Leaning Against the Seasonal Wind: Is There a Case for Seasonal Smoothing of Interest Rates?

by Satyajit Chatterjee
WHAT CAUSES INFLATION?
Laurence Ball
As suggested in this article, inflation is like the weather: everyone complains about it, but no one does anything about it. And, like the weather, inflation affects almost everybody. Some favorite candidates for the causes of inflation include OPEC, excessive government spending, and the climbing costs of medical care. What does cause inflation, and can it be eliminated? In answer to these questions, Larry Ball tells us, "There's good news and bad news."

LEANING AGAINST THE SEASONAL WIND: IS THERE A CASE FOR SEASONAL SMOOTHING OF INTEREST RATES?
Satyajit Chatterjee
Financial and banking panics occurred regularly in the United States in the 19th and early 20th centuries, triggered by a seasonal increase in the demand for money and short-term interest rates. The Federal Reserve System was established, in part, to insulate the financial system from such panics. But the introduction of federal deposit insurance in 1933 greatly lessened the need for a seasonal monetary policy to fight panics. Consequently, the primary effect of such a policy is to smooth the seasonal path of short-term interest rates, which leads Satyajit Chatterjee to pose the question: Is there a case for seasonal smoothing of interest rates?
Inflation is universally unpopular; everyone from ordinary consumers to top government officials bemoans the perpetual process of rising prices. Frequently, discussions of inflation have an air of resignation. Inflation is like bad weather: we can complain about it, but it seems to be a fact of life. For most people, the causes of inflation are murky. Popular writers lay the blame on a variety of scapegoats: governments that spend too much money, the OPEC cartel, skyrocketing costs of medical care. What causes inflation, and is there any way to eliminate it?

Economists have both good news and bad news about inflation. The good news is that we know a lot about its causes and how it could be ended. The bad news—and the reason that inflation has not been ended—is that doing so could be costly. This article describes what economists understand about inflation and what issues remain mysterious. There is a clear consensus about the long-run causes of inflation—the determinants of average inflation over a decade or more. The short-run

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behavior of inflation—the ups and downs from year to year—is only partly understood.

INFLATION IN THE LONG RUN

The year-to-year movements in inflation that make newspaper headlines are small compared with the differences in inflation across different eras or different countries. In the United States, inflation as measured by the gross-national-product deflator averaged 7.4 percent per year from 1970 through 1979, but only 2.4 percent from 1950 through 1959. From 1930 through 1939, inflation averaged -1.7 percent per year—the price level was lower at the end of the decade than at the beginning. And these differences across periods in the United States, while substantial, are dwarfed by differences across countries. From the 1950s to the mid-1980s, inflation averaged 4.2 percent per year in the United States, only 2.7 percent in Switzerland, but 8.0 percent in Italy, 21.2 percent in Israel, and 54.4 percent in Argentina (see Ball, Mankiw, and Romer, 1988). What causes these differences in inflation over long periods?

The Culprit: Too Rapid Money Growth.

While economists disagree about many issues, there is near unanimity about this one: continuing inflation occurs when the rate of growth of the money supply consistently exceeds the growth rate of output. In the long run, as Milton Friedman puts it, “inflation is always and everywhere a monetary phenomenon.” When the money supply grows much more quickly than output of goods and services, inflation is high; when it grows only slightly faster than output, inflation is low; and when it consistently decreases relative to output there is deflation: the price level falls. (The most recent example of deflation in the United States is the early 1930s.)

Why does too rapid growth in the money supply cause inflation? To see the answer, consider how the economy responds when the money supply rises. According to mainstream economics, firms do not immediately adjust their prices in response to an increase in the money supply. Because prices do not respond immediately, there is an increase in the real money supply—the money supply relative to the price level. The increase in the real supply of money pushes down the price of money—that is, the interest rate. Over time, lower interest rates stimulate borrowing and spending by firms and consumers, and the economy expands. The story ends when firms react to the booming economy and their strained capacity by raising prices. Prices rise until they match the increase in the money supply, pushing the real money supply back to its original level and choking off the boom. That is, the long-run effect of a 10 percent increase in the money supply relative to output is a 10 percent increase in the price level and no change in the ratio of money to prices. It follows that if the money supply increases 10 percent faster than output every year, prices must eventually rise 10 percent per year. The gap between the average rate of money growth and the average growth rate of output determines average inflation.

To be complete, inflation depends on the growth rate of the “velocity” of money—the frequency with which money is turned over—as well as on the gap between the average growth rates of money and output. For the United States, the average growth rate of velocity (for the M2 measure of money) has been zero over the past 40 years. In practice, then, money growth of 2 or 3 percent per year is consistent with stable prices. This rate of money growth matches the natural growth of output and spending.
In principle, differences in inflation across countries or time periods could be explained by differences in either money growth or output growth, since the gap between the two determines inflation. In practice, however, the most important factor is money growth, which varies widely, with levels near zero in some countries and over 100 percent per year in others. Variation in output growth is smaller and thus is a secondary factor in explaining differences in the gap between money growth and output growth. As a first approximation, then, differences in inflation across time periods or countries can be explained by differences in money growth.

To provide evidence for this point, Figure 1 plots average inflation and money growth in the United States for various decades. Figure 2 presents average inflation and money growth from 1986-89 for a number of countries. In Figure 1, the decades with the highest inflation, such as the 1910s and the 1970s, are those with the highest money growth. Similarly, Figure 2 shows a close relationship between inflation and money growth across countries. Countries such as Switzerland and France produce low inflation through low money growth; countries such as Turkey and Mexico produce high inflation.

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4The data for Figures 1 and 2 are taken from Friedman and Schwartz (1982) and Abel and Bernanke (1992), respectively.
through high money growth. Along with the theoretical arguments discussed above, this evidence has convinced economists that trend or average inflation is determined by money growth.

**Why Is Money Growth Excessive?** The question of what causes inflation has, at one level, an easy answer: money growth. This answer, however, raises another, deeper question: why do policymakers allow the money supply to grow quickly? The Federal Reserve and corresponding monetary authorities in other countries possess effective techniques for controlling the average growth rate of the money supply. Policymakers could slow average money growth enough to keep the average inflation rate at zero (although shocks to the economy would cause temporary movements above and below zero). Since both the public and the Federal Reserve dislike inflation, why isn’t it eliminated?

