

# Review

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## ERRATUM

In the February 1981 *Review* ("Selecting A Monetary Indicator: A Test of the New Monetary Aggregates," p. 13), the sentence, "Based on these tests, [Michael J.] Hamburger concluded that nonborrowed reserves is a better indicator of policy actions than the other monetary variables studied" should have read as follows: ". . . Hamburger concluded that bank credit is a better indicator . . ."

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# Deficits and Inflation

SCOTT E. HEIN

**T**HIRTY state legislatures have now approved, and more are considering, resolutions petitioning for a constitutional convention that would require a balanced federal budget on a fiscal year basis. The U.S. Congress is also considering a similar resolution and appears mindful, especially in deliberations on President Reagan's proposed tax and budget cuts, of widespread public demand to eliminate federal government deficits.

Many discussions of federal government deficits maintain that deficits cause inflation. The 1979 Missouri State Senate Resolution No. 13, for example, states, ". . . it is widely held that fiscal irresponsibility at the federal level, and the *resulting inflation* is the greatest threat which faces our Nation today" (italics added). This article explicitly investigates the linkage between deficits and inflation to analyze whether government deficits cause inflation. This linkage is discussed within a framework in which inflation is a monetary phenomenon. In this framework, there are two separate channels through which deficits are linked to inflation—through their impacts on the stock of money in the economy, and on an individual's desire to hold money balances.

## THE CAUSE OF INFLATION

On the simplest level, inflation results from "too much money chasing too few goods." While this theory has been widely cited, a number of specifics must be explained. First, as used here, "money" refers to a set of assets that can generally be used as a means of payment. In the United States, money is usually measured as the coin and currency circulating in the economy plus deposits held in transaction or checking accounts.<sup>1</sup> This definition of money differs considerably

from the common conception of money as a synonym for wealth or affluence. An individual can be wealthy (owning vast amounts of real estate, stocks, bonds, antiques, etc.), yet at the same time hold little wealth in the form of money as defined here.<sup>2</sup>

The total amount of money in the economy is determined primarily by monetary authorities—in the United States, this is the Federal Reserve System. Since all commercial banks and thrift institutions that issue transaction or checking deposits are required to hold a specific fraction of these deposits as reserves, the Federal Reserve can cause changes in the amount of these deposits either by changing reserve requirements on these deposits or by directly changing the level of reserves. The Federal Reserve most often uses the latter technique in controlling the money stock. This is accomplished by changing the level of reserves through "open market operations," that is, buying government securities in financial markets to increase reserves or selling securities to decrease reserves.

When the Federal Reserve wants to increase bank reserves, for example, it contacts dealers or financial institutions that are willing to sell their government securities. In exchange for the securities, the Federal Reserve credits the financial institution's commercial bank with additional bank reserves equal to the value of the securities. The commercial bank, in turn, credits the institution's account. The net result is that the

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<sup>2</sup>Anecdote has it that the Diners Club credit card originated when some wealthy individuals went to dinner at a posh restaurant and, upon receiving the bill, discovered that collectively they lacked sufficient *money* to pay the tab. Luckily for the group, they were recognized and their *credit* was accepted. Some member of the group, recognizing that a formalized credit line would be preferable, thus started the Diners Club.

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<sup>1</sup>The measure of money that most closely corresponds to this definition is M1B, recently developed by the Federal Reserve Board of Governors. For a description of this measure as well as other newly developed measures, see R. W. Hafer, "The New Monetary Aggregates," this *Review* (February 1980), pp. 25-32.

While this anecdote clearly points out the difference between money and wealth, it should also be noted that credit cards themselves are not money. This is not to say that credit cards are not generally used to initiate the purchase of goods and services. Rather, it recognizes that the use of credit cards simply *postpones* the exchange of money for the goods and services obtained; individuals still pay for goods and services with money.



Federal Reserve has more government securities, the commercial bank has larger reserves, and the dealer has larger deposits with the commercial bank. Both bank reserves and the money stock have increased. In addition, the commercial bank finds that it is holding reserves in excess of what it is required to hold. Thus, the bank can lend this excess to borrowers, further increasing the money stock.

Although the Federal Reserve affects the money supply by buying or selling government securities (federal debt), there is *no direct link* between federal government deficits (financed by issuing federal debt) and Federal Reserve open market operations. Since a 1951 accord between the Federal Reserve and the Treasury, the Federal Reserve is no longer directly responsible for stabilizing government security prices or for purchasing any given portion of the public debt. Consequently, federal deficits do not *require* that the Federal Reserve purchase more government securities; therefore, federal deficits, per se, need not lead to increases in bank reserves or the money supply.

While growth in the stock of money in the economy is a major determinant of inflation, it represents only one side of the money market. To determine whether there is "too much" money in the economy, the other side of the market — the demand for money — must also be considered. "Too much" money results only when the amount of money people have exceeds the amount they want to hold.

The demand for money is a demand *to hold* money balances. Everyone, of course, would like to have more money — to buy more goods and services or other assets. This is not the demand for money as used in this article. For our purposes, individuals demand money only to the extent they desire *to hold* a portion of their wealth in the form of monetary assets, that is, currency in their pockets and balances in their transaction accounts.

In the aggregate, the desire to hold money balances is determined primarily by four things: individuals' wealth, the total amount of goods and services produced, the average price of goods and services, and market interest rates. The first three factors are positively related to desired money holdings. Thus, to the extent that each of these factors grows over time, desired money balances also grow. The fourth factor, market interest rates, when higher, induce individuals and firms to reduce their money holdings to take advantage of higher earnings. In this regard, the rising interest rates of the last two decades have worked to

reduce the quantity of money demanded.<sup>3</sup>

If the stock of money in the economy exceeds the quantity of money demanded, there is an excess supply or "too much" money in the economy. This means that individuals would rather own more goods and services than hold the "extra" money. The excess supply of money and the excess demand for goods and services are two sides of the same problem. The excess demand for goods and services indicates that individuals would like to purchase more goods and services than are presently available at current prices. With output essentially fixed by the technology in place, the imbalance shown by the excess supply of money and the excess demand for goods can be eliminated only if the average price of goods and services rises enough to remove both the excess demand for goods and services and the corresponding excess supply of money.

Thus, an excess supply of money naturally leads to an increase in the average price of goods and services. If, over an extended period, the money stock grows at a faster rate than the quantity of money demanded, the average price of goods and services will continue to increase, and the economy will experience inflation. Inflation can be avoided if the growth in the money stock is held equal to the growth in the quantity of money demanded. This does not mean, however, that money stock growth must be zero to eliminate inflation. As the economy grows, with more goods and services being produced and consumed, and with individuals becoming wealthier, the desire to hold money balances will naturally grow. If the money stock grows at the same rate as desired money balances, there will be no inflation.

In summary, inflation results only when, over a considerable period of time, the money supply grows faster than the desire to hold money balances. According to this view, federal deficits can cause inflation only if they lead to continual increases in the money supply or to continual decreases in money demand. Both of these alternatives are examined below.

<sup>3</sup>Market interest rates, which determine the desire to hold money balances, can be broken into two components. The first component is a real rate of return, which measures the increased command over goods and services that results from postponing present consumption. The second component is a compensation required for expected inflation. If individuals expect a greater rate of inflation in the future, they require that they be compensated for the deterioration in the purchasing power of money, thus driving up the market rate of return and reducing the desire to hold money balances. In periods of hyperinflation, the latter component dominates the decision to hold money and results in a "flight" from the domestic money. See Thomas J. Sargent, "The Ends of Four Big Inflations," Working Paper #158, Federal Reserve Bank of Minneapolis (December 1980).



## DEFICITS AND THE MONEY SUPPLY PROCESS

As indicated before, federal government deficits do not directly cause money growth. As a practical matter, however, government deficits can have an important indirect effect on money supply growth.

When the federal government spends more than it takes in as revenue, the Treasury must finance the deficit by borrowing in the private marketplace (selling government securities). The increased demand for credit in financial markets, if not offset by a reduction in credit demand elsewhere or an increase in credit supply, naturally puts upward pressure on all market interest rates.<sup>4</sup> Monetary authorities may then attempt to prevent the rise in interest rates from taking place.<sup>5</sup>

To do this, the Federal Reserve will buy government securities, thus monetizing part of the public debt by increasing the level of reserves. The increase in bank reserves, as explained above, will result in a larger money stock and, other things equal, a subsequently higher rate of inflation. Consequently, there is an indirect channel—via the response of monetary authorities to higher interest rates—by which deficits can influence the inflation rate.

However, the existence of this indirect channel does not indicate that deficits cause inflation. The deficits

<sup>4</sup>“What is clear in circumstances like these, when efforts to restrain monetary growth confront strong private credit demands, is that inevitably large new borrowings by the federal government, whether to finance budgetary deficits or off-budget programs, strongly aggravate pressures on interest rates.” Paul A. Volcker, Chairman, Board of Governors of the Federal Reserve System, before the Committee on Banking, Housing, and Urban Affairs, U.S. Senate, January 7, 1981.

The extent of this upward pressure will depend, in large part, on the size of deficit relative to total savings. The larger the deficit in comparison to the savings pool, the greater the upward pressure on market interest rates. Thus, to the extent that the tax cuts proposed by the Reagan administration lead to increased savings, some of the pressure on interest rates resulting from the anticipated deficits will be mitigated. For an analysis of the effect of deficits on interest rates, see Richard W. Lang, “The 1975-76 Federal Deficits and the Credit Market,” this *Review* (January 1977), pp. 9-16; and Michael J. Hamburger and Burton Zwick, “Checking Inflation in Spite of a Deficit,” *Business Week* (March 23, 1981), pp. 12-15.

The reader is also referred to Adrian W. Throop, “Inflation Premiums, Budget Deficits,” *Federal Reserve Bank of San Francisco Weekly Letter* (March 14, 1980), pp. 1-3, for an interesting discussion of measuring the size of the deficit in inflationary times.

<sup>5</sup>Such attempts can occur either as a technical means of achieving a given money growth rate, or because monetary authorities simply don't want to see interest rates rise. While the motivating factors behind the desire to stabilize interest rates are not always clear, the impact of rising real government borrowing on monetary policy will always be the same.

themselves do not increase the money stock; only monetary authorities can do this. Only when monetary authorities attempt to prevent market interest rates from rising will deficits produce a larger money supply. If deficits persist over an extended period of time, Federal Reserve attempts to prevent market interest rates from rising will result in continual increases in the money stock. Viewed in this fashion, inflation represents the cost associated with trying to prevent market interest rates from rising.

Many have argued that such attempts to prevent interest rates from rising are self-defeating because market interest rates cannot be controlled over extended periods of time.<sup>6</sup> At best, as this argument goes, the Federal Reserve can keep interest rates from rising for only a short period of time by increasing bank reserves and money growth. The inflation that results from excessive money growth will itself soon put upward pressure on interest rates. For the purposes of this analysis, however, it is irrelevant whether or not the Federal Reserve is “successful” even in the short run. If they attempt to prevent interest rates from rising at all, they will have established a link between deficits and money growth, and consequently, between deficits and inflation.

## DEFICITS AND THE DEMAND FOR MONEY

Inflation can also be associated with government deficits if such deficits induce reductions in the public's desired money balances. There appear to be two possible channels through which this might occur. The first channel operates through the effect of changes in interest rates on the public's demand for money balances. A higher level of interest rates will reduce desired money balances, causing an excess supply of money.

As a practical matter, this effect is minor. While the demand for money is sensitive to changes in interest rates, quantitatively the effect is small. It would take a substantial rise in interest rates to reduce desired money balances enough to actually produce a measurable increase in inflation. One estimate indicates that interest rates would have to increase 500 percent (for example, from 5 percent to 25 percent) to induce the same amount of inflation associated

<sup>6</sup>See “Fed Cannot Control Interest Rates Because That Is Not Agency's Role,” *American Banker* (January 26, 1981), text of speech, “Why Can't the Fed Control Interest Rates?” by Lawrence K. Roos.



with a permanent one percentage-point increase in money supply growth.<sup>7</sup>

A second channel through which federal deficits can affect desired money holdings — and the inflation rate — is changing individuals' wealth holdings. Desired money balances are positively related to an individual's wealth. Thus, if individuals observe their wealth falling over an extended period of time, their desired money balances will also fall, and higher inflation will result despite the fact that the growth of the money stock remains unchanged.

Can deficits themselves cause wealth to decline? On an individual level, the answer is clearly no. When the federal government spends more than its direct receipts, some individuals must reduce their current consumption of goods and services. In our country, this reduction is made willingly in exchange for government securities — promises to repay the loan in the future that are backed by the taxing authority of the federal government. Thus, those individuals who forsake current expenditure to hold government debt should not be worse off or poorer, because they are doing so voluntarily.

Even though each individual holding government debt is at least as well off as before, it is entirely possible that economic participants, on an aggregate level, feel worse off. This could happen, for example, if the public feels that the federal government is inefficiently using the resources it has acquired through deficit financing.<sup>8</sup> Such perceptions could have significant wealth effects if it were commonly perceived that the government was taking away from ("crowding out") private investment, which would have added to the capital structure of the economy, without adding anything significant by way of public spend-

ing in return. People would perceive future private production capabilities as lower and, if this were not offset by an equivalent benefit from public spending, would feel poorer as a result.

While such adverse wealth effects are possible, they are the direct result of fiscal mismanagement, not deficit financing. The public could be made to feel equally worse off, if the federal government were to raise taxes to finance spending programs that the public deemed worthless. As long as the federal government allocates resources inefficiently, the public will be poorer. This is true regardless of how the resources are obtained, that is, through taxation or debt issuance. On the other hand, if the public approves of the federal government expenditures, it makes little difference whether the resources are obtained from current taxes or from the issuance of debt which will be paid off by future taxes.<sup>9</sup>

Federal deficits are associated with declining wealth only to the extent that they are symptomatic of a governmental misallocation of resources. In this respect, efforts to legislate a balanced federal budget are attacking the symptom of the problem (whether real or imaginary) instead of the problem itself. If the public perceives that its wealth is falling, it is the result of mismanagement of fiscal responsibilities, *not* deficit spending.

