirable properties—was

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3.7% per year. The corresponding average growth rate of the M1 definition of the money stock, which comprises currency and checkable deposits, was 3.8% per year. The overall relation divides conveniently into two subperiods. For the first interval, from 1948 to 1965, the average inflation rate was 2.0% per year and the average monetary growth rate was 2.3% per year. (These rates appear now to constitute little inflation and money growth, although the amounts were sufficient at the time to generate the experiment with wage-price guideposts in the 1960s.) For the second subperiod, from 1965 to 1979, the average inflation rate was 5.7% per year and the average monetary growth rate was also 5.7% per year. The advance in the average inflation rate from the first period to the second was, in fact, paralleled by an increase in the average monetary growth rate. However, this precise a linkage would not have appeared if we had looked at year-to-year relations rather than the association over several years.

The correspondence between the numbers for average inflation and rate of monetary expansion over the two long subperiods is misleading in any case, because it obscures two major phenomena whose effects on inflation happened to be roughly offsetting. First, economic growth would allow for some absorption of money without provoking inflation. My estimate of the magnitude of this effect—the net result of an offsetting trend during the post-World War II period away from the real demand for money as defined by M1 and toward the demand for other assets—is that a growth rate of the money stock equal to about 1½% per year would be consistent with zero inflation. On this count the average inflation rate over the 1948–79 period should have been 2.3% per year—1½% per year below the average rate of monetary expansion—rather than the actual value of 3.7% per year.

An opposing, positive effect on prices arose since 1948 because the increases in average rates of price change, which became anticipated, were then reflected in higher nominal interest rates. That is, lenders required this rise in interest rates to compensate for inflation and—because they would be repaying with deflated dollars—borrowers were correspondingly willing to pay the higher nominal rates. For present purposes, the important effect is the inverse influence of these higher interest rates on the public's willingness to hold non-interest-bearing money. Like an increase in the supply of money for a given level of real demand—as determined by real income and others factors—a reduction in the demand for money generates a higher level of prices. That is, the general price level must rise in order for individuals to be satisfied to hold the existing stock of money rather than spend it on commodities or interest-bearing assets.

Over the 1965–79 period, the interest rate on Aaa rated (long-term) corporate bonds rose from 4.5% to 9.6%; my estimate is that the negative

effect of this change on the demand for money raised the average inflation rate from 1965 to 1979 by almost 2% per year. It is often said that these types of shifts in the demand for money—also referred to as increases in the velocity or frequency of monetary circulation—represent one-time influences on the level of prices rather than continuing influences that appear as a higher average rate of inflation. However, the "one-time" price level effect was sufficient in this case to contribute a substantial amount to the average inflation rate over the years 1965–79.

Over the entire 1948 to 1979 period, the interest rate on Aaa corporate bonds advanced from 2.8% to 9.6%, which I estimate pushed up the average rate of inflation over the full thirty-one years by about 1.1% per year—still a substantial effect on average inflation from the channel of higher velocity.

The mechanism by which higher expected inflation is embedded in higher nominal interest rates, which reduce the demand for money and thereby push up the price level, is significant in interpreting some longer-term aspects of the inflationary experience over the years 1948–79, but it is far more important in accounting for the lack of a close year-to-year association between changes in money and changes in prices. Up to 1965, the year-to-year movements in long-term interest rates were relatively small: the largest one-year changes were the increases by about one-half a percentage point for 1957 and 1959. Therefore, although the shifts in demand for money that were provoked by interest rate changes or other factors could have weakened the year-to-year correlation between inflation and monetary growth substantially, the channel of shifting interest rates did not generate the volatility of prices that has recently become familiar.

The moderate fluctuations in long-term interest rates before 1965 can, in turn, be related to the relative stability of long-term inflationary expectations. These anticipations would be justified under our earlier type of monetary system, which provided some constraints on the long-run expansion of monetary aggregates. I will return to this theme shortly.

The behavior of long-term interest rates has been far more volatile since 1965: year-to-year movements by one-half a percentage point or more have become typical, and increases in the neighborhood of one full percentage point occurred in 1969, 1970, 1974, and 1979. For 1980 the rise in long-term rates was on the order of two percentage points. (Incidentally, the largest negative change was −0.6 percentage points in 1971.) Quantitatively, I estimate that each one percentage point move in these interest rates is associated positively—through the channel of higher velocity that was described above—with about a four percentage point shift in the one-year inflation rate. Therefore the recent volatility of interest rates, induced by volatility of inflationary expectations, corresponds to magnified fluctuations in short-run inflation rates.