The answer to this question is different in different types of economies. In some countries, the answer is simple: the government prints money at a rapid rate to finance budget deficits. This explains most episodes of very high inflation—the annual inflation of several hundred percent or more that has afflicted South American countries and Israel within the past decade. These countries have had high levels of government spending and have been unable politically to match this spending with tax revenues; thus they have financed their spending by creating new money. Predictably, rapid money creation has produced high inflation. Inflation has been brought under control only when the underlying budget deficit was reduced. (In Israel, for example, such a stabilization occurred in 1985.)

Budget deficits are not, however, the basic source of inflation in the United States or in most European economies. The U.S. government has, of course, run large deficits over the past decade. But these deficits have been financed primarily by borrowing, not by printing money. That is, the government covers its deficit mostly by issuing bonds. The Federal Reserve contributes to government revenue by creating new money, but this “seignorage” is small: less than 1 percent of total revenue. In countries like the United States, policymakers would gladly eliminate inflation through lower money growth if the only cost were a small revenue loss. The deterrent to lowering inflation must arise from a different source.

The reason U.S. policymakers are reluctant to push inflation to zero is that doing so is likely to cause a recession, or at least slower economic growth. This fear is supported by both macroeconomic theory and historical experience. Slower money growth reduces inflation in the long run, but there is a lag, as discussed earlier. When money growth falls, firms initially continue to raise prices at the rate to which they are accustomed. With money growing more slowly than prices, the real money supply falls, causing a recession. Only the experience of the recession causes inflation to fall.

This theoretical story fits much of the U.S. experience. One cause of the recession that began in 1990 was, arguably, the Fed’s efforts to reduce inflation in the late 1980s. More clearly, disinflation was a major cause of the recession of 1981-82—the worst recession since the 1930s. Paul Volcker, the chairman of the Federal Reserve from 1979 to 1986, moved decisively to eliminate the double-digit inflation of the late 1970s. He succeeded, but at a price: inflation fell from 10.1 percent in 1980 to 4.0 percent in 1983, but unemployment rose from 5.8 percent in 1979 to 9.5 percent in both 1982 and 1983. Research by economic historians has shown that this experience is part of a regular pattern:

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5Specifically, the Fed manipulates the supply of money through “open market operations”—purchases and sales of government bonds. Buying bonds with money adds to the economy’s money stock, and selling bonds drains money out of the economy.
when the Fed slows money growth substantially to reduce inflation, a recession occurs almost invariably.\(^6\)

While some policymakers are willing to pay this price to reduce inflation, others are not. And the Fed’s eagerness to fight inflation appears to depend on the severity of the inflation problem. Volcker was sufficiently concerned about double-digit inflation to implement the monetary tightening needed to reduce inflation. But inflation of around four percent, the level through much of the 1980s, did not create enough distress to prompt a further tightening. Thus inflation continued. (For more on this subject, the reader is referred to “What Are the Costs of Disinflation?” by Dean Croushore, in the May/June 1992 issue of this Business Review.)

**SHORT-RUN FLUCTUATIONS IN INFLATION**

Although money growth determines average inflation in the long run, the short-run behavior of inflation is more complicated. Inflation fluctuates around its long-term trend from year to year; for example, annual inflation rates in the second half of the 1980s varied around their average of 3.6 percent, with annual rates from 1985 to 1989 of 3.6, 2.5, 3.3, 4.3, and 4.2 percent. Short-term fluctuations in inflation were larger in the 1970s: the annual rates from 1970 to 1974 were 4.7, 5.6, 5.0, 7.6, and 9.6 percent. One source of these inflation movements is temporary fluctuations in the growth of the money supply. In contrast to the long run, however, too rapid money growth is not the only, or even the primary, determinant of inflation. Figure 3 plots inflation against money growth for each year during

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6Romer and Romer (1989) identify six episodes since World War II in which the Fed sharply tightened policy to reduce inflation. In each case, a recession occurred within two or three years.
the 1970s and 1980s. Clearly, annual inflation can differ considerably from money growth. What causes this short-run divergence?

**Demand Shocks.** One source of short-run changes in inflation is shifts in aggregate demand—in desired spending by government, businesses, and consumers. Suppose that the government spends more to finance a war or businesses become more confident about the future and invest in factories and machines. As the demand for military hardware or for factories rises, the economy expands: firms increase production and hire more workers, cutting unemployment. But again, high output and low unemployment eventually spur faster increases in wages and prices: inflation rises. Similarly, a fall in aggregate demand causes a recession, leading firms to raise prices more slowly. The economy's short-run movements between booms and recessions produce fluctuations in inflation as well.

A good example of inflation arising from a shift in aggregate demand—a shift that was not initiated by monetary policy—is the increase in inflation in the late 1960s. Annual inflation varied from 0.8 percent to 2.3 percent over the period of 1960-64, but rose to 5.3 percent in 1969. The consensus explanation for this experience is increased government spending. As the Vietnam War escalated, the Johnson administration raised military spending while also continuing the social programs of the "Great Society." As a result, the federal budget deficit grew from $1.4 billion in fiscal year 1965 to $25.2 billion in 1968, and the economy overheated: unemployment fell, but inflation rose.

**Price Shocks.** Until the early 1970s, most economists believed that shifts in aggregate demand were the dominant source of short-run movements in inflation. This view had to be modified, however, after the experience of the 1970s, when price shocks—a.k.a. "supply shocks"—caused large increases in inflation. These shocks were sharp increases in the prices of particular goods, namely food and energy products, arising ultimately from poor weather and the emergence of the OPEC cartel. These shocks created "stagflation": inflation rose while unemployment rose and real output fell (in contrast to the experience of demand shocks, which push inflation and unemployment in opposite directions). From 1972 to 1974, annual inflation rose from 5.0 percent to 9.6 percent as a result of a rise in food prices and the first OPEC price increase. OPEC II raised inflation from 7.1 percent in 1977 to 10.1 percent in 1980. These increases dwarfed the fluctuations in inflation arising from the demand shocks of the previous 20 years. More recently, the spike in oil prices during the gulf crisis raised inflation in the second half of 1990.