In summary, it appears that deficits have little effect on the desire to hold money balances. As a result, inflation is not significantly linked to deficits through their impact on money demand.

## DEFICITS, MONEY AND INFLATION: EXAMINING THE THEORY

The analysis of this article suggests that inflation is a result of an excess growth of money in the economy. Deficits are associated with inflation only to the extent that they lead to increases in the money stock. To examine this theory in relation to the experience of the last 25 years, let's consider the popular alternative explanation of inflation, namely, that federal government deficits directly cause inflation.

<sup>7</sup>R. W. Hafer and Scott E. Hein, "Evidence on the Temporal Stability of the Demand for Money Relationship in the United States," this *Review* (December 1979), pp. 3-14.

Some would argue that the size of the federal deficit is closely watched and figures importantly in the formation of individuals' inflationary expectations. If deficits grow in size, individuals will expect more inflation (driving market interest rates up) and, as such, will reduce their desired money balances. However, this article argues that there is no direct link between deficits and inflation. Thus, individuals who expect more inflation as a result of larger deficits alone are acting irrationally. The crucial question regarding future inflation is the extent to which the deficits are monetized. If the deficit is not monetized, future inflation will not result. Deficits, per se, are not inflationary; thus, the proposition that individuals will form inflation expectations based on the size of the deficit alone is not viable as a long-run proposition.

<sup>8</sup>This effect seems to have been important in European cases of hyperinflation following World War I, as many defeated countries ran sizable deficits to make reparations to the World War I victors. See Sargent, "The Ends of Four Big Inflation."

<sup>9</sup>This argument presumes that the public recognizes the "pay me now or pay me later" choice between a current tax hike and the issuance of debt. In other words, when the public sees the federal government issue debt, it recognizes that future taxes must be raised to pay off the increase in debt. See Neil A. Stevens, "Government Debt Financing — Its Effects in View of Tax Discounting," this *Review* (July 1979), pp. 11-19.



First, consider the relationship between federal deficits and money stock growth. Chart 1 shows the relationship between the federal government debt (which rises when the government runs deficits and falls when it runs surpluses) and the money stock over the last 25 years. From 1955 through 1974, growth rates of the federal debt and the money stock move in tandem, generally accelerating through early 1973. This accelerating pattern is then broken, as the growth of both debt and money stock slows somewhat from early 1973 through early 1975—ironically enough, a period of recession in which one would anticipate an increase in debt.

The growth rate of the money stock always exceeds the growth rate of the federal debt from 1955 through early 1975, as the Federal Reserve increased the portion of the federal debt it held (see the third tier in chart 1). Over this period, the Federal Reserve purchased federal debt at a *faster* rate than the federal government issued it. This means that bank reserves grew at faster rates than the federal debt and, thus, the money supply expanded faster than the debt.<sup>10</sup> The experience over this period is fully consistent with the notion that the Federal Reserve was attempting to offset the upward pressure on market interest rates that resulted from the accelerating issuance of federal debt; acceleration in the growth of the federal debt was paralleled by an acceleration in money stock growth.

In 1975, however, there was a clear break in the prevailing relationship between the federal debt and the money stock. From 1975 through 1980, the federal debt grew at a 13.0 percent rate, more than twice its growth rate from 1967 to 1974. Money growth did not accelerate to this extent, rising at a 7.1 percent rate from 1975 through 1980, only slightly above the 6.1 percent rate from 1967 to 1974.

Thus, the period 1975-80 was the first sustained period since the accord in which the money stock grew at a slower rate than the federal debt. This drastic change occurred because the Federal Reserve did not continue its past practice of increasing the proportion of the federal debt that it held. In fact, the Federal Reserve did just the opposite. The proportion of the federal debt held by the Federal Reserve fell from almost 24 percent in 1974 to less than

18 percent in 1980. Either the increase in the federal debt over this period did not put auxiliary upward pressure on market interest rates or the Federal Reserve became less concerned with keeping interest rates down and more directly concerned with money growth itself. In either case, the close correlation between debt and money growth was broken.

With this relationship between the federal debt and the money stock in mind, consider the two alternative causes of inflation: (1) excess money growth and (2) federal deficits. If the first alternative is correct, growth in the federal debt should generally underpredict inflation over the 1955-74 period and overpredict inflation thereafter compared to the relationship between money growth and inflation. This should occur because debt grew slower than money over the early period and faster than money thereafter. If the second alternative is correct, the relationship between inflation and growth of the federal debt should be closer than that between inflation and money growth.

Chart 2 shows the relationship between inflation, money growth and the growth in the federal debt over the last 25 years. All rates are measured on a compounded annual rate basis. Inflation is measured by the four-quarter rate of change in the implicit GNP deflator. Money growth is measured by the 12-quarter rate of change in M1B. This extended period accounts for the fact that only sustained periods of excess money growth result in inflation.<sup>11</sup> These observations were lagged two quarters because money growth has little or no immediate effect on inflation. Debt growth is similarly measured on a 12-quarter basis. Lagging the debt measure did not appreciably improve its relationship with inflation, so it is charted on a contemporaneous basis.

The chart shows clearly that money growth is more closely related to inflation than is the growth in the federal debt. More important, the two propositions from our theory are borne out. Specifically, relative to money growth, the growth in the federal debt underpredicts inflation over the period 1955-74 and overpredicts inflation over the period 1975-80. Over the early period, inflation averaged 3.4 percent, the money growth measure averaged 3.5 percent and the debt growth measure averaged 2.1 percent. Over the latter period, inflation averaged 7.5 percent, money

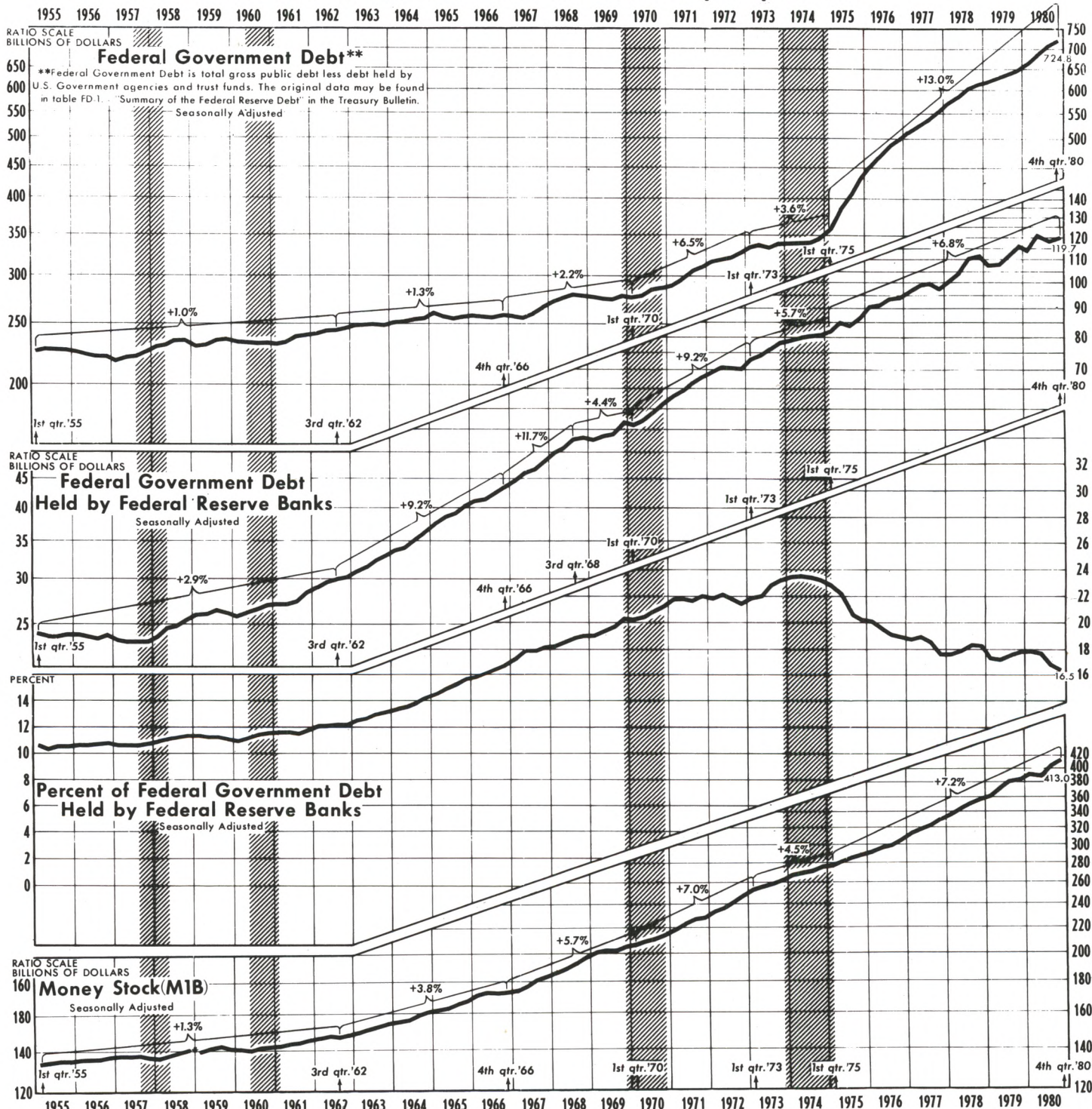
<sup>10</sup>The relationship between federal debt held by the Federal Reserve and money growth is not necessarily a perfectly stable one. To the extent that the Federal Reserve changes reserve requirements, a given stock of bank reserves results in a different money stock.

<sup>11</sup>For a more technical analysis of this lag, see Keith M. Carlson, "The Lag From Money to Prices," this *Review* (October 1980), pp. 3-10.



Chart 1

# Influence of Federal Government Debt on Monetary Expansion

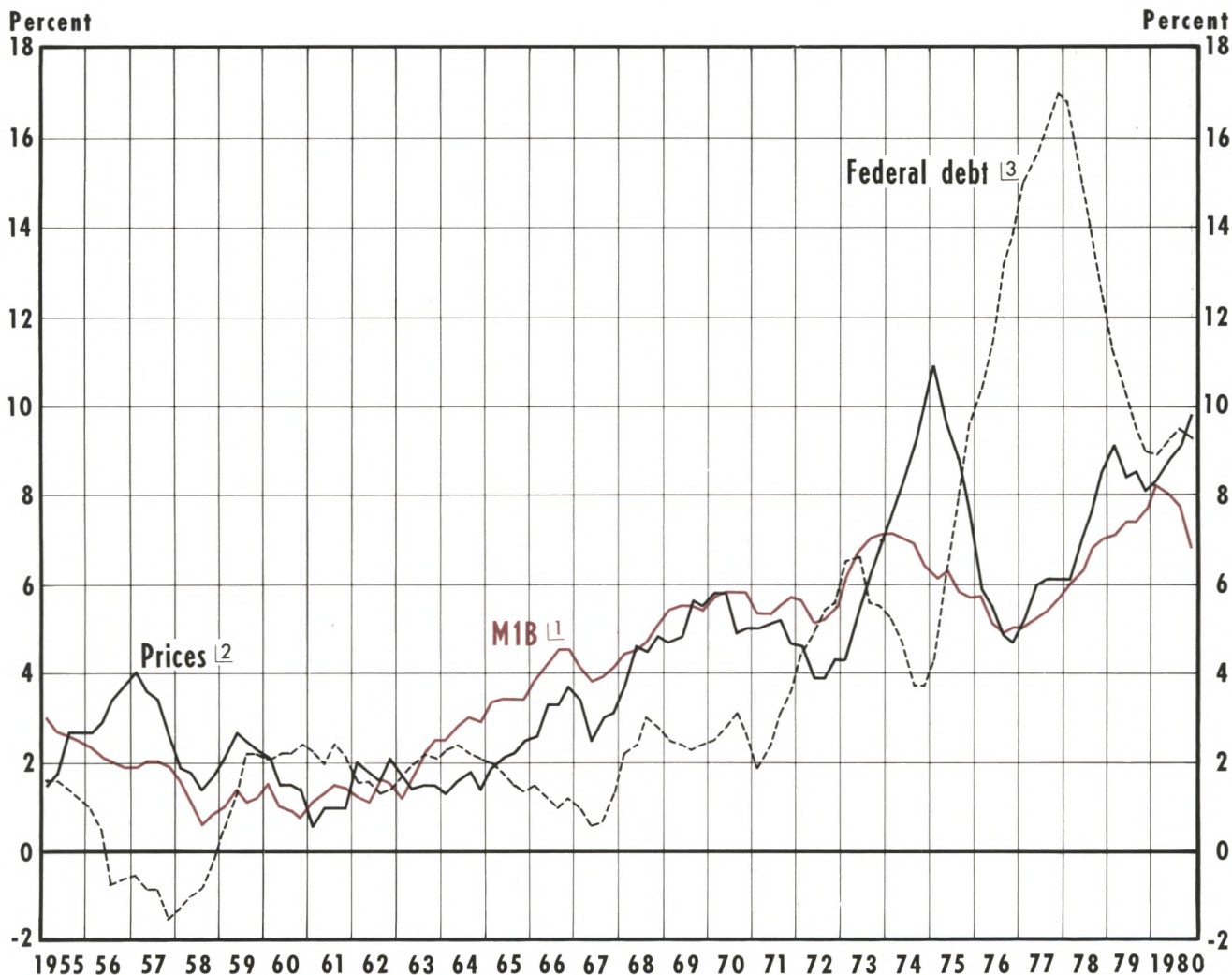


\*Data prior to 1959 are M1.  
 Shaded areas represent periods of business recessions.  
 Percentages are annual rates of change for periods indicated.  
 Latest data plotted: 4th quarter



Chart 2

# Growth Rates of M1B, Prices and Federal Debt



<sup>1</sup> Data are two-period lag of three-year growth rates.