There are some unsettled issues concerning the timing among interest rate shifts, velocity changes, and price level movements. In the case of money supply shocks (though apparently not for fully perceived changes in money), there appear to be positive output effects in the United States out to a lag of one to two years. The full positive response of the general price level to a monetary surprise seems to take as long as four years. On the other hand, the velocity shifts that are associated with interest rate changes have no noticeable counterpart in the form of positive output movements. (There is an indication of a minor negative effect.) A full positive response of the price level within one year is consistent with preliminary econometric evidence, although some lagged effect for an additional year cannot be decisively ruled out. While the detailed findings are tentative and subject to some estimation problems, they suggest that the common practice of lumping money supply shocks and velocity shifts together as disturbances to "nominal aggregate demand" may be seriously misleading. Unlike for the case of monetary shocks, shifts in inflationary expectations—which are reflected in interest rate movements and in consequent changes in velocity—seem capable of producing dramatic movements in the general price level within a one-year period.

The interplay between inflationary expectations, interest rates, and current actual inflation applies as much in the negative direction as it does in the positive one that has been prevalent in recent years. Long-term interest rates declined precipitously from around 13% in March 1980 to about 11% in July. If interest rates had stayed at this reduced level for the remainder of 1980, my estimate for overall 1980 inflation (based on the deflator for the gross national product) would have been about 12% rather than the roughly 18% value that would have been associated with the March level of interest rates. (The actual rate of inflation for the GNP deflator for 1980 was 9.3%.)

The sensitivity of short-run price level movements to shifts in inflationary expectations has implications for the forecastability of inflation. Suppose that movements in long-term bond yields are unpredictable, which holds as a close approximation because participants in the efficient security markets would react strongly to perceived future changes in bond prices. In this case the volatility of bond yields—which currently seems understated at plus or minus one percentage point per year—combined with a fourfold association between long-term interest rate movements and price level changes over a year suggests a minimal forecast error for one-year-ahead inflation rates of plus or minus 4% per year. (This conclusion obtains if no other price-determining variables are strongly correlated with long-term interest rate movements). For the present economic environment, this analysis indicates that no econometric model could ever reduce the average error in one-year-ahead inflation rate predictions below this amount.

This analysis of inflation has focused on money supply and demand

influences rather than on numerous special factors that primarily influence relative prices. The general price level is not found by simple addition of the relative prices for food, oil, medical care, housing, and so on. In fact, any absolute level of prices and any overall rate of inflation are consistent with any specified configuration of levels or changes in relative prices. This observation leaves open the possibility that a particular allocative disturbance could raise the general price level and simultaneously increase some specified relative prices. For example, a harvest failure in the United States, which raises the relative price of food, also has some downward impact on United States aggregate output and thereby a positive effect on the absolute price level for a given behavior of the money stock. Similarly, a rise in the relative costs of (imported) oil tends to depress United States real income and thereby raise the overall level of prices. Any positive monetary response to this type of disturbance would reinforce the inflationary impact, although the limited evidence on money supply behavior does not support this hypothesis. In any event these possibilities for short-term interplays between inflation and relative price changes should not obscure the point that the principal movements in United States inflation cannot be explained along these lines.

3.2 The Role of a Monetary Standard

A key issue is the reason for the changes in the behavior of interest rates and the relation of these changes to developments in the monetary process. My conjectured scenario is as follows. In earlier periods before roughly 1965, the monetary regime guaranteed some long-run stability in monetary growth and therefore in long-term inflation, which in turn restricted the effects of shifting inflationary expectations on movements of long-term interest rates. Elements of the monetary regime that worked in this direction were fixed exchange rates and some remnants of the classical gold standard, as reflected in the maintenance of a fixed value for the dollar price of gold (although gold was subject at most times to some exchange restrictions). The pegging of some nominal prices—that is, the willingness of the central bank to buy or sell a specific commodity for a fixed number of dollars—and the related balance-of-payments mechanism—whereby a country that inflated unduly lost international reserves such as gold or some paper alternatives that became popular in the post–World War II period—provided at least some restraint on long-run world monetary expansion. The international economy has been moving gradually away from this type of monetary setup since World War I and especially since the 1930s, although some remnants of the gold standard and fixed exchange rates in the form of the post–World War II Bretton Woods arrangements were in operation as recently as 1971.