Why do rises in food and energy prices create inflation? The reader will be forgiven for thinking that the answer is obvious: food and energy are a significant fraction of the economy, and rises in prices are the definition of inflation. Economists, however, believe that the issue is not so simple because of the distinction between the overall price level and relative prices.

In classical economic theory, the price level is determined by the money supply, as described above. Changes in supply and demand for various products arising from weather conditions, cartel decisions, and so on affect not the price level but relative prices: OPEC makes oil more expensive relative to other goods. Theoretically, this is accomplished partly by an increase in the absolute price of oil and partly by decreases in all other prices. With these price adjustments, oil can become relatively more expensive while the price level remains unchanged at the equilibrium level determined by the money supply. In practice, this is not what happens: OPEC in fact raised the average price level. But it is not obvious why this is so.7

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7Writing in 1975, Milton Friedman puts the point this way: "It is essential to distinguish changes in relative prices from changes in absolute prices. The special conditions that
This issue is the subject of recent research by me and Gregory Mankiw of Harvard University (Ball and Mankiw, 1992). Our explanation for the inflationary effects of price shocks rests on two ideas. First, there is some inertia in prices. Firms do not instantly adjust prices to every change in circumstances; instead, they adjust only if their desired price change is large enough to justify the costs of adjustment. For example, a mail-order company will print a new catalog to announce a 50 percent sale, but it is not worth the effort to announce a one-cent price change arising from a tiny change in costs; instead, the firm will simply keep its prices fixed. This behavior implies that large shocks have disproportionately large effects on prices: firms adjust to them quickly, while they make smaller adjustments more slowly.

The second key idea is that “price shocks” are episodes in which certain relative prices rise or fall by unusually large amounts. In the OPEC episodes, for example, some relative prices—those for oil-related products—rose 50 percent or more in response to the trebling of oil prices. By definition, other relative prices went down to balance these increases: if some prices are relatively higher, others must be relatively lower. It was not the case, however, that equilibrium prices of some nonoil products needed to fall by more than 50 percent. Instead, the relative price decreases were spread over all nonoil goods: a fraction of relative prices rose a large amount, balanced by smaller relative decreases in the majority of prices.

Combining this idea with the previous one—that large shocks have disproportionate effects—explains why OPEC was inflationary. The large relative shocks to oil-related prices triggered quick upward adjustments. For example, given the large increase in oil prices, gas stations would have suffered huge losses had they not quickly raised prices at the pump. In contrast, while prices of many other goods came under downward pressure, the required price decreases were small and hence occurred more slowly.

When consumers spent more money on oil, they had less available for toothbrushes, soft drinks, and all other nonoil goods, creating an incentive for the sellers of these products to reduce prices. But the desired decreases were only a few percentage points because OPEC did not cut heavily into toothbrush or soft drink demand. Thus firms were slow to adjust prices downward. In the short run, oil-related prices rose, and the offsetting decreases did not fully occur. Thus prices rose on average: there was inflation.

This theoretical story explains a large number of the rises and falls in inflation in the United States. The oil and food price episodes in the 1970s are examples. Another example is the large decrease in oil prices in 1985-86. Our theory predicts that inflation should fall in this episode because the decreases in oil prices occur more quickly than the smaller increases in other prices. And, indeed, inflation fell from 4.4 percent in 1984 to 2.5 percent in 1986.

Our theory also explains episodes before the famous supply shocks of the 1970s. For example, inflation rose above 10 percent in 1951, largely due to a demand shock: the Korean War. Inflation then plummeted to near zero in 1952, and the cause appears to be a price shock. Specifically, the prices of meat, rubber, vegetable oil, and several other products fell steeply. More generally, my research with Mankiw suggests that a combination of demand and price shocks explains most of the year-to-year fluctuations in U.S. inflation since 1950.

Although some relative price increases are inflationary according to our theory, others are
not. One example is the steady increase in the cost of medical care. These price increases probably have little to do with inflation, despite frequent claims to the contrary in popular discussions. A relative price increase affects inflation only if there is an unusually large shock during a particular year, so that the upward price adjustment occurs more quickly than the offsetting downward adjustments. Medical costs have risen faster than the overall price level for several decades, but the rise has been steady; there are no cases of 50 percent or 100 percent increases within a year, as in the case of oil. This smooth adjustment of relative prices could occur without inflation. If the Federal Reserve pursued noninflationary monetary policy, the average price level would remain steady, with rises in the price of medical care offset by price decreases in other industries.

FROM THE SHORT RUN
TO THE LONG RUN

According to the analysis so far, the average rate of inflation over a long period is determined by the amount that average growth of the money supply exceeds average output growth. Inflation fluctuates around its trend from year to year in response to various demand and price shocks. We have seen that these ideas explain much of the U.S. inflation experience, but they do not capture one aspect: the link between the short run and the long run.

Suppose that inflation is proceeding at the level determined by trend money and output growth and that oil prices rise sharply. The theories reviewed so far suggest that this price shock should raise inflation in the short run but that inflation should then return to its long-run trend if trend money growth is unchanged. In fact, shifts in inflation arising from demand or price shocks appear quite persistent. When government spending raised inflation in the late 1960s, and when OPEC raised inflation in the 1970s, there was little sign that inflation would naturally return to its previous level. Instead, inflation continued until the Federal Reserve became sufficiently concerned to tighten policy, producing a recession. (Such policy tightenings occurred in 1970 in response to the high inflation of the late 1960s and in 1974 and 1978-79 after the OPEC shocks. See Romer and Romer, 1989.) Absent a policy tightening and recession, inflation arising from price or demand shocks seems to continue indefinitely: short-run shifts in inflation have long-run effects on trend inflation. How can this evidence be squared with our earlier theories?

Recall the crucial fact that trend inflation is ultimately caused by faster growth in the money supply than in output. Logically, if shocks such as OPEC shift trend inflation, they must induce the Federal Reserve to raise trend money growth (until the point when policymakers decide that inflation is too high and accept the cost of disinflation). Why does a short-run spurt in inflation lead the Fed to raise the average level of money growth?