<sup>2</sup> GNP deflator. Data are one-year growth rates.

<sup>3</sup> Total debt, not including debt held by U.S. agencies and trusts. Data are three-year growth rates.

Latest data plotted: 4th quarter

growth, 6.4 percent, and debt growth, 11.5 percent.<sup>12</sup> This evidence then is consistent with the theory that inflation is caused by excessive money growth. On

the other hand, the evidence is *not* consistent with the view that increases in the federal debt (i.e., deficits) cause inflation.

<sup>12</sup>The reader can see that money growth underpredicts inflation by a sizable amount over the period 1974-76. This is the result of a one-time wealth loss following the significant oil price increases of late 1973 and early 1974. The wealth loss resulted in reductions in the quantity of money demanded and, as a result, inflation was greater than money growth alone would suggest. A similar phenomenon is observed in

1980, but on a smaller scale. For technical discussions of this effect, see Denis S. Karnosky, "The Link Between Money and Prices - 1971-76," this *Review* (June 1976), pp. 17-23; and Robert H. Rasche and John A. Tatom, "Energy Resources and Potential GNP," this *Review* (June 1977), pp. 10-24.



## SUMMARY AND CONCLUSION

This article has described how federal deficits could cause inflation within a monetary framework. The potential link between federal deficits and inflation has been traced through the impact of deficits on the money stock and on the desire to hold money. It was argued that the link between deficits and money growth is not a causal one, in the strict sense of the word; that is, deficits need not directly cause increases in the money stock. Only when monetary authorities attempt to prevent interest rates from rising will federal deficits lead to increases in the money stock and, subsequently, inflation. This link was apparently important from 1955 through early 1975. More recently, however, the link appears to have been broken, either

because monetary authorities have shown more concern about money growth and less about the level of interest rates or because recent deficits have not put undue pressure on market interest rates. Over the period 1975 to 1980, the rate of increase in the federal debt has been almost twice that of money growth and inflation.

Two possible channels by which deficits could reduce the desire to hold money balances were also detailed. These channels, operating through rising market interest rates and reduced wealth, are direct conduits by which deficits could directly lead to inflation. Neither of these channels, however, is relevant to recent inflation in the United States.





# Navigating Through The Interest Rate Morass: Some Basic Principles

by G. J. SANTONI and COURTENAY C. STONE

**I**N ancient times, the Delphic oracle was renowned for providing cryptic, often meaningless, answers to important questions. In recent times, this Delphic tradition has seemingly inspired much of the popular discussion about the causes and consequences of interest rate movements. Without difficulty, one can find comments which indicate that interest rates are simultaneously too high and too low; or, that high interest rates are “caused” both by slower money growth and expansionary money growth; or, to cite one of the more puzzling pieces of analysis, that the dollar will rise in foreign exchange markets because of interest rate movements, whether interest rates rise or fall.<sup>1</sup>

Discussions of interest rate movements and their consequences are frequently misleading and often mistaken. In large part, the errors in such discussions stem from the absence of a theoretical framework with which to assess and evaluate the behavior of interest rates. The purpose of this article is to introduce some basic economic concepts about interest rates. It is intended to provide the reader with the minimal background necessary to analyze some of the more common assertions regarding interest rates.

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<sup>1</sup>Our personal favorite is the following: “Said Bache Halsey Stuart Shields in its foreign exchange weekly report, ‘If rates go higher it helps the dollar on a real rate of return basis; if rates go lower it reflects confidence that the U.S. will shortly experience a decline in the rate of inflation.’ So, either way, the dollar benefits.” This appeared in “Dollar Soars in Face of Lower Interest Rates as Focus Shifts to More Fundamental Factors,” *The Money Manager* (February 2, 1981), p. 12.

## DIFFERENT INTEREST RATES MOVE SIMILARLY OVER TIME

Theoretical discussions of interest rates typically refer to something called “the rate of interest.” Yet, there is a wide variety of interest rates, each of which is important for a specific type of financial transaction. Charts 1 and 2 depict the movements of several of these interest rates over the past few years. Three things are immediately obvious: First, there are differences — in some cases, sizable — between the *levels* of these interest rates. For example, Federal Housing Administration (FHA) mortgage rates exceed the yield on state and local Aaa bonds by as much as 300 to 600 basis points during the 1976-80 period (chart 2).<sup>2</sup>

Second, short-term interest rates are generally more variable than long-term rates. For example, the rate on 3-month Treasury bills (chart 1) ranged from below 5 percent (in 1976 and 1977) to over 15 percent (in 1980), a movement of more than 1,100 basis points. In 1980, 3-month Treasury bill rates fluctuated more than 800 basis points. On the other hand, the yield on long-term Treasury securities (chart 2) ranged from 7.20 percent to 12.39 percent over the 1976-80 period, a difference of about 500 basis points. In 1980, the range was 265 basis points (from 9.74 percent to 12.39 percent).

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<sup>2</sup>One percentage point is equal to 100 basis points.



Chart 1

Short-Term Interest Rates

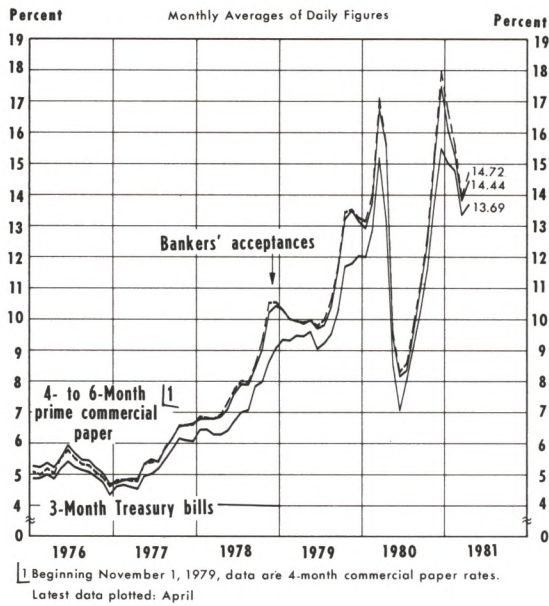
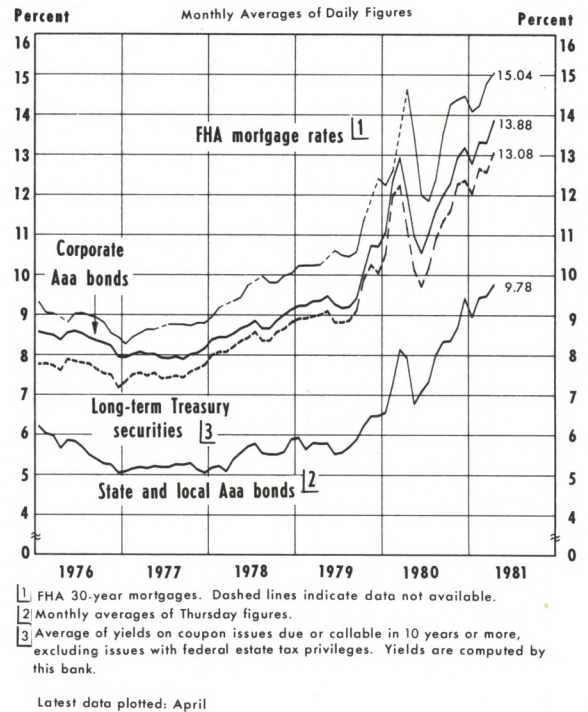


Chart 2

Long-Term Interest Rates



Third, and most important for this article, although there are differences among interest rates, charts 1 and 2 clearly show one significant feature common to all: *interest rates generally move together over time.* For example, interest rates generally declined throughout 1976, rose steadily in 1977 and 1978, and followed similar up-and-down patterns in 1979 and 1980.

Because this article is concerned with the factors that produce similar movements in *all* interest rates, the discussion focuses on “the rate of interest,” rather than referring to specific interest rates.

**THE INTEREST RATE: THE PRICE OF WHAT?**

Many discussions of interest rates go astray from the start because the rate of interest is never correctly defined. It is generally conceded that the rate of interest is a *price* that is paid or received for something; the problem lies in correctly determining what it is the price of. In this section, we show that it is the price of consuming goods *now* rather than later.

*Nominal Prices, Inflation and the Price of Money*

The price of anything is simply the rate at which it can be traded or exchanged for something else.

The prices that we observe every day are *nominal* prices: they specify the rate at which specific goods are exchanged for *money*. If one gallon of milk can be purchased for two dollars, we typically say that the price of milk is \$2.00 per gallon. However, we can also correctly say that the price of money is one-half gallon of milk per dollar. *The price of money in terms of any specific good is simply the inverse of the nominal price of that good.*

Inflation occurs when there is a general rise in the nominal prices of all goods and services over an extended period of time. This movement is typically measured by increases in various indices, such as the consumer price index (CPI) or the GNP implicit price deflator. When nominal prices of goods and services are generally rising, these indices display similar behavior.

Just as the price of money in terms of a specific good is the inverse of that good’s nominal price, the price of money in terms of a composite measure of all goods and services is obtained simply by calculating the inverse of the general price index. Thus, inflation can be considered as a general rise in the nominal prices of goods and services or, equivalently, as a general fall in the price (or value or purchasing power)



**Table 1**  
**GNP Implicit Price Deflator and the Price of Money: 1970-1980**

Year	GNP Implicit Price Deflator/100 (1972 = 1.00)	Price of Money <sup>1</sup> (1972 = 1.00)
1970	.91	1.10
1971	.96	1.04
1972	1.00	1.00
1973	1.06	.94
1974	1.15	.87
1975	1.26	.79
1976	1.32	.76
1977	1.40	.71
1978	1.50	.67
1979	1.63	.61
1980	1.77	.56

<sup>1</sup>The "price of money" is the inverse of the numbers shown in column 2.

of money. The relationship between one general measure of prices (the GNP implicit price deflator) and the price of money over the past decade is shown in table 1. The price (or value) of a dollar fell from 1.00 in 1972 to .56 in 1980 in terms of the nominal prices of goods and services. This indicates that a dollar could be purchased in 1980 for about half the goods and services that it cost in 1972.

By remembering this inverse relationship between the nominal prices of goods and the price of money, you will avoid making the most persistent error that pervades interest rate discussions. The interest rate is frequently, but erroneously, called the price of money. A simple comparison of the movement of interest rates (charts 1 and 2) with the movement of the price of money (table 1) demonstrates the fallacy inherent in this view. The price of money declined consistently throughout the 1970s. Interest rates, on the other hand, generally increased over this period. Whatever price the interest rate represents, it is clearly not the price of money.<sup>3</sup>

<sup>3</sup>Nor is it the price paid for the use of money: "Experience shows that nearly every student of economic science has . . . acquired a number of crude and usually false ideas on this important subject. Such, for instance, is the idea that interest is the price paid for the 'use of money' . . ." Irving Fisher, *The Rate of Interest* (New York: The Macmillan Co., 1907), p. 3.

## *Relative Prices and Economic Behavior*

A *relative* price of one good measures the rate at which that good can be directly exchanged for another good. When money is used in the process of exchange, relative prices between goods are not immediately observed; they are easily calculated, however, as the ratio of the nominal prices of any two goods. For example, if the nominal price of milk is \$2.00 per gallon and the nominal price of eggs is 50 cents per dozen, the relative price of milk (in terms of eggs) is four dozen eggs per gallon of milk.

Changes in relative prices, not those in nominal prices per se, are the ones that affect economic behavior. If wages rise relative to the prices of machinery, employers will reduce their use of labor and substitute more capital goods in production. If the price of American cars (including costs of operation) rises relative to that of foreign cars, consumers will purchase fewer U.S.-produced autos and more foreign-produced cars. When the price of beef rises relative to that of chicken or pork, we consider it only rational to purchase more of the relatively cheaper meats and fewer of the more expensive steaks. This response to relative price changes is so universal and thoroughly documented that it is called the "law of demand."

## *The Interest Rate: The Relative Price of Earlier Availability*

The interest rate is the price that we see quoted in lending and borrowing transactions in credit markets. It is generally expressed as the *premium* that must be paid in an exchange between current and future *dollars*. For example, if you can borrow \$100 now in exchange for \$110 to be paid to the lender in one year, the rate of exchange between future and current dollars is 1.1 dollars in one year per dollar of credit now. This rate of exchange is generally designated by the implied rate of interest — in this example, 10 percent. This is why the rate of interest is called the price of credit.

However, this designation obscures the significant role that the interest rate plays in economic decisions. The interest rate would exist even in the absence of financial markets. Stripped of the mystique associated with complex financial transactions, the interest rate is simply the price paid for obtaining the use of goods



now — it is the price paid for earlier availability of goods and services.<sup>4</sup>

Consider what this concept reveals about its impact on the decisions that people make. As the price paid for earlier availability, the interest rate measures the rate at which people exchange the use of goods and services today for their use at some time in the future. If, for example, the annual rate of interest is 10 percent and nominal prices are not expected to change, every dozen eggs, ton of steel and quart of milk you use today “costs” you 1.1 times that amount of eggs, steel and milk that you would have had next year if you had only saved (refrained from using them) now.

We noted previously that an increase in the *relative* price of anything that we buy will induce us to buy less of it and more of other things that are now relatively cheaper. An increase in the interest rate means that the cost of consuming goods today rises in terms of the future goods that must be given up. Because the interest rate is the price that reflects the options available to individuals through time, it is the one price that pervades all of the economic decisions that people make. Specifically, the decisions that, in the aggregate, determine the economic progress of a nation — how much to save and invest — are fundamentally related to the rate of interest that people expect to prevail. It is no wonder that interest rate movements provoke such widespread concern.