Although there were earlier periods when the United States did not

adhere to a gold or silver standard, these episodes typically occurred in times of war and could reasonably be perceived as temporary. For example, the United States was on a system of flexible exchange rates following the Civil War until the resumption of the gold standard in 1879. In fact, the drop by about 50% in the price level from 1866 to 1879 can be viewed as a prerequisite for returning to the prewar gold price. It seems reasonable to view this period as substantially influenced by the prospects for eventual return to the gold standard at the earlier parity. The period since 1971 seems to be the first time that we have completely severed, both currently and prospectively, the link between our money and a commodity base. Perhaps the most interesting aspect of this policy move was its casual nature—after all, most people thought that the important economic action in 1971 was the institution of the Nixon price controls.

An earlier manifestation of the trend away from a commodity standard was the removal of silver from most United States coins minted after 1964. I have often (only partly in jest) referred to this action as one of President Johnson's most significant policy moves. The Johnson decision on silver and Nixon's 1971 attempt to demonetize gold were typically viewed at the time as aspects of the modern trend away from the special monetary role of the precious metals. But they seem more appropriately regarded as a continuation of the well-established tendency of all unrestrained monarchs to secure revenue by debasing the currency. In fact, a principal point of the gold standard was to control governments, and we have not become sufficiently modern to come up with a statisfactory substitute (although governments have perhaps become more adept at eliminating these constraints).

There were some good economic reasons for shifting to a flexible exchange rate system. Under the Bretton Woods regime where exchange rates were pegged within relatively narrow bounds, individual countries often resorted to restrictions on trade in commodities and capital in order to prevent balance-of-payments deficits, which would have led naturally to lower rates of domestic monetary growth and inflation. These trade restrictions tended in general to retard economic efficiency. Further, with countries unwilling to tie domestic monetary policies fully to the dictates of the fixed exchange rate/gold standard setup, there were recurring financial crises that led occasionally to large devaluations (or, less frequently, to upward adjustments in the form of revaluations) of individual currencies. (Of course, this process had the indirect benefit of providing high levels of employment for central bankers and financial crisis managers more generally. But presumably, these people have experienced no trouble finding work in the present, calm financial climate.) There were some real benefits along the above lines from switching to flexible exchange rates, although the tendency toward adopting trade restrictions seems to be again on the rise.

What is certainly clear is that before 1971 most economists underestimated the extent to which the international system of fixed exchange rates with some role for gold served, although imperfectly, to restrain growth in the world money supply and thereby the world price level. Since the move in 1971 toward flexible exchange rates and the complete divorce of United States monetary management from the objective of a pegged gold price, it is clear that the nominal anchor for the monetary system—weak as it was earlier—is now entirely absent. Future monetary growth and long-run inflation appear now to depend entirely on the year-to-year "discretion" of the monetary authority, that is, the Federal Reserve. Not surprisingly, inflationary expectations and their reflection in nominal interest rates and hence in short-run inflation rates have all become more volatile.

The current high long-term nominal interest rates seem principally to represent the financial markets' prediction of an increase in future monetary growth and long-term inflation, a possibility that arises because of the shift to a paper money regime that possesses no nominal anchor. Further, the expectation of future monetary expansion and inflation is sufficient, as discussed earlier, to account for a leap in the short-run actual rate of inflation without a contemporaneous acceleration of monetary aggregates. However, it remains true even under our present monetary arrangements (one cannot really call it a monetary "standard") that the realization of higher long-term inflation is contingent on faster growth of the actual money supply. This magnitude of acceleration of money cannot, in fact, be discerned from the observed monetary data. Following average annual rates of monetary growth of 7–8% for 1977–79 (for the new M1-B concept of money, which includes NOW accounts and similar types of interest-bearing, checkable deposits), there was a sharp deceleration of money from February through May 1980. This monetary contraction was apparently reversed for June–July: my estimate was that money growth for all of 1980 would be at roughly a 5–6% rate. Even a return to the previous monetary growth rate of 8% per year would lead in the long run to annual inflation rates of only about 6–7%, which are well below both the actual inflation rate for 1980 and the forecasts of future average inflation that were implicit in nominal interest rates during 1980. The inflation predictions that were implicit in security market yields for 1980 were on the order of 10–11% for a long-term average. These projections corresponded, in turn, to forecasted long-run monetary growth of about 12% per year, as contrasted with the actual values for 1980 of less than 8% (which itself represented an acceleration from the 2% rate that prevailed earlier in the post–World War II period). I surely do not claim to have inflation and monetary growth predictions that are superior to those revealed by the financial markets; after all, much more than me, their livelihood depends on making reasonable forecasts.