The usual answer to this question focuses on the behavior of inflationary expectations. In past experience, individuals have seen that increases or decreases in inflation usually persist for a substantial period. Thus, when they see a new rise in inflation (because of an OPEC shock, for example), they expect inflation to stay high. Crucially, this expectation is self-fulfilling: the expectation that inflation will stay high causes it to stay high. The reason expectations affect actual inflation is that they affect decisions about wage- and price-setting. If everyone expects a 10 percent rate of inflation to continue, workers will demand 10 percent wage increases to keep up. Firms will raise prices 10 percent to match the higher wages they pay and also the 10 percent increases they expect from their competitors. Thus inflation will continue at 10 percent, fulfilling expectations.

The Federal Reserve is not helpless in the face of this self-fulfilling inflationary spiral. The spiral can continue only as long as it is
“accommodated” by the Fed—as long as the Fed raises money growth as much as inflation has risen. However, a price shock such as that caused by OPEC is not only inflationary for the U.S., it also is contractionary. Because the higher price of imported oil leaves Americans with less of their incomes to spend on domestic goods and services, it causes output and employment to fall, at least temporarily. The Federal Reserve could bring inflation back down by slowing money growth. The result will be to reduce output further, causing a recession that eventually forces inflation down. Over substantial periods, however, such as the 1970s, the Fed has been unwilling to impose this cost on the economy. Thus, once a shock such as OPEC raises inflation, it can stay high for a long period before a Paul Volcker takes charge and disinflates. The price shock creates a vicious circle in which persistence in inflation creates the expectation of persistence, which in turn creates persistence.

While this story is widely accepted, it is not airtight. At an empirical level, it appears true that changes in inflation are expected to persist. Surveys of the expectations of forecasters and of ordinary citizens show that a rise in current inflation leads to higher forecasts of future inflation. At a deeper level, however, it is not clear why expectations behave that way. Since the expectation of persistence is self-fulfilling, it proves itself correct. But there are other expectations that would also be self-fulfilling. Suppose that a price shock raised inflation in one year, but everyone expected that inflation would return to its original level in the next year. With the expectation of moderate inflation, workers would moderate their wage demands, and firms would moderate their price increases. Thus the expectation of low inflation would also prove itself correct. Since expectations of either persistent or nonpersistent inflation are self-fulfilling, it appears that either expectation would be rational. The U.S. economy has settled into a situation in which people expect inflation to persist, perhaps only because it has in the past.

CONCLUSIONS

The behavior of inflation is one of the better-understood areas of macroeconomics. There is a wide consensus about the long-run determinants of inflation and, arguably, a consensus about much of its short-run behavior. The average inflation rate over long periods is determined by the extent to which the average rate of money growth (which, in the United States, is chosen by the Federal Reserve) exceeds the average growth rate of real output. Short-run inflation fluctuates around its long-run average because of demand shocks, such as large increases in government spending, and supply shocks, such as sharp rises in the prices of food and energy.

Some countries have persistently high inflation because they continuously create new money to finance large, ongoing budget deficits. Such countries are unable to reduce money growth enough to halt inflation because their governments have been unable to eliminate budget deficits and because they do not have effective alternatives for financing those deficits. In the United States, however, the government budget deficit is financed almost entirely with Treasury debt, not money creation. The United States had low average inflation in the 1980s because money growth, on average, only slightly exceeded output growth.

Finally, the distinction between short-run and long-run determinants of inflation is blurred by the fact that short-run changes often influence the long-run trend. When a demand or price shock raises short-run inflation in the United States, expectations of future inflation rise. Historically, the Fed often accommodated these expectations by allowing money growth to rise, so expectations were fulfilled. Not allowing money growth to rise would have slowed output growth and perhaps caused a recession.
These conclusions—a summary of the thinking of mainstream economists—partly fit ideas that are popular among journalists and the public and partly contradict such ideas. It is common, for example, to blame inflation on excessive deficit spending by the government. This view is on target for the case of Argentina, but not for the United States. Little of the U.S. deficit is financed by printing money. Thus it was possible for U.S. inflation to fall between the 1970s and the 1980s even though the U.S. budget deficit rose substantially. On the other hand, the view that government spending fuels U.S. inflation has a grain of truth. There are periods, notably the Vietnam era, when too much spending overheats the economy, producing inflation that persists as long as monetary policy is accommodative.

Perhaps the most common scapegoats for inflation are the particular prices that the public observes to rise rapidly. In some eras, these are oil or food prices; a current favorite is medical care. When journalists and citizens blame individual prices for inflation, they confuse average and relative prices. Particular prices could rise just as much in relative terms even if the overall price level were constant. Again, however, there is a grain of truth in conventional thinking. Particularly sharp increases in prices, such as OPEC shocks, are inflationary.


Leaning Against the Seasonal Wind: Is There a Case for Seasonal Smoothing of Interest Rates?

Satyajit Chatterjee*

Since it began in 1914, the Federal Reserve System has followed a policy of allowing the supply of money to vary over the seasons. At present, the Fed allows the money supply to grow faster than average in the third and fourth quarters of each year to meet the seasonally high demand for money during summer and the holiday shopping season and forces it to grow slower than average in the first and second quarters. In other words, the Fed injects additional money into the economy during the last two quarters of a year, then withdraws this addition during the first half of the following year.

This seasonal pattern in the growth rate of money supply and the Fed’s role in generating it is evident in Figure 1. The two lines show the seasonal deviations in the quarterly growth rate of M1 and the monetary base (the sum of bank reserves and currency in circulation) from their average quarterly growth rates in the post-WWII period. The Federal Reserve, through its open-market operations, increases the growth rate of the monetary base in the

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third and fourth quarters as money demand rises, then reverses this increase in the following two quarters when money demand shrinks. Correspondingly, the seasonal growth rate in M1 is above average in the third and fourth quarters when the quantity of money demanded rises quickly and falls below average in the first two quarters when quantity of money demanded shrinks.

Because it accommodates seasonal variation in the demand for money, the Fed’s seasonal monetary policy has the effect of reducing seasonal variation in short-term interest rates. Indeed, by some measures, there does not appear to be any evidence of seasonal movements in short-term interest rates in the post-WWII period. If the Federal Reserve were to stop this seasonal variation in the growth rate of the monetary base, short-term interest rates would rise in the third and fourth quarters in response to the higher demand for money during these times and fall in the first two quarters in response to the lower demand for money.