## THE EXPECTED RATE OF INTEREST IS ALWAYS POSITIVE

The rate of interest that people *expect* to receive from saving and investing is always positive. There are two primary reasons that this is so. The first reason concerns the fact that resources can be used productively over time. The second reason is that people have “positive time preference.”

### *Resources Have Productive Uses*

The interest rate is always positive because resources can be used in ways that increase their value over time. Today’s steer can be slaughtered now or placed on a feed lot to grow in weight and size, yielding more beef and a larger hide in the future. There are a wide variety of goods which grow in value

<sup>4</sup>For a comprehensive discussion of interest rates, see Armen Alchian and William R. Allen, *Exchange and Production: Competition, Coordination, and Control* (Belmont, California: Wadsworth, 1977), pp. 424-59.

over time. Some goods, (e.g., steers, trees, wheat) physically grow larger over time; other goods (e.g., whiskey, cheese, wine) improve in quality with age. Still other goods (e.g., steel, coal, oil, labor) can be converted into capital goods (e.g., machines, trucks, autos). Since we live in a world in which more wheat, smoother whiskey and more trucks in the future are the costs of consuming wheat, whiskey and leisure time now, the price of earlier availability — the rate of interest — is always positive.<sup>5</sup>

### *People Have Positive Time Preference*

People prefer consuming goods presently to consuming similar goods in the future. This is called positive time preference.<sup>6</sup> It means that people value the present use of resources (goods) more highly than they value the future use of resources. Since this is the case, they must be induced to forego the present use of resources by the payment of a positive rate of interest. Because of positive time preference and because it is possible to use resources in ways that are productive (increase their value) over time, people who give up the use of resources now will demand to be paid a positive interest rate for doing so; after all, they could always keep the resources themselves and receive the potential gains directly. Similarly, people who want to use resources (e.g., steers) currently, either to consume them (as steaks) or invest them (on feed lots) will always have to pay a posi-

<sup>5</sup>This view has a considerable history and is widely held among economists. Irving Fisher, *The Theory of Interest* (New York: Kelley and Millman, 1954), p. 192, argues: “In the real world our options are such that if present income is sacrificed for the sake of future income, the amount of future income secured thereby is greater than the present income sacrificed . . . Nature is, to a great extent, reproductive . . .” See also Jack Hirshleifer, *Price Theory and Applications* (Englewood Cliffs, N.J.: Prentice-Hall, 1976), pp. 399-408 and pp. 415-32; Fisher, *The Rate of Interest*, p. vii; Frank H. Knight, *Risk, Uncertainty and Profit* (New York: Kelley and Millman, 1957), p. xli; and Frank H. Knight, “The Business Cycle, Interest, and Money: A Methodological Approach,” *Review of Economics and Statistics* (May 1941), p. 221.

<sup>6</sup>See, for example, Eugen von Bohm-Bawerk, *Capital and Interest* (South Holland, Ill.: Libertarian Press, 1959), p. 259; Jack Hirshleifer, *Investment, Interest and Capital* (Englewood Cliffs, N.J.: Prentice-Hall, 1970), p. 117; and Mancur Olson and Martin J. Bailey, “Positive Time Preference,” *Journal of Political Economy* (February 1981), p. 1-25. Olson and Bailey state in their conclusion: “. . . the case for positive time preference is absolutely compelling . . .”

For a standard textbook discussion of the issue, see Daniel Orr, *Property, Markets, and Government Intervention* (Pacific Palisades, Cal.: Goodyear Publishing Co., 1976), p. 175: “Almost any individual, if pressed with careful questioning, will declare that he would prefer to receive a dollar today, rather than tomorrow. After all, receipt today permits all the alternatives that receipt tomorrow does . . . ; and other alternatives are opened up by the choice to take the dollar today . . .”



tive rate of interest; competition among prospective borrowers alone will assure this.<sup>7</sup>

## EX ANTE AND EX POST RATES OF INTEREST

The previous section points out that the expected rate of interest is always positive; people will not forego the present use of goods (save or invest) unless they expect to receive a positive return from doing so. The expected rate of interest, the rate that determines the extent of saving and investment, is sometimes called the *ex ante* rate of interest. This interest rate is forward looking; it is this anticipated return that motivates individuals to make specific economic decisions regarding how resources will be used.

This rate of interest must be carefully distinguished from the actual rate of return that is ultimately received. The rate of return actually earned as a consequence of each decision is called the *ex post* rate of interest. The *ex post* rate is the *hindsight* rate of interest, and, as such, can be negative, positive or zero. Because it is unknown at the time the decision is made, the *ex post* interest rate is irrelevant for determining economic decisions. There is no way to undo past actions.

To see why *ex post* returns, per se, do not affect individuals' decisions, consider the following example. Suppose you are offered an opportunity to bet on the outcome of a coin toss. You are convinced that the coin is a fair coin; moreover, you will be allowed to toss the coin. The following odds are offered: if the coin turns up "heads," you win \$100; if the coin turns up "tails," you pay \$50. Since, in your estimation, the coin is as likely to turn up heads as it is tails on each toss, your *ex ante* or expected gain is \$25 on each coin toss.<sup>8</sup>

<sup>7</sup>As Friedrich A. Hayek points out: "There can be no doubt that the existence of such a positive rate of profit [a positive real return] on investments is the main source of demand for loans of money, since command over present money is command over present resources which can be turned into future commodities at a profit. And there can also be little doubt that the existence of such a rate of profit is at least one of the reasons why people who might themselves employ the money profitably, will not be willing to lend it without special remuneration . . ." *The Pure Theory of Capital* (Chicago: University of Chicago Press, 1941), p. 355.

<sup>8</sup>The expected gain (loss, if negative) is equal to the probability of heads (.5) multiplied by your winnings if heads comes up (\$100), minus the probability of tails (.5) multiplied by your loss if it comes up (\$50). There is, of course, one substantial difference between this example and credit market transactions. The coin toss is a zero-sum game; the expected gain to one individual equals the expected loss to another. In credit markets, both borrowers and lenders expect to gain from the transaction; economic exchange is a positive-sum game.

Because you *expect* to win, you naturally accept the bet. You flip the coin and it turns up tails. You have just lost \$50 as a result of your decision to bet. The *ex post* return from having bet reflects the change in your wealth; it is a negative \$50.

What does this example show? First, *ex ante* and *ex post* returns can differ significantly because they represent entirely different concepts. Since they address different issues, different information is used in their calculation. The *ex ante* return used to make the decision was related to the various possible outcomes and the probability of each outcome. The *ex post* return, however, reflects solely the change in wealth that actually results from the decision.

Note, further, that the actual return resulting from past decisions is not relevant to subsequent decisions unless it somehow affects the current *ex ante* return. For example, suppose you can continue to bet on the toss of the coin under the same conditions at the same odds. Because you have acquired no information that would lead you to change your expected gain from betting, you would rationally continue to play the game. Your initial loss is what is called a "sunk cost;" it can not be recovered no matter what you do. The only things that are relevant in the process of making decisions are the expected returns of the opportunities that you presently confront.

To summarize, the *ex ante* rate of interest is the one individuals use to make savings and investment decisions; this forward-looking rate guides resource use. The *ex post* rate of interest, on the other hand, is backward-looking; it tells you how well you actually did.

## NOMINAL AND REAL RATES OF INTEREST

In general, the interest rates with which we are most familiar (e.g., those quoted in financial markets) are expressed as the rate of exchange between current and future *dollars* rather than between current and future goods and services. These published interest rates are formed in the process of contracting between borrowers and lenders and express the rate at which a loan is *expected* to appreciate (in terms of dollars) over the contract period. Therefore, all interest rates quoted in financial markets are *ex ante* interest rates.

There are immense gains to both borrowers and lenders from specifying contracts in terms of money, the medium of exchange, rather than directly in terms of the actual goods and services; if this were not so,



we would observe considerably more “barter” loans. Specifying these contracts in terms of money, however, introduces an additional complication into the determination of the interest rate. This problem requires a discussion of the distinction between the nominal and real interest rate.<sup>9</sup>

In the absence of an *expected* inflation, the rate of interest on credit transactions will be the same whether money or goods and services are specified in the loans. If nominal prices are expected to remain unchanged, the price of money is likewise not expected to change. Thus, it will not matter whether loan contracts are specified in goods or money; they will yield equivalent interest rates.

The interest rate implied by the rate of exchange between present and future *goods* is called the *real* rate of interest. The interest rate implied by the rate of exchange between present and future *money* is called the *nominal* rate of interest. Because it represents an exchange between money now and money in the future, the nominal interest rate is influenced by the expected change in the *nominal* prices of goods and services over the contract period.

The following example highlights the relationship between the real and nominal rates of interest. Suppose that wheat currently sells for \$4.00 per bushel and that you have 100 bushels of wheat. If the annual real rate of interest is currently 10 percent and if nominal prices are expected to remain unchanged, it makes no difference to you whether you lend 100 bushels of wheat now in exchange for 110 bushels next year, or sell the wheat for \$400 and lend the proceeds in exchange for \$440 next year. Because the two options are identical, the nominal interest rate (the rate on the exchange of current for future money) is equal to the real rate (the interest rate on the direct exchange of current for future wheat).

If, however, the nominal prices of all goods are expected to rise by, say, 5 percent during the year, the nominal rate of interest must rise by 5 percent as well to compensate the lender for the reduced value of the future money that will be received. Thus, although the real rate remains unchanged, the nominal rate of interest rises to 15 percent; it is equal to the sum of the real rate (10 percent) plus the expected rate of inflation (5 percent).

<sup>9</sup>From this point on, the term “*ex ante*” is deleted to simplify the discussion. However, since the discussion is intended to analyze interest rates that affect behavior, references to “the rate of interest” refer to the *ex ante* interest rate unless otherwise noted.

The nominal interest rate observed in financial markets is equal to the sum of the real interest rate and the *expected* rate of inflation over the contract period.<sup>10</sup>

## A LITTLE THEORY GOES A LONG WAY

The theoretical discussion of interest rates developed in this article provides a means of interpreting many statements about interest rate movements. Consider, for example, the following popular misconceptions about interest rates.

**Error #1: “Slower Money Growth Drives Up Interest Rates.”** This is perhaps the most widespread misconception that exists about interest rate movements. It derives, in part, from the fallacy that the interest rate is the price of money. If the interest rate were the price of money, then reduced growth of the money supply (relative to the growth in money demand) would indeed cause interest rates to rise. However, as noted earlier, the interest rate is *not* the price of money.

Because the price of money is the inverse of the nominal prices of goods and services, reduced money growth will increase the price of money and reduce the rate at which nominal prices of goods and services are rising. In other words, *slower money growth reduces the expected rate of inflation*. Since the nominal interest rate equals the real interest rate plus the expected rate of inflation, slower money growth will also reduce nominal interest rates.

A casual observation of the data indicates the close link between “tight” money growth and low interest rates over long time periods. Over shorter periods, however, there is an ambiguous relationship between movements in money growth and interest rates. For example, as shown in chart 3, we can easily find periods when money growth and interest rates moved in similar directions (e.g., March-April 1980, July-mid September 1980) or in opposite directions (e.g., November-mid December 1980, January-March 1981). What is important here, however, is that we can demonstrate, using this simple theoretical framework, that the initial statement is specious.<sup>11</sup>

<sup>10</sup>The discussion in this article ignores the effects of taxes on nominal interest rates.

<sup>11</sup>A more comprehensive analysis of the relationship between money growth and interest rates would focus on whether the money growth was anticipated or not, whether it was expected to be permanent or not, and whether short-term or long-term rates of interest were being analyzed. These necessary additional qualifications provide further evidence for the vacuousness of the statement, “Slower money growth drives up interest rates.”



Chart 3  
**Levels of M1B and Selected Interest Rates**



\*Weekly averages of daily market yields.

**Error #2: "Higher U.S. Interest Rates Increase the Dollar's Value In Foreign Exchange Markets."** Once again, remember that the nominal interest rate equals the sum of the real interest rate and the expected rate of inflation. Unless we know why U.S. nominal interest rates are rising, we cannot possibly tell whether the foreign-exchange value of the dollar will rise or fall. If, for example, U.S. nominal interest rates have increased because the expected rate of inflation has risen, the international price of the dollar will

fall; greater U.S. inflation means a lower price of the dollar regardless of the market in which it is traded.

If, on the other hand, U.S. nominal interest rates have increased because the real interest rate has risen, we do not know how the dollar will respond in foreign exchange markets. If advances in U.S. technology have opened up new and highly profitable investment opportunities, both the real and nominal interest rates will rise, and the value of the dollar will



increase as foreign capital is drawn into the United States. However, if major political instability should arise in the United States, both U.S. real and nominal rates of interest will rise, and the foreign-exchange value of the dollar will fall as domestic and foreign investors withdraw their funds from the United States.

In general, the relationship between movements in U.S. interest rates and the foreign-exchange value of the dollar is ambiguous.<sup>12</sup> Changes in U.S. nominal interest rates indicate nothing about how the foreign-exchange value of the dollar will respond. The theoretical framework developed here points out the nature of the ambiguity and indicates the additional information necessary to determine the actual relationship.

### *Error #3: "The Real Interest Rate Is Negative."*

There are two different real interest rates: the *ex ante* real interest rate and the *ex post* real interest rate. The *ex ante* real interest rate is the real return that you expect to earn (or pay) when you lend (or borrow). The *ex ante* real interest rate is always positive except in certain bizarre scenarios.<sup>13</sup> People will never willingly save, lend or invest if the expected return is negative.<sup>14</sup>

In the world as we know it, people are generally unwilling to deliberately reduce their wealth. Negative *ex ante* interest rates mean that lenders are *knowingly* transferring some of their wealth to borrowers and that borrowers are *knowingly* increasing their wealth at the lenders' expense. Competition among borrowers to obtain wealth from lenders, and decisions by some prospective lenders to become borrowers instead, eliminate any prospect that the ex-

pected interest rate is negative. To be sure, charity does exist. For example, some parents give some of their wealth to their children. However, the impersonal nature of credit markets rules out their serving as charitable institutions.