3.3 Possibilities for Monetary Reform

If the above scenario is correct, the inflation problem must be analyzed in terms of changes to the basic monetary structure. It would make a major difference if institutional changes were made that once again provided a nominal anchor for the monetary system. The important constrast is between mechanisms that precommit the long-run path of nominal aggregates and those, like the present procedure, which allow nominal values to evolve in the long run as the accumulation of short-run monetary decisions that are subject at each date to policymaker "discretion." A system that ensures long-run price stability would also sharply dampen the volatility of interest rates, which are a major factor in the variability of short-term inflation rates.

3.4 Commodity Standards

As mentioned before, our previous systems with nominal anchors have involved fixed exchange rates with some role for a pegged price of a reserve commodity such as gold. One possibility would be to return to this type of system, possibly with an expanded commodity base substituting for the special position of gold or silver. Some detailed proposals of this type were advanced many years ago under the title of commodity-reserve currency. The history of this idea goes back almost a hundred years to Alfred Marshall's proposal for using gold and silver together in the form of a stable bimetallism, which is usually called "symmetallism." The basic idea is for the central bank to vary the money supply and its corresponding commodity reserve as dictated by pegging the price of a reserve bundle that includes so many ounces of gold, so many ounces of silver, a few bricks, a certain amount of wheat, and so on. That is, the central bank would stand ready to buy or sell units of this reserve bundle at a fixed dollar price. It has been argued that considerations of storability and homogeneity severely limit the feasible scope for this type of commodity reserve.

One general drawback of this type of setup is the resource cost for maintaining the commodity base, which seems now to be a trivial price if it would actually buy a satisfactory remedy for inflation. The biggest problem may be that the "saving" in these resource costs typically takes the form of additions to government revenue via direct or indirect debasement of the currency. Another problem with commodity standards involves fluctuations in the pegged price of the reserve bundle relative to prices in general—which are the ultimate objects of interest. This problem is likely to arise when the commodity reserve is not representative of consumer market baskets, as seems surely to be the case. In this context it is, however, doubtful that the extreme recent fluctuations in the real

prices of gold and silver would have arisen if the international economy had remained on the gold standard.

It is in any case clear from history that even a reasonably serious gold standard—such as that operating in the pre–World War I period—may have ruled out chronic inflation, but did not prevent sharp short-run changes in domestic monetary aggregates, which were associated under our fractional-reserve banking system with financial panics and economic contractions. For example, the sharp downturn from 1893 to 1897—which seems second in severity over the last century only to the Great Depression of the 1930s—occurred during the peak operation of the gold standard. Of course, the elimination of fractional-reserve banking may have prevented these problems.

3.5 A Monetary Constitution

More realistic possibilities seem to involve the establishment of some type of monetary constitution,[2] which would involve precise legal restrictions (hence, precommitments) on the long-term path of nominal aggregates. The well-known constant-growth-rate rule for the money supply, long advocated by Milton Friedman, is a monetary system of this general type. The important aspect of Friedman's proposal is neither the constancy of the growth rate nor the choice of a particular number for the rate nor the precise definition of the monetary aggregate, but rather the firm commitment to and hence anchor on some future nominal values. This type of system would also avoid a number of difficulties and costs that characterize commodity standards. However, while this type of monetary constitution seems attractive in theory, it should be emphasized that our historical experience provides evidence only about the workings of regimes with nominal anchors that are of the gold standard type, not about environments where the behavior of paper money is backed by explicit legal commitments. Clearly, the form of these commitments is an important matter that warrants extensive discussion. Notably, the law or constitutional provision would have to be written so as to provide proper inducements to ensure that government officials behaved in accordance with the rules. I certainly do not wish to exaggerate the probability of achieving satisfactory governmental compliance.

Although the most important consideration is the capacity of a monetary constitution to peg some future nominal values, there is also some significance to the choice of concept for the target monetary aggregate. This decision is analogous to the selection of a specific reserve bundle under a commodity-reserve-currency scheme. Stabilization of the monetary base—currency plus bank reserves held at the Federal Reserve—has the advantage of applying to a magnitude that is under reasonably close control of the monetary authority. On the other hand, some earlier

experiences, most notably the Great Depression, indicate that control of the base does not guarantee stability of broader monetary aggregates or the general price level. From 1929 to 1933 the monetary base advanced at an average annual rate of 3.4% at the same time that M1 declined at an average rate of 7.3% and the price level fell by an average of 6.3% per year. Similar, but less dramatic, behavior for the monetary aggregates applies to the 1937 recession. The Great Depression experience involved sharp increases in the public's demand for currency and in banks' demand for reserves, both of which were spurred by widespread bank failures. The 1937 recession involved a startling rise in required reserves by the Fed. Conceivably, these large variations in the relation of the money supply to the monetary base could no longer occur; in particular, the institution of federal deposit insurance seems to have eliminated bank failures as a major element in money supply determination. However, particularly with the Federal Reserve's moves in the spring of 1980 to extend reserve requirements to a variety of institutions, one cannot confidently rule out the type of dramatic shift in required reserves that occurred in 1937.