Economists have questioned the need for a seasonal monetary policy. In his well-known lecture *A Program for Monetary Stability*, Milton Friedman saw no “objection to seasonal fluctuations in short-term interest rates” and recommended that the Fed desist from following such a policy. More recently, Gregory Mankiw and Jeffrey Miron, in an article titled “Should the Fed Smooth Interest Rates? The Case of Seasonal Monetary Policy,” have also raised doubts about the wisdom of such a policy. Indeed, why should the Fed accommodate seasonal changes in money demand and stabilize short-term interest rates? After all, the increase in rental rates for vacation properties on the New Jersey shore in August is a natural outcome of market forces and does not call for a program of rent stabilization by the government. By the same token, why shouldn’t the Fed tolerate an increase in the rental price of money (interest rates) caused by natural forces in the third and fourth quarters of each year?

In this article I examine this question by looking first at the historical reason underlying the Fed’s seasonal monetary policy and determining whether the historical rationale is still valid. In light of the major institutional changes

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1 In a recent article, Robert Barsky and Jeffrey Miron report the absence of seasonal movements in the three-month T-bill rate over the period 1948:2-1985:4. However, there have been periods when short-term interest rates have shown some seasonal fluctuations. Stanley Diller, in an article written in 1971, used measures of seasonality different from the ones employed by Barsky and Miron and documented that T-bill rates showed some seasonality in the 1950s, but this seasonal pattern all but disappeared in the 1960s. Citations may be found in the “References” section at the end of this article.
that have occurred in the banking industry since 1933, I argue that the historical reason for the Fed’s seasonal monetary policy is now much less relevant. On the other hand, improvements in economists’ understanding of the different ways in which monetary policy could affect the functioning of the economy suggest benefits and costs of a seasonal monetary policy that were not apparent in 1914. In the rest of the article, I discuss the nature of these costs and benefits.

THE HISTORICAL RATIONALE

Throughout the latter part of the 19th century and the early years of the 20th, the U.S. financial system was plagued by recurrent crises. Edwin Kemmerer, a Cornell University scholar who testified before the National Monetary Commission in 1910, listed no less than six major crises and 15 minor crises in financial markets between the years 1890 and 1910. These financial panics were a combination of bank failures, bank runs, and stock-market crashes. Kemmerer, as well as other contemporary scholars, believed that most of these crises had a seasonal connection. The United States, at that time a still heavily agricultural nation, experienced large increases in the demand for currency and short-term loans during early spring and autumn when farmers were planting and harvesting. The increased demand for currency drained cash from country banks precisely at a time when their farming customers clamored for loans. As a result, the country banks would call in their reserves with the city banks and thereby transmit the seasonal pressure on bank reserves to the city banks as well. To try to accommodate having fewer reserves and greater loan demand, many banks tried to make do with reserve-deposit ratios that were precariously low and left them vulnerable to unexpected cash withdrawals. Bankers and depositors were quite aware that during these times the banking system’s ability to absorb unexpected adverse shocks was low. Thus, an unexpected loan default or an unexpectedly heavy withdrawal that caused a city or a country bank to fail would generate panic withdrawals from other banks as well. Even if the withdrawal or default did not lead to a bank failure, the episode made banks nervous enough to call in more of their loans, many of which were stock-market call loans, which, in turn, led to sharp drops in stock prices.

The seasonal element in these financial panics is evident in the historical record. Of the 21 financial panics documented by Kemmerer, seven occurred in September and October and another seven between March and May. Thus, fall and spring accounted for all but a third of the total number of panics between 1890 and 1910.

While these panics differed in severity, some were quite serious. For instance, the panics of May 1893 and October 1907 resulted in the suspension of convertibility of deposits into currency. In general, these disturbances were considered disruptive enough to warrant serious attention and led to the creation of the National Monetary Commission to investigate the source of the problem facing the U.S. banking industry. The deliberations of the commis-

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2In addition to Kemmerer’s testimony, see, for example, the testimony of O.M.W. Sprague and the book by Laurence Laughlin.

3See Jeffrey Miron’s 1986 article for a description of the connection between seasonality and financial panics.

4Unfortunately, there is no quantitative estimate of the disruption caused by these financial panics. Jacob Hollander, a professor of political economy at Johns Hopkins University who also testified before the National Monetary Commission, noted the importance of bank loans collateralized by stock certificates in the financing of business activity in the U.S. This suggests that U.S. businesses probably faced considerable difficulty in carrying out their normal operations during times when panic conditions made such collateralized loans unattractive.
sion, published in 1910, identified the seasonal pressure on bank reserves as one of the principal contributory factors in these panics. Three years later, the Federal Reserve Act of 1913 established the Federal Reserve System and charged it with the task of eliminating the seasonal pressure on bank reserves by allowing banks to borrow additional reserves and currency ("to furnish... an elastic currency") during times of increased seasonal demand for currency.

Thus, a seasonal monetary policy came to be one of the key goals of the Federal Reserve System. The policy was remarkably successful in that in the 15 years following November 1914, there were no financial crises in the U.S.

Aside from eliminating panics triggered by seasonal shortages of liquidity, the Fed's seasonal monetary policy also had another important effect. Because of the seasonal pressures on bank reserves, the period before the founding of the Fed was characterized by prominent seasonal fluctuations in short-term interest rates. As bank reserves tightened in the fall and spring and the commercial banks called in their loans, short-term interest rates rose. Then, as the seasonal pressure on reserves ebbed, short-term interest rates declined in the winter and summer. After the Fed went into operation in 1914 and eliminated the seasonal pressure on bank reserves, it also eliminated the seasonal fluctuation in short-term interest rates. Thus, the seasonal smoothing of short-term interest rates that continues to characterize Federal Reserve policy to this day originated in the battle against financial panics.

Figures 2 and 3 display the pre- and post-Fed seasonal patterns in the call money rate (an overnight interest rate) and commercial bank reserves, respectively.\(^5\) In Figure 2, the vertical axis measures the average difference in call money rates across adjacent months in the pre-Fed and post-Fed era. For example, in the pre-Fed era, call money rates were, on average, 1.02 percentage points per annum higher in September than in August and 1.15 percentage points per annum higher in December than in November. In contrast, in the post-Fed era, call money rates were only 0.13 percentage points per annum higher in September than in August and only 0.089 percentage points per annum higher in December than in November. More generally, Figure 2 clearly shows that the call money rate was considerably more seasonal in the pre-Fed era than in the post-Fed era.