It is always possible, of course, that the *ex post* real rate of interest for some people is negative; the future, after all, is uncertain. For instance, the actual rate of inflation could be significantly higher than was generally expected. As a result, the *ex post* real interest rate could be negative for lenders, indicating an unexpected wealth transfer from lenders to borrowers. For the borrowers, of course, this unexpected wealth gain means that their *ex post* real return is not only positive, it is considerably higher than they initially expected.

Negative *ex post* real interest rates are, by their very nature, unexpected. Consequently, although they do occur and have real effects on individuals' wealth, they are meaningless for prospective savings and investment decisions.

What can we conclude about the statement, "The real interest rate is negative"? If it indicates that the expected real interest rate is negative, the statement is false; the expected real interest rate is always positive. If it indicates that past lending or borrowing decisions have resulted in unexpected wealth transfers, it reminds us that decisions involving the future are always uncertain.

## SUMMARY

Discussions of interest rate movements and their consequences are frequently misleading and often mistaken. In large part, the errors in such discussions stem from the absence of a theoretical framework from which to assess and evaluate the behavior of interest rates.

This article presented a simple theoretical discussion of interest rates. The important distinctions between *ex ante* and *ex post* interest rates on the one hand, and nominal and real interest rates on the other, were introduced and explained.

Finally, the concepts introduced in this article were applied to several commonly observed statements concerning interest rates. The widely-held views exemplified by these statements were shown to be invalid.

<sup>12</sup>This discussion assumes that foreign *ex ante* real interest rates and expected inflation rates remain unchanged. A more comprehensive analysis would incorporate the movements in U.S. interest rates *relative* to foreign interest rates. See, for example, Douglas R. Mudd, "Do Rising U.S. Interest Rates Imply a Stronger Dollar?" this *Review* (June 1979), pp. 9-13.

<sup>13</sup>For example, ". . . a world in which the only provisioning for the future consisted of carrying over initial stocks of perishable food, clothing and so forth and if every unit so carried over into the future were predestined to melt away . . ." would provide the preconditions for a negative *ex ante* real interest rate. The quote is from Irving Fisher, *The Theory of Interest and Capital* (New York: Augustus M. Kelley, 1965), p. 91.

<sup>14</sup>This observation has even reached Congress: "The public simply will not hold securities unless yields exceed expected inflation." Minority Views, *Monetary Policy for 1981*, Fifth Report by the Committee on Banking, Finance, and Urban Affairs, 97 Cong. 1st Sess., H. Rept. 97-10, p. 15.



# The Impact of Energy Prices and Money Growth on Five Industrial Countries

R. W. HAFER

**I**N the winter of 1973-74, the Organization of Petroleum Exporting Countries (OPEC) quadrupled the price of oil from \$3 a barrel to about \$12 a barrel, a fourfold increase that, along with a marked slowing of money growth, precipitated one of the longest and deepest post-war declines in economic activity in most industrial nations. The subsequent recession was followed by a period of relatively rapid economic expansion in most of these nations, only to be halted by yet another explosion in energy prices in 1979 and 1980. Once again, it appears that this price increase has been accompanied by sharply reduced money growth.

This article discusses the impact of recent energy price changes and monetary growth on the economic performance of five major industrial countries: Canada, Germany, Japan, the United Kingdom and the United States. The analysis focuses on the growth of real output, industrial production and consumer prices, and changes in the level of the unemployment rate over the 1979-80 period.

## ENERGY PRICES, MONEY GROWTH AND ECONOMIC ACTIVITY

A rise in energy prices represents an increase in the cost of a significant productive input. Consequently, an increase in energy prices relative to other prices precipitates a decline in the amount of goods and services supplied by the economy at any given level of prices.<sup>1</sup> A higher general price level is then necessary if the

same amounts of labor (given a nominal wage rate), capital and energy inputs are to be used. Because of the increase in energy prices and the economic obsolescence of existing plant and equipment, however, producers will reduce their use of energy. The results of these related actions are a decline in real output and an increase in the price level. Thus, the level of prices consistent with maintaining full employment of labor and capital increases, and the actual *and* full-employment level of output (potential output) falls as a consequence of the energy price increase.

Just as an increase in the relative price of energy precipitates a reduction in economic activity, so a substantial *decrease* in the growth of the money supply relative to its trend path also leads to declining economic activity. For example, a significant reduction in money growth relative to trend has preceded almost every economic contraction in the United States since the latter part of the 19th century.<sup>2</sup> Associated with these contractions are declines in production and concomitant increases in idle resources (i.e., unemployment). Thus, restrictive money growth, in the short-run, reduces the economy's output of goods and services. There is evidence, however, that the general level of prices is temporarily unaffected by such restrictive money growth.<sup>3</sup>

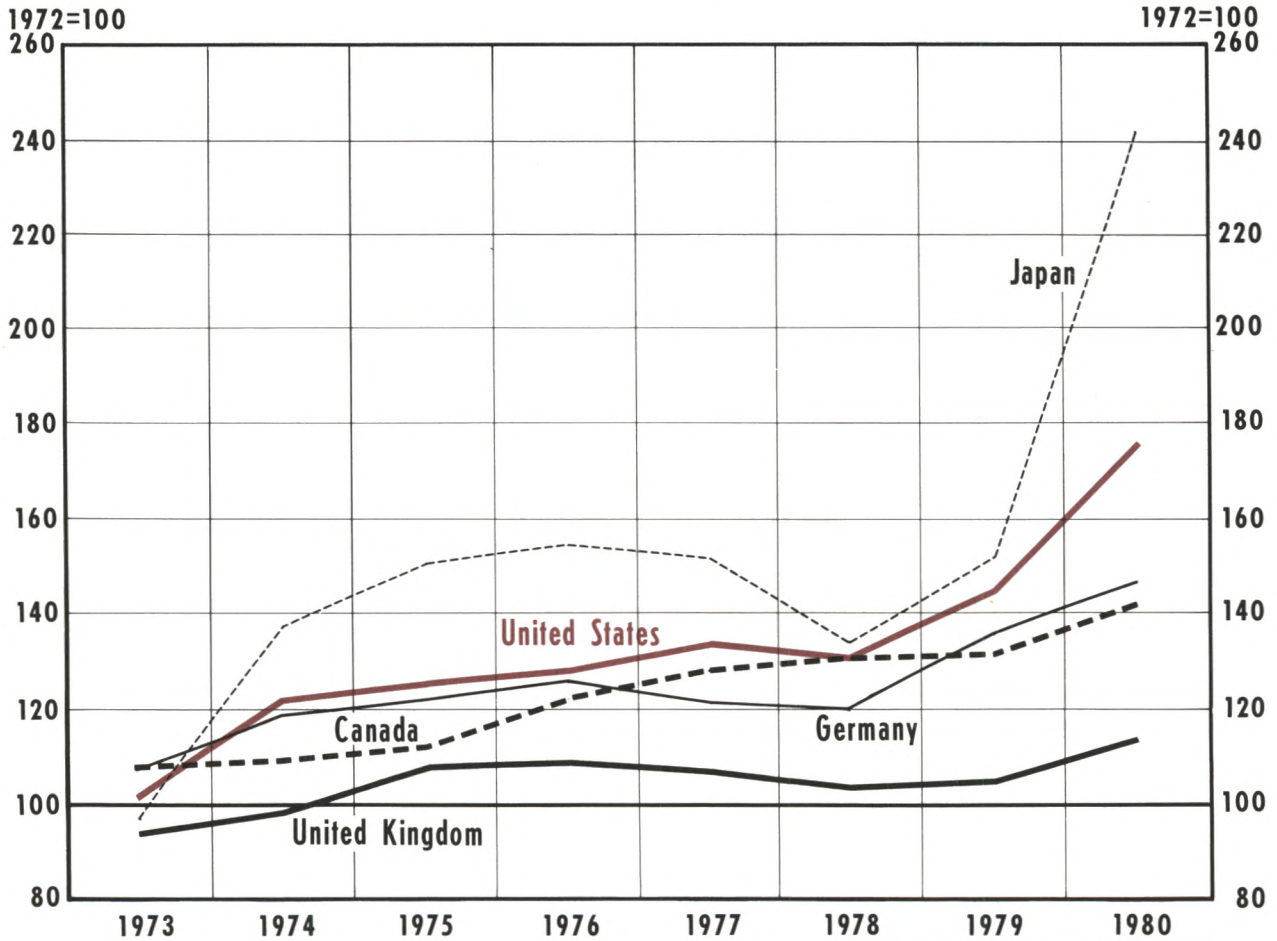
<sup>2</sup>See Milton Friedman and Anna J. Schwartz, "Money and Business Cycles," *Review of Economics and Statistics* (February 1963), pp. 32-64 and William Poole, "The Relationship of Monetary Decelerations to Business Cycle Peaks: Another Look at the Evidence," *Journal of Finance* (June 1975), pp. 697-712.

<sup>3</sup>See Keith M. Carlson, "The Lag from Money to Prices," *this Review* (October 1980), pp. 3-10.

<sup>1</sup>John A. Tatom, "Energy Prices and Short-Run Economic Performance," *this Review* (January 1980), pp. 3-17.



Chart 1  
**Relative Price of Energy to Final Users\***



Source: OECD, *Economic Outlook*

\*Energy component of consumer and wholesale price indices divided by total indices excluding energy. Relative energy prices at the wholesale level have been weighted by the share of industry in total final energy demand.

Note: Data for 1980 are estimated.

The 1973-74 and 1979-80 episodes of generally declining economic activity in the five countries are characterized by both higher relative energy prices and restrictive money growth. Consequently, the analysis presented above is necessary to understand the recent economic events. It will be evident that the relationships outlined above generally hold across the countries examined.

**ENERGY PRICES**

Chart 1 shows what has happened to one measure of the relative price of energy — the ratio of energy

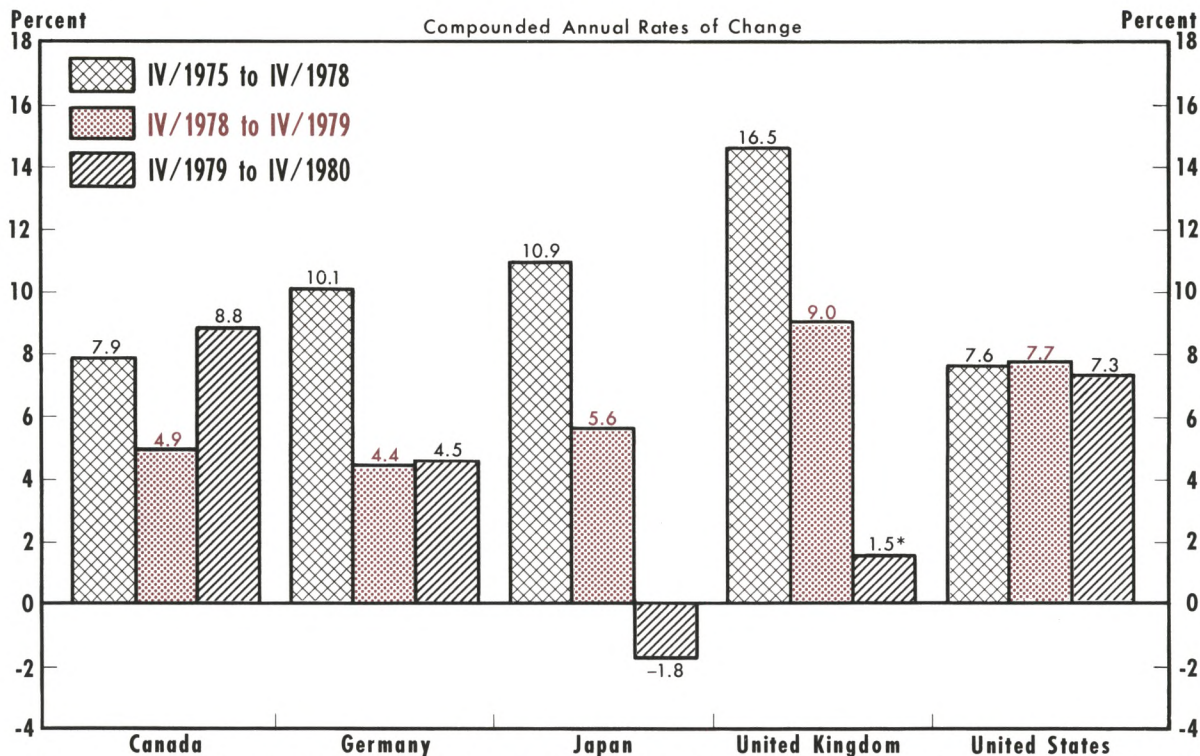
prices (to final users) to the price of final goods — for the five countries since 1972.<sup>4</sup> The 1973-74 increase in OPEC oil prices is clearly shown in the general increase in relative energy prices: the simple average annual rate of increase during 1973-74 for the five countries was about 16 percent.

The recent boost in oil prices has again led to increases in relative energy prices. In the United States,

<sup>4</sup>The relative prices of energy are computed by dividing the energy component of the wholesale and consumer price indices by the total index excluding the energy component. See Organization for Economic Co-Operation and Development (OECD) *Economic Outlook* (December 1980), p. 52.