At the other end of the spectrum, one could instruct the Fed to stabilize the general price level. However, because this proposal applies to a variable that is only indirectly influenced by Fed instruments, it would invite volatility in the monetary aggregates. A compromise between stabilization of the monetary base and stabilization of the price level would be a rule expressed in terms of the most familiar monetary aggregate, M1, which includes currency and checkable deposits—that is, media of exchange. Empirical evidence indicates that, first, this aggregate can be reasonably well controlled by the Fed at least on a quarter-to-quarter basis and, second, stabilization of this concept of money goes a long way toward ensuring stability of overall economic activity.

Another issue that arises is whether, say, quarterly errors in achieving money growth targets should be compensated or forgotten in subsequent quarters. For example, suppose that the monetary rule dictates expansions in seasonally adjusted M1-B at a 2% annual rate. If the actual growth for one quarter is excessive by an annual rate of 1%, should the next quarter's target be 2% or 1% (or some value in between)? In a regime where past mistakes are ignored in formulating future growth rate targets, the level of nominal aggregates (and the price level) at future dates involves the summation of all these random errors. The levels of money and prices therefore become increasingly unpredictable as the horizon increases. Further, a system where mistakes are forgotten seems less likely to be well enforced. Therefore there are some arguments for requiring monetary errors to be made up in future periods. The precise timing of this adjustment seems unimportant, although a full correction for the subsequent quarter is one possibility.

3.6 Wage and Price Controls

The discussion of monetary structures that anchor expectations about future dollar values should be contrasted with a different approach that also frequently stresses expectations, namely, wage and price controls. The systems I have analyzed constrain fluctuations in expectations about future prices by providing substantive constraints on the future monetary magnitudes that ultimately determine inflation. In this way the limited fluctuations of inflationary expectations feed back into stability of current values of interest rates and prices. However, a key element in this analysis is the reasonableness or rationality of the stable expectations that emerge. The mechanism is internally consistent in the sense that individuals have an objective basis for their beliefs and do not observe patterns for money and prices that deviate dramatically and persistently from their expectations.

Arguments for wage and price controls often stress the important effect of shifting inflationary expectations on current prices and interest rates. However, these proposals neglect the rationality of these expectations in the sense of their consistency with the underlying institutional setup that determines monetary behavior. Expectations cannot be stabilized without stabilizing the variables—in this case long-run money growth and inflation—to which the expectations pertain. The recurring failure of controls reflects their focus on symptoms rather than on the underlying sources of inflation.

3.7 The Nature of Policy Advice

I conclude by commenting on a type of policy advice that seems not so useful for economists to offer. Namely, there is a tendency—in which I certainly have shared—to recommend year-by-year values for money growth, deficits, and so on, without questioning the underlying policy structure. Telling the Federal Reserve to select substantially different values—usually lower values—for monetary growth seems similar to urging firms and households to choose different numbers for prices, employment, production, and so on. As in the case of the private sector, it is reasonable to view the Fed's monetary decisions as emerging from a given structure of constraints and rewards, although possibly the nature of this process is less well understood for the case of the monetary authority than it is for businesses and consumers. In particular, I doubt whether it makes much difference whether the Federal Reserve Board chairman's name is Volcker or Miller or Burns or even—almost beyond imagination—Milton Friedman. Recommendations for changed monetary behavior would be most usefully expressed in terms of proposed alterations to the underlying constraint and reward structure. The adop-

tion of a monetary constitution or reinstatement of a gold standard type of regime represents this type of change in the structure of policy. Discussions of the inflation problem would be usefully phrased in terms of the desirable or undesirable operating characteristics of alternative monetary regimes, which include the gold standard and other possibilities.

Notes

1. Milton Friedman, "Inflation: Causes and Consequences," Council for Economic Education (Bombay: Asia Publishing House, 1963), reprinted in *Dollars and Deficits* (Englewood Cliffs, N.J.: Prentice-Hall, 1968), p. 39.

2. Another possibility, which I have not given attention to in this paper, involves removing the government from the money-issue business. Media of exchange would then be provided entirely by private entities. The workings of a private, noncommodity monetary system are not well understood (at least by me).