Figure 3 shows the other side of the same

\(^5\)The information on which these plots are based was obtained from Truman Clark's 1986 article, Table 2 (p. 82) and Table 4 (p. 84).
leaning Against the Seasonal Wind

Satyajit Chatterjee

The vertical axis measures the average difference in bank reserves (in millions of dollars) across adjacent months. In the pre-Fed era, the bank reserves declined by about $10.68 million in September, reflecting the withdrawal of currency for farm expenditures. A decline of similar magnitude is also evident in the month of February. In contrast, bank reserves rose $22.79 million in September in the post-Fed era, fueled by Federal Reserve purchases of Treasury securities from banks. This increase in reserves allowed banks to meet the currency drain and, at the same time, expand the volume of their agricultural loans. In general, the Federal Reserve’s seasonal monetary policy made bank reserves much more responsive to the pace of commercial activity and thereby eliminated the pronounced seasonal pattern in short-term interest rates.

Seasonal pressures on currency and credit demand, alas, are not the only reason for financial disruptions. The 15-year stretch of financial tranquility ended rudely with the stock market crash in October 1929; the terrible years of the Great Depression followed. A seasonal monetary policy notwithstanding, five major banking crises occurred between the years 1929 and 1933.6

The experience of the Great Depression convinced American business and legislative communities that monetary policy alone was inadequate to insulate the economy from financial and economic disasters. In a far-reaching institutional change, the Banking Act of 1933 introduced federal insurance of bank deposits, which made bank deposits completely safe for the majority of depositors. While deposit insurance does not cover all commercial bank deposits, the FDIC has acted in the past to protect all deposits, even the so-called uninsured ones. Typically, in the event of a bank failure FDIC policy is to merge the failed institution with an ongoing one. This way, the liabilities of the failed bank become the liabilities of the ongoing institution, and uninsured depositors emerge unscathed as well.

However, what often goes unnoticed is that the existence of deposit insurance greatly reduces the need for a seasonal monetary policy to fight banking panics. Seasonal pressures on bank reserves and short-term interest rates may cause some unlucky or ineptly managed banks to fail, but because of explicit and de facto deposit insurance such failures are unlikely to lead to bank runs or financial panics. Since

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6Milton Friedman and Anna Schwartz provide in-depth discussions of the origins and dynamics of these panics in their book *A Monetary History of the United States 1867-1960*. Miron’s article discusses the seasonal factors that may have contributed to these banking crises.
combating financial panics was the main reason for a seasonal monetary policy in the first place, has this policy outlived its usefulness?

SEASONAL MOVEMENTS IN INTEREST RATES ARE COSTLY

Even though seasonal changes in interest rates probably would not cause financial panics today, a seasonally varying short-term interest rate results in a loss of economic efficiency. This loss of efficiency, while not as dramatic and severe as that imposed by a banking panic, could nevertheless provide a rationale for continuing a seasonal smoothing of short-term interest rates. To understand how this efficiency loss occurs, we need to understand how changes in short-term interest rates affect individuals' and corporations' demand for money.

Consider the case of Sadie Wherebucks, who must decide how much money to hold, on average, in her wallet or checking account and how much to put in a time deposit or a short-term security such as T-bills. When short-term interest rates are low, the convenience provided by holding money is more important to Sadie than the small amount of income that she gives up by holding money instead of interest-bearing assets, so Sadie will hold more money. When short-term interest rates are high, Sadie will reduce the amount of money she holds so that she can hold greater time deposits or invest in T-bills.

If Sadie holds more financial wealth in a savings account or in the form of T-bills, she will have to use her bank or broker more often to convert her assets into money to meet her daily expenses. This will impose additional costs on Sadie either because she has to make frequent trips to her bank or because she has to pay her broker's commission fees more often. Therefore, one effect of an increase in short-term interest rates will be to increase Sadie's transaction costs as she attempts to make do with smaller average holdings of money.

What is true of Sadie as an individual is even more true of corporations. Because firms deal with large flows of funds, higher short-term interest rates present them with even greater inducement to tighten up on their cash management. They spend considerably more time and resources on making sure that they reduce their holdings of currency or checking account balances.

At the other end, because of the increased flow of customers, banks would probably be forced to incur additional expenses. For instance, a bank might have to hire an extra teller or put up an extra ATM. Similarly, as individuals and corporations use the services of their brokers more frequently, brokerage firms would have to spend more resources to deal in a timely fashion with the additional business.

This means that if the Fed were to stop accommodating the seasonal variation in money demand and thereby let short-term interest rates rise during Christmas and summer and decline other times of the year, it would increase the level of transaction costs during Christmas and summer and lower it at other times of the year.

However, the net effect of this move would be to increase the level of transaction costs over the course of a whole year. The reason for this is intuitive and quite simple. By letting short-term interest rates rise at a time when the economy is in greater need of money, the Fed would force individuals and corporations to conserve on money holdings at a time when the cost of doing so is high. In contrast, by letting interest rates fall when the demand for money is low, the Fed would encourage individuals and corporations to relax their conservation efforts at a time when conserving money balances is relatively less costly. In other words, the Fed would be withdrawing money from circulation when the economy has more need for it and would be putting it back in circulation when it has less need for it. Clearly, such a policy would impose an additional cost on the economy.
How big might this cost be? How much more time, effort, and resources would be used to conserve on money holdings if the Federal Reserve did not accommodate the seasonal increase in demand for money? The answer depends on how much short-term interest rates would rise during the period of seasonally high money demand: if interest rates need to rise a lot to induce people to hold interest-bearing assets such as bonds instead of money, it indicates that the value of resources used up in reducing money balances (the cost of trips to the bank, brokers’ fees) is large. Empirical studies typically find that people adjust their money holding very little in response to changes in short-term interest rates. This result suggests that the gains from following a seasonal monetary policy (or the cost of following a nonseasonal policy) may be worth worrying about.