Chart 2  
**Money Growth**



Sources: Bank of Canada, *Bank of Canada Review*; Deutsche Bundesbank, *Monthly Report of the Deutsche Bundesbank*; Bank of Japan, *Economic Statistics Monthly*; U. K. Central Statistical Office, *Financial Statistics*; Board of Governors of the Federal Reserve System.  
 \*Because of data limitations, period covered is IV/1979 to III/1980

for example, relative energy prices increased at about a 20 percent annual rate during 1979-80; Canada, Germany and the United Kingdom sustained increases of about 8 percent. Just as in the 1973-74 period, the most dramatic increase occurred in Japan; relative energy prices increased at a 60 percent rate during 1979-80.<sup>5</sup>

<sup>5</sup>Although there are similar movements in relative energy prices in chart 1 during the 1973-74 and 1978-80 periods, the observed differences are due to the varying impacts of higher oil prices across countries. Because the relative energy prices reported in chart 1 are based on the energy components of the wholesale and consumer price indices, the differential impact of a change in the price of oil can be explained by the speed at which prices of the energy and fuels constituting the indices' energy component adjust to the oil price increase. To do this, the change in the energy component of the wholesale price index is divided by the rise in the import price of oil. Because the coverage of the energy prices is not identical, the ratio (known as the pass-through ratio) is not directly comparable across countries. They may, however, give an insight into the different countries' price response to the increased oil price.

The pass-through ratios calculated for the 1978-80 period suggest that the relatively larger increases in the relative

## MONETARY GROWTH

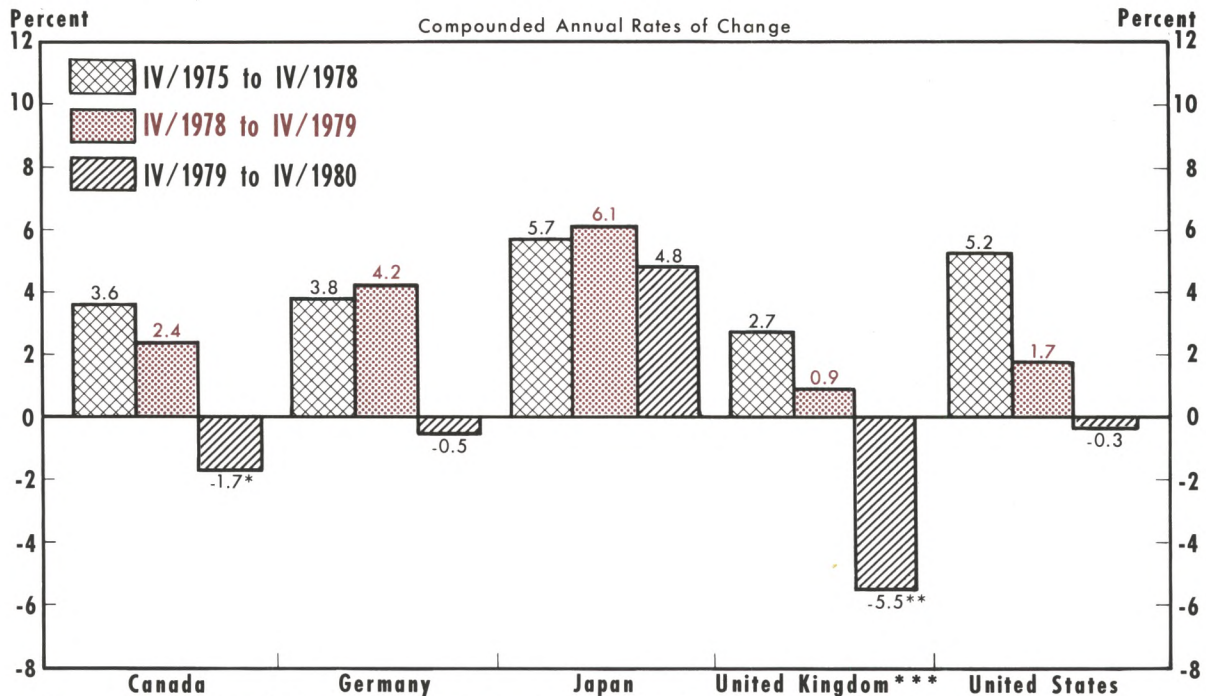
The rise in oil prices during the 1973-74 period was accompanied by generally higher prices, reduced real economic output and lower growth of the money stock. The data in chart 2 reveal that the general response to the recent oil price shock again was to slow the growth of the money supply. Using the IV/1975-IV/1978 period for comparison, money stock growth has slowed considerably in Germany, Japan

price of energy to final users for the United States and Japan are explained by the fact that a given change in oil prices passes through each index's energy component faster than the others: the pass-through ratios are 0.69 and 0.81, respectively. The lower ratios for the United Kingdom (0.51), Canada (0.41) and Germany (0.29) suggest that the speed with which oil price increases feed into the energy component of the price index is less for these economies. These ratios are explained by differing responses of prices for competing fuels, changes in controls over both domestic production and pricing of competing fuels, and different tax structures on energy use in the countries.

For a complete description of the pass-through ratio, see *OECD Economic Outlook* (December 1980), p. 51-53.



Chart 3  
Real GNP



Sources: Bank of Canada, Bank of Canada Review; Statistical Supplements to the Monthly Reports of the Deutsche Bundesbank; Bank of Japan, Economic Statistics Monthly; International Monetary Fund, International Financial Statistics; Department of Commerce, Bureau of Economic Analysis.

\*Because of data limitations, period covered is IV/1979 to III/1980.

\*\*Because of data limitations, period covered is IV/1979 to II/1980.

\*\*\*Data are Real GDP.

and the United Kingdom, while decreasing slightly in the United States. In contrast, Canada's money growth has actually been faster since IV/1979.

Chart 2 may not provide the most accurate description of the sharp declines in money growth instituted by the various governments. By examining money growth rates over shorter time intervals, the degree of monetary tightness is more fully revealed. Consider, for example, Canada and the United States. Chart 2 reveals no slowing in monetary growth for Canada and very little for the United States. From IV/1979 to II/1980, however, a far different picture emerges: the growth rate of money in Canada during this period is 1.6 percent; in the United States it is 1.8 percent. Each of these figures reveals a tightening in money growth relative to trend and, other things equal, portends a decline in economic activity.

Money growth was sharply reduced in all five countries up to the second quarter of 1980. This is similar to the 1973-74 period and has produced a greater

decline in economic activity than would have resulted from the energy shock alone.<sup>6</sup>

## ECONOMIC ACTIVITY

### Real GNP

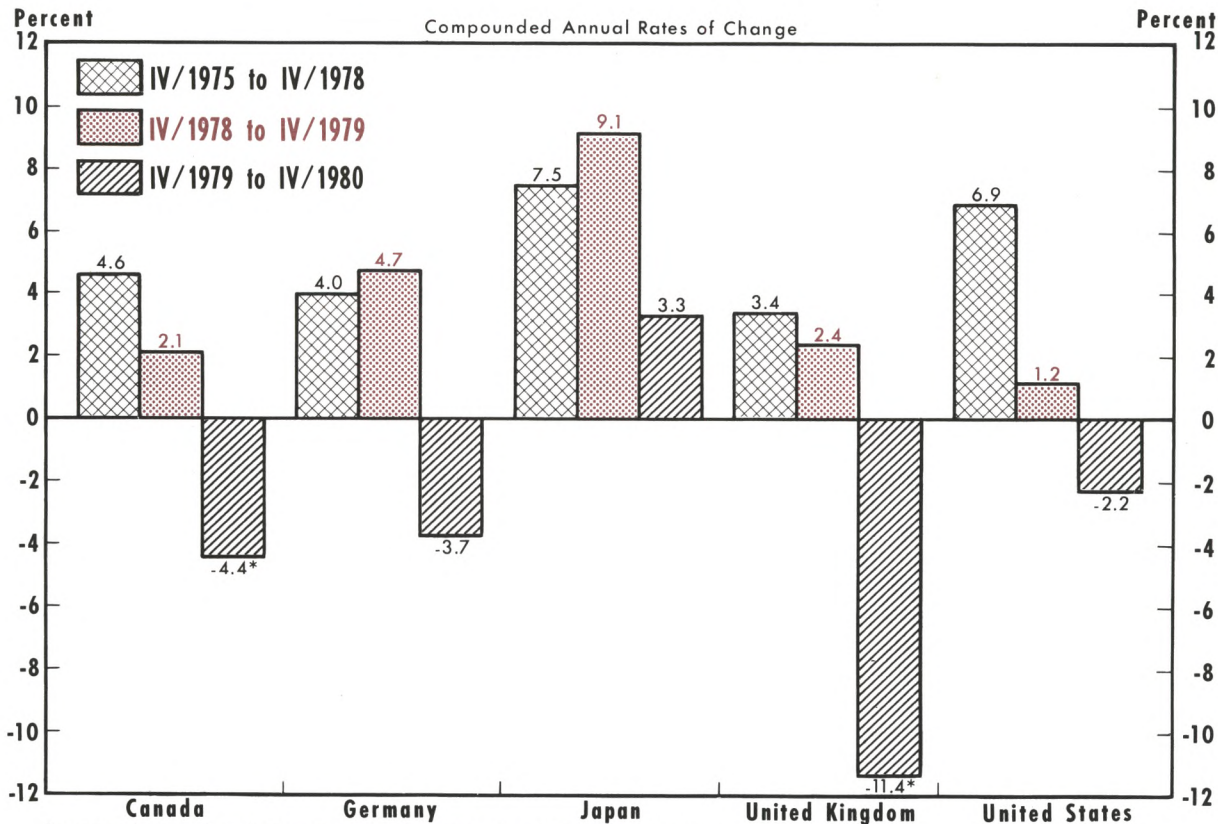
The growth of an economy's real gross national product (real GNP) is a widely used indicator of an economy's overall economic performance.<sup>7</sup> To illustrate the magnitude of the recent downturn in economic activity, chart 3 shows the growth rates of real GNP for the five countries during three time periods. The first period, IV/1975-IV/1978, is used as a reference period and represents the expansion phase of the

<sup>6</sup>See John A. Tatom, "Energy Prices, Economic Performance and Monetary Policy," Federal Reserve Bank of St. Louis Working Paper No. 81-007 (1981), p. 34.

<sup>7</sup>Gross national product is the total market value of all goods and services produced in the economy during a given period of time. Real GNP is this figure adjusted for changes in prices.



Chart 4  
**Industrial Production**



Sources: International Monetary Fund, *International Financial Statistics*; Statistical Supplements to the Monthly Reports of the Deutsche Bundesbank; Bank of Japan, *Economic Statistics Monthly*; Board of Governors of the Federal Reserve System.

\*Because of data limitations, period covered is IV/1979 to III/1980.

most recent business cycle. The other periods, IV/1978-IV/1979 and IV/1979-IV/1980, illustrate the general downturn in real GNP growth following both the sharp increase in energy prices and the reductions in money growth rates.

As chart 3 shows, Canada, the United Kingdom and the United States experienced marked deviations from previous real GNP growth in IV/1978-IV/1979. Of these three, the United States sustained the sharpest decline in real economic activity with a 3.5 percentage-point decline in the growth rate of output compared to the preceding three-year period. The downturn in real economic growth is even more pervasive during IV/1979-IV/1980; all countries except Japan registered a negative growth in real GNP. Moreover, the data in chart 3, since they are calculated for four-quarter periods, reduce the large fluctuations that actually took place in each country. For example, from I/1980

to II/1980, real GNP decreased at rates of 4.3 percent in Canada, 7.5 percent in Germany, 9.8 percent in the United Kingdom and 9.9 percent in the United States. In each case, these one-quarter rates of change were some of the largest declines in output growth in the post-war period.

Japan apparently has maintained much of its growth during the recent period. The most recent growth rate of 4.8 percent reflects only a slight decline from the previous 6.1 percent rate. Looking at the one-quarter growth rates, however, reveals a substantial slowing in Japan's real economic activity, much like the other countries: from I/1980 to II/1980, Japan's real output increased at only a 2.5 percent rate, down sharply from the previous quarter's expansion rate of 7.6 percent. Thus, Japan also has experienced a marked slow-down in its rate of output growth following the recent surge in energy prices and reduced money growth.



**Table 1**  
**Unemployment Rates**

	1975	1976	1977	1978	1979	1980
Canada	6.9%	7.1%	8.1%	8.4%	7.5%	7.5%
Germany	4.7	4.6	4.6	4.3	3.8	3.8
Japan	1.9	2.0	2.0	2.2	2.1	2.0
United Kingdom	3.9	5.3	5.8	5.8	5.4	6.8
United States	8.5	7.7	7.1	6.0	5.8	7.1

Source: OECD.

### Industrial Production

The slowing in economic activity also is evidenced in industrial production growth (chart 4). Again, with the exception of Japan, the growth of industrial production (a measure of the output in the manufacturing, mining and utility sectors) has turned negative during the past year. The largest decline occurred in the United Kingdom with an 11.4 percent decrease in 1980.

Examining the quarterly growth rates reveals that each country experienced the largest decline in industrial production growth during the first few quarters of 1980: industrial production decreased, on average, at about a 10 percent rate from I/1980 to II/1980.<sup>8</sup> Similarly, Japan's industrial production decreased at about a 9 percent rate from II/1980 to III/1980. The interesting feature of these figures is the coincidence among countries of the decline in industrial production, which suggests that the energy price shock, combined with similar monetary policies, have had similar impacts.

### Employment

The unemployment rate typically declines during the expansion phase of the business cycle and increases during economic contractions, generally following economic activity with a short lag. The recent declines in the production of goods and services indicated in charts 3 and 4 suggest that unemployment has increased in these countries.

The association of output growth and unemployment is illustrated by the United States' experience

since 1975 (table 1). The unemployment rate, at 8.5 percent in 1975, declined throughout the next five years to a level of 5.8 percent in 1979, then jumped to over 7 percent in 1980. Similarly, the jobless rate in the United Kingdom increased from 5.4 percent in 1979 to 6.3 percent in 1980, a period of economic contraction.