But that is not the whole story. A nonseasonal monetary policy would cause not just seasonal changes in short-term interest rates, but also seasonal adjustments in the price level. Those price adjustments would reduce the size of seasonal changes in interest rates and also reduce the extra transaction costs generated by following a nonseasonal monetary policy. For this reason, and because there is skepticism about the reliability of estimates of how sensitive the demand for money is to changes in interest rates, it is difficult to draw firm conclusions about how big the costs imposed on the economy by a nonseasonal monetary policy would be.

In any event, regardless of the size of the benefit from a seasonal monetary policy, we now have an answer to the question we posed in the introduction: what is the difference between seasonal variability in the rental price of shore property and seasonal variability in the rental price of money? In the former case, the seasonal rise in rents reflects a real scarcity of rental space during times of high demand, and the increase in rents is an efficient way of allocating the limited amount of available space to families that value it most. In contrast, the scarcity of money is artificial in that the Federal Reserve can change the quantity of money available at very little cost. Therefore, since families and corporations gain more from a lower rental price of money during Christmas and summer than they lose from a higher rental price of money at other times of the year, it makes sense for the Fed to smooth the rental price of money over the seasons.

ARE SEASONAL MOVEMENTS IN INTEREST RATES COSTLY IN OTHER WAYS?

Macroeconomists agree that a nonseasonal monetary policy will increase the overall level of transaction costs, but they do not agree on whether there are other costs of following a nonseasonal policy.

To see where these disagreements come from, let’s take a closer look at the statement that a nonseasonal monetary policy would raise short-term interest rates during Christmas and summer and lower it at other times of the year.

So far we have talked about interest rates without being specific about what type of interest rates we mean. In reality, there are two distinct types of interest rates, and it is important that we keep them separate. The type that people are most familiar with is the nominal or money interest rate reported in the financial columns of newspapers. For instance, if the interest rate on a one-year Treasury bill is listed as 3.4 percent, then each $1 invested in a T-bill today will fetch $1.034 in a year. The nominal interest rate does not adjust for change in the purchasing power of the dollar; that is, it does not take into account that the purchasing power of a dollar available a year from now may be

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7For a review of the empirical literature on the sensitivity of money demand to interest rates and other variables, see Judd and Scadding’s 1982 article.
less than that of a dollar given up today because the general level of prices in the economy may be higher a year from now. In contrast, the real interest rate does take changes in the purchasing power of the dollar into account. The real interest rate is calculated by subtracting the inflation rate expected over the maturity period of the asset from its nominal interest rate. For instance, if the annual inflation rate is expected to be 3.0 percent, the real interest rate on the one-year T-bill is only 0.4 percent.

This distinction between nominal and real interest rates raises two questions about our previous discussion. First, when we asserted that people’s demand for money depends on short-term interest rates, which interest-rate concept did we mean? Second, would a nonseasonal monetary policy lead to seasonally varying short-term real interest rates or seasonally varying short-term nominal interest rates or both?

The first question is easy to answer. People’s demand for money depends on nominal interest rates. Consider, again, the case of Sadie Wherebucks, who must decide how much money to hold in her wallet or checking account and how much to invest in T-bills. As an investor, Sadie is concerned with the real interest rate she expects to receive on her T-bill investments. By holding money instead of T-bills, she forgoes this real interest rate, and, in addition, her money loses value over time because of inflation. Consequently, the total cost to her of holding a dollar is the real interest rate she could have received on the T-bill plus the inflation rate she expects. But this sum of the real interest rate and expected inflation rate is simply the nominal interest rate. Therefore, in deciding how much money to hold it is the nominal interest rate that counts.

Unfortunately, answering the second question is not as easy and opinions differ. The classical view is that a change in monetary policy affects only price levels and inflation rates. Real variables, such as real interest rates, real output, and real investment, are unaffected by such changes. Therefore, a classical economist would argue that the increase in the short-term nominal interest rates at Christmas that would accompany a nonseasonal monetary policy would result from lower prices during the Christmas season but higher prices in winter—after Christmas—and in spring. In his view, it is the faster rate of price increase expected between Christmas and spring that leads to the rise in the short-term nominal interest rate during the Christmas season. Similarly, a classical economist also would expect a nonseasonal monetary policy to cause prices to drop in summer, then rise in autumn, resulting in an increase in the short-term nominal interest rate in the summer. He would argue, however, that real variables such as output and employment would be unaffected by these seasonal price changes (see Seasonal Monetary Policy: The Classical View). Since real variables are not affected, no additional costs or benefits result from pursuing nonseasonal monetary policy. Hence, from the classical perspective, seasonal smoothing of interest rates is desirable because it saves on transaction costs without disrupting real economic activity.

This conclusion is not shared by monetarists. Since monetarists adhere closely to classical views in regard to their perception of how money supply changes affect the economy, the rejection of seasonal monetary policy by economists such as Milton Friedman and Robert Lucas, Jr., is at first surprising. However, their reasons for jettisoning a seasonal monetary policy have to do with their views on how the Federal Reserve should conduct its business-cycle policy. Monetarists believe that a sound monetary policy involves implementing steady growth in the supply of money, with a view to

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8For a more recent and more emphatic denial by Friedman of the usefulness of seasonal monetary policy, see his 1982 article. For Robert Lucas’s view, see his 1980 article.
Seasonal Monetary Policy: The Classical View

Does the Fed’s choice of seasonal monetary policy affect the real interest rate? Classical economists, who see the real interest rate as being determined primarily by real factors, such as the population growth rate, the rate of technical progress, and people’s propensity to save, argue that changes in the money supply, after agents have adjusted to it, do not have any effect on the real interest rate. In other words, they argue that while an unexpected increase in the money supply can reduce the real interest rate for a considerable length of time, the rate returns to its original level as the extra money diffuses through the economy. Once the economy adjusts to the new level of money supply, the only effect of a higher money stock is a higher price level.

Applied to the choice of seasonal monetary policy, this argument suggests that in the immediate aftermath of a shift to a nonseasonal policy, there will be a period when the real interest rate will be affected. However, as the economy gets used to the new policy, the real interest rate will return to its original level, and the only change will be in the seasonal path of prices.

To see how this works, consider the following numerical example. For simplicity, imagine that there are only two seasons: Christmas and spring. Suppose that when the Fed follows a seasonal monetary policy, the consumer price index is 100 and the real interest rate is 3 percent in both seasons. Since there is no change in the price level from one season to the next, the expected rate of price increase is zero for both seasons. Therefore, the real interest rate is 3 percent in both seasons as well.

Now suppose that the Fed switches to a nonseasonal monetary policy and refrains from increasing the money supply during the Christmas season. Since the money supply during the Christmas season is now lower than before, the level of Christmas prices will be lower. Suppose that Christmas prices fall by 2 percent, to a level of 98. Because this nonseasonal policy lowers the average stock of money over the year, it will exert downward pressure on prices in the spring as well and those prices will fall, although not by as much as the Christmas price level. Suppose then that the spring price level falls by one-half percent, to a level of 99.5. With these new price levels, the expected rate of price increase going from spring into Christmas will be 100 x (99.5 - 98)/98 = 1.53 percent, and the expected rate of price increase from Christmas to spring will be 100 x (98 - 99.5)/99.5 = -1.50 percent. Since real interest rates do not change, the nominal interest rate will rise to 4.53 percent during the Christmas season and fall to 1.50 percent in spring.

Suppose that the seasonal monetary policy involved a money supply of 100 in spring and 105 during the Christmas season. With the move to a nonseasonal policy, the money stock will be 100 in all seasons, which would make the average money stock over a year 100 as opposed to 102.5 with the seasonal monetary policy. If the monetary authorities moved to a nonseasonal policy but raised the constant stock of money to 102.5, then relative to the prices that prevailed in the presence of seasonal monetary policy, prices during the Christmas season would fall and those in spring would rise.

keeping the inflation rate steady and predictable. They view seasonal adjustments to the growth rate of money supply as a nuisance that distracts attention from the more important task of keeping the money supply growing smoothly over time. Thus, monetarists argue that the benefits of a seasonal monetary policy are small compared with the costs of potentially erratic movements in the money supply occasioned by attempts to “fine-tune” the growth of money stock to match the seasonal movements in money demand.

Keynesian economists also differ with the classical view of a seasonal monetary policy, but for entirely different reasons. A Keynesian economist would disagree with both classical economists and monetarists concerning the likely consequences of a move to a nonseasonal
monetary policy. In the Keynesian view, changes in interest rates that result from an imbalance between the demand for and supply of money show up in both nominal and real interest rates because prices are not perfectly flexible in the short run. The resulting changes in real interest rates affect the aggregate output of the economy by changing aggregate demand. Therefore, by following a nonseasonal monetary policy, the Fed would drive up real interest rates and thus reduce the real output of the economy to below current levels during the Christmas season and in summer.

Therefore, in the Keynesian view, a move to a nonseasonal policy would result in greater seasonal variability in short-term real interest rates and a lesser seasonal variability of output and employment. Would these changes impose additional costs on the economy? Keynesian economists would argue that a nonseasonal policy almost certainly imposes costs on the economy that go beyond the transaction costs discussed earlier, but whether it imposes more costs than existing seasonal monetary policy is more difficult to know.

To appreciate the Keynesian point of view, it is important to recognize that Keynesian economists regard the classical view on the functioning of a market economy as the ideal toward which actual market economies tend, but which they seldom attain. Because of various frictions in the operation of markets, Keynesian economists believe that the outcome of an unregulated market economy is typically quite different from the outcome depicted by classical economists. Consequently, Keynesian economists perceive a need for government policies designed to steer market outcomes toward the classical ideal.

In the present context, as already noted earlier, Keynesian economists would challenge the classical assumption that prices are fully flexible over the seasons. They would argue that if the Fed were to stop accommodating the seasonal demand for money, the price level would tend to fall during the Christmas season and tend to rise in the spring, but not by as much as in the classical argument. Therefore, short-term real interest rates will rise above the classical ideal during the Christmas season and will fall below it in spring; correspondingly, real output and employment will be below the classical ideal during the Christmas season and above it in spring. Consequently, Keynesian economists would feel the need for a monetary policy that works to reduce seasonal fluctuations in short-term real interest rates. In other words, they would perceive the need for a seasonal monetary policy.9

That having been said, it does not follow that Keynesian economists would necessarily endorse the Fed’s existing seasonal policy. The Keynesian objective is to get to the classical ideal, but the Fed’s current policy may result in too much seasonal variability in output and employment and too little seasonal variability in short-term real interest rates relative to it. In the absence of quantitative information on what the ideal seasonal pattern of short-term real interest rates and output really is, it is not possible for a Keynesian to know whether the Fed’s existing seasonal monetary policy is the best one.

CONCLUSION

The Federal Reserve’s policy of accommodating seasonal movements in money demand originated in an attempt to eliminate recurrent financial panics. At the time the Federal Reserve System was established, it was widely felt that the seasonal outflow of bank reserves that occurred in the fall and spring jeopardized the liquidity of the banking system and raised fears on the part of depositors that banks would be unable to honor their deposit liabilities. A key

9See Gregory Mankiw and Jeffrey Miron’s 1991 article for a detailed discussion of the Keynesian view on the usefulness of seasonal monetary policy.
objective of the Federal Reserve System was to allow banks to borrow additional reserves during these months of heavy currency demand so that the natural pace of commercial activity would cease to be a threat to the banking system.

This practice of increasing bank reserves and the supply of currency during a time of seasonally high demand continues to the present. However, given the institutional changes that have occurred in the banking environment since 1914, most notably the introduction of federal deposit insurance, it is doubtful whether a seasonal monetary policy is needed to protect the banking system from panics. Therefore, a different justification of seasonal monetary policy is needed.

This article has suggested that a justification for seasonal monetary policy may be found in the argument that such a policy, by smoothing the path of short-term nominal interest rates, serves to reduce transaction costs.

The article also pointed out that a classical economist would view the reduction in transaction costs as the only significant impact of a seasonal monetary policy and would therefore argue in favor of such a policy. In contrast, monetarists would argue in favor of eliminating seasonal monetary policy on the grounds that it interferes with what they see as the more important task of keeping the money stock growing smoothly and predictably over time. Keynesian economists would concede that existing policy may be too seasonal but would argue that some degree of seasonality in money supply is desirable; therefore, they would caution against abandoning such a policy.
References


Working Papers

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