The unemployment rates in the other countries have remained relatively stable during the past few years. In Japan, for example, the unemployment rate remained near 2.0 percent throughout 1975-80. In Germany, on the other hand, the reported unemployment rate actually has declined during this period.

The differences in labor market response to a downturn in economic activity can be explained by different institutional factors among the countries. Figures on German unemployment data, for example, do not include "guest workers" (temporary foreign workers). The impact of this group on the reported statistics is shown in the unemployment rate for 1977 that includes the approximately 440,000 guest workers who emigrated from Germany: 6.4 percent.<sup>9</sup> This figure is significantly larger than the 4.6 percent reported in table 1, an indication of the difficulties that inter-country differences in data reporting cause in measuring the actual rise in unemployment accompanying a decline in economic activity.

### INFLATION

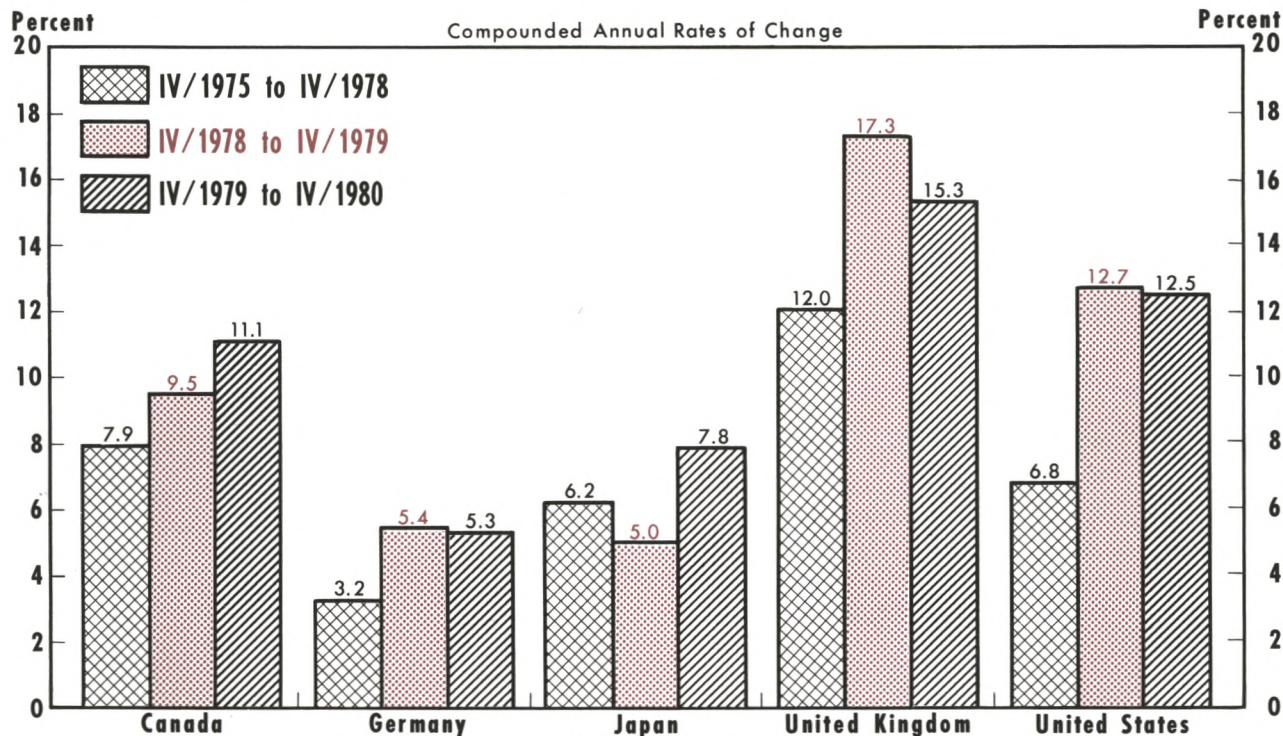
A *sustained* increase in the general level of prices is determined primarily by previous money growth over an extended period of time. Short-term deviations of

<sup>8</sup>The figures for each country are: Canada -10.2 percent; Germany, -9.0 percent; Japan, 0.6 percent; United Kingdom, -11.8 percent; and the United States, -19.2 percent.

<sup>9</sup>*The Effect of OPEC Oil Pricing on Output, Prices and Exchange Rates in the United States and Other Industrialized Countries*, Congressional Budget Office (February 1981), p. 61.



Chart 5  
Consumer Prices



Sources: International Monetary Fund, *International Financial Statistics*; Bank of Japan, *Economic Statistics Monthly*; Department of Labor, Bureau of Labor Statistics

changes in the price level from this underlying, or monetary, rate of inflation occur for a variety of reasons. One example is the sharp increase in the price of energy relative to other goods caused by OPEC actions.<sup>10</sup> Thus, the energy price increases during 1973-74 and 1979-80 precipitated declining real economic output *and* increases in the price level.<sup>11</sup>

As illustrated in chart 5, with the exception of the United Kingdom, consumer prices increased at relatively moderate rates from IV/1975 to IV/1978. With the exception of Germany and Japan, the inflation rates have reached double-digit levels over the IV/1978-IV/1980 period following the recent oil price shock.<sup>12</sup>

<sup>10</sup>For a discussion of the theory underlying this proposition and its application to the 1971-1976 period in the United States, see Denis S. Karnosky, "The Link Between Money and Prices - 1971-1976," this *Review* (June 1976), pp. 17-23.

<sup>11</sup>Empirical evidence supporting this claim is presented in Tatom, "Energy Prices and Short-Run Economic Performance."

<sup>12</sup>The recent increase in the inflation rate in the face of declining economic activity is a phenomenon similar to that of the last downturn. For a discussion of this period, see

Changes in the rate of inflation across the countries examined in chart 5 imply certain changes in foreign exchange markets. Exchange rate movements result from changes in the relative prices of foreign and domestic goods. If, for example, foreign goods become less costly relative to domestic goods (i.e., the foreign inflation rate is less than the domestic rate), the demand for foreign goods and, hence, foreign money rises. Consequently, the international value of the domestic currency falls with respect to the foreign currency.

This relationship between relative price movements and exchange rate movements is verified by foreign exchange market developments in the 1979-80 period. As an example, the difference between the inflation rates in the United States and Canada in 1979 was about 3 percentage points (12.7 percent minus 9.5 percent). In 1980, however, this difference fell to about 1.5 percentage points. As the foregoing discussion suggests, the U.S. dollar appreciated (increased

Donald S. Kemp, "Economic Activity in Ten Major Industrial Countries: Late 1973 through Mid-1976," this *Review* (October 1976), pp. 8-15.



in value) with respect to the Canadian dollar. Calculating the inflation differentials from the data in chart 5, we find that the relative rate of inflation declined when compared to Germany and Japan in the 1979-80 period. In contrast, inflation increased in the United States compared to the United Kingdom over the period. With the exception of Japan, the relationship described above is supported: the U.S. dollar appreciated against the German deutschemark and depreciated against the English pound during the 1979-80 period.

## CONCLUSION

Recent actions taken by OPEC have increased sharply the relative price of energy in the five industrial countries examined in this article. Monetary growth followed a generally restrictive pattern in 1979-80, similar to that in 1973-74. As a consequence of both OPEC actions and reduced money growth, the economies of Canada, Germany, Japan, the United Kingdom and the United States have been burdened with declines in real GNP and rising rates of inflation

during the past two years. In Canada, the United Kingdom and the United States, unemployment rates have remained abnormally high or have increased in recent years.

Periods of declining economic activity and rising prices create problems in selecting the appropriate monetary policy response. A sharp, prolonged decrease in money growth intended to inhibit upward pressure on prices due to rising energy prices will aggravate the decline in real economic activity. On the other hand, an increase in money growth intended to offset the decline in real GNP will contribute to even greater future inflation. One recent study indicates that, with no change in money growth, rising energy prices will affect the rate of inflation only temporarily. Moreover, increasing the rate of growth of money only temporarily reduces the increased unemployment that accompanies the slowdown.<sup>13</sup> This suggests that stable money growth may well be the correct response to such supply shocks.

<sup>13</sup>Tatom, "Energy Prices and Short-Run Economic Performance."





# Recent Revisions of GNP

KEITH M. CARLSON

**G**ROSS national product (GNP) is the market value of goods and services produced by labor and property supplied by residents of a country before the deduction of depreciation charges for capital goods. This measure is widely accepted as the most comprehensive measure of national economic activity. Its use is no longer restricted to economists; noneconomist professionals and laymen now rely on this measure in the planning and coordination of a variety of activities. The availability of estimates is taken for granted; the reliability and accuracy of these estimates are seldom questioned.

The task of preparing and distributing estimates of GNP rests with the Bureau of Economic Analysis (BEA) for the U.S. Department of Commerce. Although much work was done during the 1930s and early 1940s in developing estimates of national economic activity, it was not until 1947 that the Department of Commerce started regularly publishing national income and product statistics within the framework of a comprehensive national economic accounting system. These statistics have since been published in the Department of Commerce's monthly publication, *Survey of Current Business*.

Since the publication of the 1947 *National Income Supplement*, the Department of Commerce has published seven comprehensive revisions of the national income and product accounts. The main purpose of these revisions is to make use of new source data; however, from time to time, the department develops new estimating procedures and makes definitional and conceptual changes. The latest of these revisions was published in December 1980.<sup>1</sup>

This article focuses on the nature of the most recent revisions on GNP estimates and their implications in interpreting and analyzing economic trends.

<sup>1</sup>For a full discussion of the revision, see "The National Income and Product Accounts of the United States: An Introduction to the Revised Estimates for 1929-80," *Survey of Current Business* (December 1980), pp. 1-26.

## BASIS FOR RECENT REVISIONS

The recent revisions apply primarily to estimates since 1968. New information from the 1972 input-output tables, the 1977 economic censuses (mining, manufacturing, wholesale and retail trade, construction, transportation, selected services and governments) and the 1973 and 1976 Taxpayer Compliance Measurement Program provide the basis for the bulk of the changes.<sup>2</sup> The most important conceptual change involves the redefinition of GNP to include reinvested earnings of incorporated foreign affiliates of U.S. direct investors and eliminate those of incorporated U.S. affiliates of foreign direct investors.<sup>3</sup> Reinvested earnings are the difference between an affiliate's after-tax earnings and dividends paid to stockholders.

### *Summary of GNP Revisions*

Table 1 compares the previous and revised estimates of GNP for 1979, the year in which the revision was the largest. Each side of the table represents an alternative but equivalent method of calculating the value of GNP. The left-hand side of the table shows GNP in terms of the costs incurred and the profits earned in its production. These are charges against GNP, which consist of factor charges, that is, the incomes of factors of production (labor and property), and nonfactor charges, which include indirect

<sup>2</sup>The input-output tables summarize inter-industry flows of production, showing how much of each industry's output is sold to every other industry and to final buyers, and how much of each industry's inputs are bought from each other industry and from the factors of production.

The Taxpayer Compliance Measurement Program is conducted by the Internal Revenue Service and is based on a sample of individual income tax returns for the purpose of obtaining data on the nature and extent of compliance with the Internal Revenue laws.

<sup>3</sup>U.S. (foreign) direct investors are U.S. (foreign) residents who own or control 10 percent or more of the voting securities of an incorporated foreign (U.S.) business enterprise or an equivalent interest in an unincorporated foreign (U.S.) business enterprise.



**Table 1**  
**1979 GNP (in billions of current dollars)**

Income Approach	Previous	Change	Revised	Expenditure Approach	Previous	Change	Revised
National income	\$1,924.8	\$38.5	\$1,963.3	Personal consumption expenditures	\$1,509.8	\$ 1.1	\$1,510.9
Compensation of employees	1,459.2	1.7	1,460.9	Plus: Gross private domestic investment	387.2	28.6	415.8
Proprietors' income with inventory valuation and capital consumption adjustments	130.8	0.8	131.6	Plus: Net exports of goods and services	-4.6	18.0	13.4
Rental income of persons with capital consumption adjustment	26.9	3.6	30.5	Exports	257.5	23.9	281.3
Corporate profits with inventory valuation and capital consumption adjustment	178.2	18.7	196.8	Imports	262.1	5.9	267.9
Net interest	129.7	13.7	143.4	Plus: Government purchases of goods and services	476.4	-2.7	473.8
Plus: Indirect business tax and nontax liability	189.5	-1.1	188.4				
Business transfer payments	10.2	-0.7	9.4				
Statistical discrepancy	3.7	-1.5	2.2				
Less: Subsidies less current surplus of government enterprises	2.3	0.7	3.1				
Plus: Capital consumption allowances with capital consumption adjustment	243.0	10.7	253.6				
Equals: Charges against gross national product	2,368.8	45.1	2,413.9	Equals: Gross national product	2,368.8	45.1	2,413.9

business taxes and capital consumption allowances (depreciation).

The right-hand side of table 1 gives GNP in terms of expenditures according to four major market categories: (1) personal consumption expenditures, (2) gross private domestic investment, (3) net exports of goods and services, and (4) government purchases of goods and services. These categories conform to the operational definition of final products as those purchases not resold during the accounting period.

The comparison of previous and revised estimates reflects all statistical and definitional factors under-

lying the revisions. These revisions represent, in total, 1.9 percent of the previous GNP estimate for 1979. On the income side, the largest changes resulted from revisions in corporate profits, net interest and capital consumption allowances. On the expenditure side, the major changes were in gross private domestic investment and net exports of goods and services.

### *Redefining GNP: The Conceptual Change*

The major conceptual change in the recent revision is the treatment of reinvested earnings of incorporated foreign and U.S. affiliates of direct investors in the estimation of GNP. Since GNP can be derived in two



ways (see table 1), the conceptual change must show up in both methods of GNP calculation.

Prior to the revision, the net inflow of reinvested earnings of foreign and U.S. affiliates of direct investors was *not* included in the measure of corporate profits. Since GNP, as measured by the income method, is the sum of all income earned by labor and property of U.S. residents, including that from foreign ventures, the exclusion of these reinvested earnings was inconsistent.<sup>4</sup> The magnitude of this inconsistency, however, was small until recently. Including these earnings in the estimate of GNP requires calculating the difference between reinvested earnings of incorporated foreign affiliates of U.S. investors and reinvested earnings of incorporated U.S. affiliates of foreign investors. Because these reinvested earnings are much larger for U.S. investors than for foreign investors, the effect of the change is to increase the measure of U.S. GNP, especially in recent years. This effect was estimated at \$15.1 billion in 1979.

On the income side, corporate profits were increased, representing an increase in income originating in foreign countries but accruing to domestic residents; this magnitude is well in excess of the income originating domestically but accruing to foreign residents. The effect of this conceptual redefinition accounts for 33 percent of the revised increase in GNP in 1979.

On the expenditure side of table 1, the effect of the redefinition is reflected in net exports. Reinvested earnings of an affiliate of a U.S. investor is an export of the service of capital; that of an affiliate of a foreign investor is an import of the service of foreign capital. With exports of capital services exceeding imports, the basis is provided for an upward revision of GNP as measured by expenditure for final product.

### **Other Sources of Revision: Statistical Changes**

The definitional change accounted for 33 percent of the revision in 1979 GNP; the remaining 67 percent was attributable to statistical considerations. These statistical revisions reflected: (1) new and revised data from regularly used sources that become available every few years (called benchmark revisions), (2) new and revised data from regularly used sources that become available annually, (3) data from sources previously not available, (4) new estimating techniques, and (5) new classifications. Only the largest of these statistical changes are highlighted here.<sup>5</sup>

*Income side* As indicated in table 1, the largest changes on the income side were for corporate profits, net interest and capital consumption allowances. Since \$15.1 billion of the \$18.7 billion revision in corporate profits was attributable to the inclusion of reinvested earnings, the effect of statistical revisions on corporate profits was quite small.

The other substantially revised component of national income was net interest. The revision resulted from a BEA study of corporate income tax returns, which indicated that interest receipts were a smaller proportion of business receipts of corporate credit agencies other than banks and savings and loan associations (for example, credit unions, credit card companies, finance companies) than previously estimated. As a result, the reduction in interest receipts received by businesses increased the amount of net interest received by households.

The final component of GNP from the income side that was affected substantially by the revision was the capital consumption allowance (depreciation). This nonfactor charge against GNP was revised upward by almost \$11 billion in 1979 to reflect faster growth in the gross capital stock than originally estimated (see revision of gross private domestic investment below). In addition, there were a number of small changes involving reestimates of corporate profits and proprietors' incomes.

*Expenditure side* Aside from the revision of net exports of goods and services, the only other substantially revised component of final expenditure was gross private domestic investment. The revision was quite large, amounting to \$28.6 billion in 1979.

Most of this revision stemmed from the use of data received from new benchmark sources, primarily the 1972 input-output tables, as well as preliminary estimates for the 1977 input-output tables, and the 1977 economic censuses. As a result of these new sources and regular sources made available on an annual basis, revisions in estimates of producers' durable equipment accounted for \$21.2 billion of the total upward revision in gross private domestic investment.

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<sup>4</sup>This conceptual change puts the national income accounts on the same basis as the balance of payments accounts. Reinvested earnings were introduced into the balance of payments accounts in 1978. See *Survey of Current Business*, Part II (June 1978), p. 7.

<sup>5</sup>For a complete discussion of these statistical revisions, see *Survey of Current Business* (December 1980).



Table 2

## GNP (in billions of current and 1972 dollars) and GNP Deflator

	GNP IN CURRENT DOLLARS				GNP IN 1972 DOLLARS				GNP DEFLATOR			
	Previous		Revised		Previous		Revised		Previous		Revised	
	Level	Change	Level	Change	Level	Change	Level	Change	Level	Change	Level	Change
1960	\$ 506.0	4.0%	\$ 506.5	3.8%	\$ 736.8	2.3%	\$ 737.1	2.2%	68.7	1.7%	68.7	1.6%
1961	523.3	3.4	524.6	3.6	755.3	2.5	756.6	2.6	69.3	0.9	69.3	0.9
1962	563.8	7.7	565.0	7.7	799.1	5.8	800.3	5.8	70.6	1.8	70.6	1.8
1963	594.7	5.5	596.7	5.6	830.7	4.0	832.5	4.0	71.6	1.5	71.7	1.5
1964	635.7	6.9	637.7	6.9	874.4	5.3	876.4	5.3	72.7	1.6	72.8	1.5
1965	688.1	8.2	691.1	8.4	925.9	5.9	929.3	6.0	74.3	2.2	74.4	2.2
1966	753.0	9.4	756.0	9.4	981.0	6.0	984.8	6.0	76.8	3.3	76.8	3.2
1967	796.3	5.8	799.6	5.8	1,007.7	2.7	1,011.4	2.7	79.0	2.9	79.1	3.0
1968	868.5	9.1	873.4	9.2	1,051.8	4.4	1,058.1	4.6	82.6	4.5	82.5	4.4
1969	935.5	7.7	944.0	8.1	1,078.8	2.6	1,087.6	2.8	86.7	5.0	86.8	5.1
1970	982.4	5.0	992.7	5.2	1,075.3	-0.3	1,085.6	-0.2	91.4	5.4	91.5	5.4
1971	1,063.4	8.2	1,077.6	8.6	1,107.5	3.0	1,122.4	3.4	96.0	5.1	96.0	5.0
1972	1,171.1	10.1	1,185.9	10.1	1,171.1	5.7	1,185.9	5.7	100.0	4.1	100.0	4.2
1973	1,306.6	11.6	1,326.4	11.8	1,235.0	5.5	1,255.0	5.8	105.8	5.8	105.7	5.7
1974	1,412.9	8.1	1,434.2	8.1	1,217.8	-1.4	1,248.0	-0.6	116.0	9.7	114.9	8.7
1975	1,528.8	8.2	1,549.2	8.0	1,202.3	-1.3	1,233.9	-1.1	127.2	9.6	125.6	9.3
1976	1,702.2	11.3	1,718.0	10.9	1,273.0	5.9	1,300.4	5.4	133.7	5.2	132.1	5.2
1977	1,899.5	11.6	1,918.0	11.6	1,340.5	5.3	1,371.7	5.5	141.7	6.0	139.8	5.8
1978	2,127.6	12.0	2,156.1	12.4	1,399.2	4.4	1,436.9	4.8	152.1	7.3	150.1	7.3
1979	2,368.8	11.3	2,413.9	12.0	1,431.6	2.3	1,483.1	3.2	165.5	8.8	162.8	8.5
1959-64		5.5%		5.5%		4.0%		4.0%		1.5%		1.5%
1964-69		8.0		8.2		4.3		4.4		3.6		3.6
1969-74		8.6		8.7		2.5		2.8		6.0		5.8
1974-79		10.9		11.0		3.3		3.5		7.4		7.2

### ANALYTICAL IMPACT OF RECENT REVISIONS

When economic data are revised, a question naturally arises whether the previous interpretation of past events should be changed significantly. If so, a reassessment of the role of public policy may be required. Since the most recent GNP revision involves a redefinition of GNP as well, the continued use of that measure for analytical purposes also requires examination.

#### *Interpretation of Recent Trends*

Table 2 shows the previous and revised estimates of GNP, real GNP and the implicit GNP deflator.<sup>6</sup>

Although the differences appear to be substantial for 1969 through 1979, the rates of change for these three key variables are only negligibly affected by the revisions. Since it is rates of change that provide the basis for interpreting the direction and magnitude of movement of the economy, the revisions do not appear to have significantly affected previous interpretation of economic events. Although small on a year-to-year basis, the revisions do accumulate over time. For example, GNP in 1972 dollars advanced at a 3.5 percent average rate from 1974 to 1979, compared with a pre-

<sup>6</sup>Tables 2 and 3 show the revisions back through 1960. All of the major GNP series were revised back through 1929. Prior to 1960, annual revisions were of a magnitude of 0.5 percent or less.



**Table 3**  
**GNP and GDP (in billions of current and 1972 dollars) and Implicit Price Deflator**

	CURRENT DOLLARS				1972 DOLLARS				IMPLICIT PRICE DEFLATOR			
	GNP		GDP		GNP		GDP		GNP		GDP	
	Level	Change	Level	Change	Level	Change	Level	Change	Level	Change	Level	Change
1960	\$ 506.5	3.8%	\$ 502.9	3.8%	\$ 737.1	2.1%	\$ 731.8	2.1%	68.7	1.6%	68.7	1.6%
1961	524.6	3.6	520.7	3.5	756.6	2.6	751.0	2.6	69.3	0.9	69.3	0.9
1962	565.0	7.7	560.5	7.6	800.3	5.8	793.8	5.7	70.6	1.9	70.6	1.9
1963	596.7	5.6	591.8	5.6	832.5	4.0	825.6	4.0	71.7	1.6	71.7	1.6
1964	637.7	6.9	632.3	6.8	876.4	5.3	868.9	5.2	72.8	1.5	72.8	1.5
1965	691.1	8.4	685.2	8.4	929.3	6.0	921.4	6.0	74.4	2.2	74.4	2.2
1966	756.0	9.4	750.3	9.5	984.8	6.0	977.5	6.1	76.8	3.2	76.8	3.2
1967	799.6	5.8	793.7	5.8	1,011.4	2.7	1,003.9	2.7	79.1	3.0	79.1	3.0
1968	873.4	9.2	866.7	9.2	1,058.1	4.6	1,050.0	4.6	82.5	4.3	82.5	4.3
1969	944.0	8.1	937.1	8.1	1,087.6	2.8	1,079.7	2.8	86.8	5.2	86.8	5.2
1970	992.7	5.2	985.4	5.2	1,085.6	-0.2	1,077.6	-0.2	91.5	5.4	91.4	5.4
1971	1,077.6	8.6	1,068.5	8.4	1,122.4	3.4	1,112.9	3.3	96.0	4.9	96.0	4.9
1972	1,185.9	10.1	1,175.0	10.0	1,185.9	5.7	1,175.0	5.6	100.0	4.2	100.0	4.2
1973	1,326.4	11.8	1,310.4	11.5	1,255.0	5.8	1,239.9	5.5	105.7	5.7	105.7	5.7
1974	1,434.2	8.1	1,414.4	7.9	1,248.0	-0.6	1,230.7	-0.7	114.9	8.7	114.9	8.7
1975	1,549.2	8.0	1,531.9	8.3	1,233.9	-1.1	1,220.0	-0.9	125.6	9.3	125.6	9.3
1976	1,718.0	10.9	1,697.5	10.8	1,300.4	5.4	1,284.8	5.3	132.1	5.2	132.1	5.2
1977	1,918.0	11.6	1,894.5	11.6	1,371.7	5.5	1,354.7	5.4	139.8	5.8	139.8	5.8
1978	2,156.1	12.4	2,126.2	12.2	1,436.9	4.8	1,416.8	4.6	150.1	7.4	150.1	7.4
1979	2,413.9	12.0	2,370.1	11.5	1,483.1	3.2	1,455.9	2.8	162.8	8.5	162.8	8.5
1959-64		5.5%		5.5%		4.0%		3.9%		1.5%		1.5%
1964-69		8.2		8.2		4.4		4.4		3.6		3.6
1969-74		8.7		8.6		2.8		2.7		5.8		5.8
1974-79		11.0		10.9		3.5		3.4		7.2		7.2

vious estimate of 3.3 percent. The rise in the GNP deflator during this period is now estimated at a 7.2 percent average rate, compared with the previous estimate of 7.4 percent.

Probably the most important revisions from the standpoint of implications for public policy involve investment and saving. Estimates of both were raised sufficiently to raise the ratio of each relative to GNP in recent years. For example, the ratio of nonresidential fixed investment to GNP in 1979, originally estimated at 10.8 percent, was revised to 11.6 percent. Previous conclusions about the severity of the nation's capital formation problem will require renewed study in light of these revisions.

### *Analysis of Economic Relationships*

GNP is defined as income earned by the labor and property of U.S. residents. As such, it includes a considerable and growing portion that originates in the rest of the world. How good, then, is it as a measure of U.S. economic activity? An alternative measure of U.S. economic activity is gross domestic product (GDP). GDP is defined as the value of production attributable to factors of production actually located in a given country regardless of their ownership; that is, GDP equals GNP minus the product of U.S. residents originating in the rest of the world. Incorporating reinvested foreign earnings into estimates of GNP thus widened the difference between GNP and GDP.



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The nation's primary economic goals are stated in terms of employment, price stability and economic growth. Since GNP is a measure of *all* income earned by U.S. residents, it is a better measure of the nation's welfare than GDP. GDP, however, can be thought of as a measure of the economic performance of the U.S. economy because it focuses attention on the *origin* of income and product, rather than ownership. Consequently, the difference between GNP and GDP provides one indication of the contribution of international investment to the general welfare of the U.S. residents. Moreover, certain economic analyses might be more appropriately conducted using GDP instead of GNP, simply because income originating abroad is not directly relevant to some issues. For example, studies of the productivity problem are best done with GDP; similarly, analysis of the impact of mone-

tary and fiscal policy would seem more relevant in terms of GDP than GNP.

Table 3 compares the rates of change for GNP and GDP in both current and constant dollars and for their respective implicit price deflators. As shown in this table, the two deflator measures are identical from 1960 to 1979. The current and constant dollar measures occasionally deviate by more than 0.1 percent after 1962, but their growth rates move consistently in the same direction.

The rates of change shown in table 3 do not provide clear support for switching analytical emphasis from GNP to GDP. However, the growing wedge between GNP and GDP suggests, at least, that GDP should be watched *along with* GNP in assessing economic developments.