

What Accounts for the Postwar Decline in Economic Volatility?

BY KEITH SILL

Over the past 20 years, the U.S. economy has had fewer and shorter recessions. In addition, over time, swings in the growth of many macroeconomic variables, such as gross domestic product, have become smaller. Why this decline in economic volatility? In this article, Keith Sill highlights some of the facts about the increased stability of the U.S. economy and assesses the contribution of policy and other factors to the decline in volatility.

The U.S. economy appears to have become much more stable in the 1990s and early 2000s than it was in the 1950s, 1960s, and 1970s. We have fewer and shorter recessions, and the swings, over time, in the growth of real gross domestic product (GDP), unemployment, inflation, and a host of other macroeconomic variables have become smaller. Many explanations have been offered for this lower volatility in economic activity. Some are related to changes in the structure of the economy, such as better inventory management and the shift in employ-

ment from manufacturing industries to service industries. Some focus on the contribution of changes in monetary and fiscal policy to the increase in economic stability.

This increase in economic stability is beneficial if it means that households face lower risk. Generally, people are risk-averse — they prefer a sure thing to an uncertain outcome. A more stable economy with fewer recessions means that employment and incomes are likely more stable. Fewer households may face the severe consequences of long-term job loss. Households, especially those that have difficulty borrowing, have less variable consumption and face less uncertainty when making their spending plans.

In this article I will highlight some of the facts about the increased stability of the U.S. economy and assess the contribution of policy and nonpolicy factors in accounting for the decline in economic volatility. We will

see that a change in monetary policy since the early 1980s seems to be an important part of the story behind the increased stability of the U.S. economy.

DOCUMENTING THE DECLINE

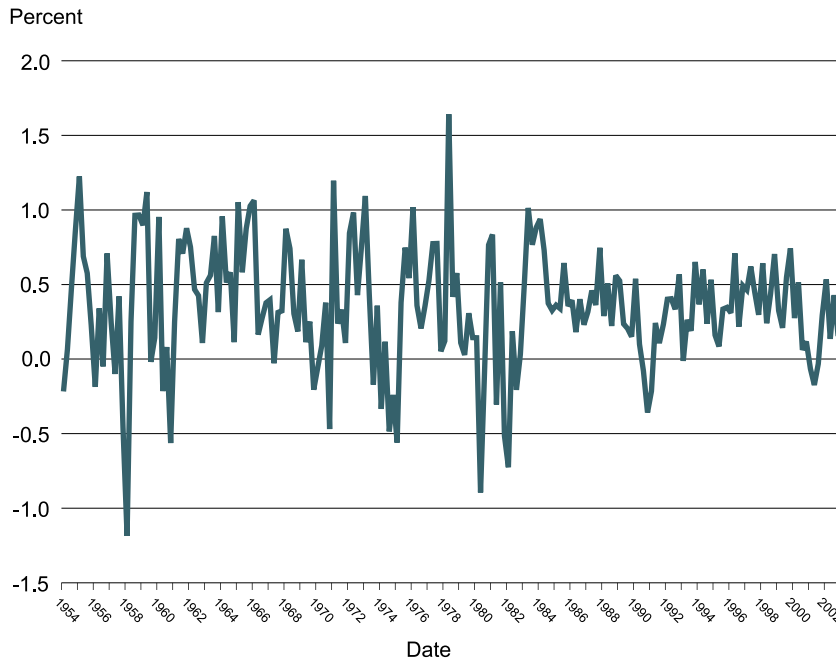
The U.S. economy has become much more stable since the 1980s. Examining the growth rate of real GDP in the U.S., we can easily see this increased stability (Figure 1). From the mid-1950s to the 1980s, quarterly growth of real GDP mostly moved in a range from about -1 to +1.25 percent. In the 1990s and 2000s, real GDP growth did not exceed 0.75 percent or fall below 0.5 percent. It is clear that swings in real GDP growth have become much smaller over the last 20 years or so.

The volatility of real GDP growth can be measured using the standard deviation, which quantifies how much a variable moves up and down around its average value. By this measure, the volatility of real GDP growth is much lower in the 1990s and 2000s than before. The table shows volatility measures for several variables by decades. In the 1960s, volatility was somewhat lower than the postwar average, before jumping up in the 1970s. Volatility was about as high in the 1980s as it was in the 1970s, then fell dramatically during the 1990s.

The table also shows the coefficient of variation for each variable by decade. The coefficient of variation adjusts the standard deviation for changes in the mean level of the variable. We see the same general pattern as with the standard deviation:



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FIGURE 1**Quarterly Real GDP Growth**

volatility was lower in the 1990s.

Figure 2 shows how the volatility of real GDP growth has evolved over time.¹ From the mid-1950s to the

¹The volatility of real GDP growth is measured using a 20-quarter rolling standard deviation. That is, each point on the graph represents a standard deviation calculated using the previous 20 quarters of data.

mid-1960s, volatility largely fell from a high of about 0.7 percent to a low of about 0.3 percent. From the mid-1960s to the mid-1980s, volatility generally increased, reaching almost 0.6 percent in 1982. But from the mid-1980s on, volatility has dropped dramatically, falling to below 0.27 percent by the early 2000s. On balance, it appears that the volatility of real GDP growth

since the mid-1980s is, on average, about half of what it was prior to that time.

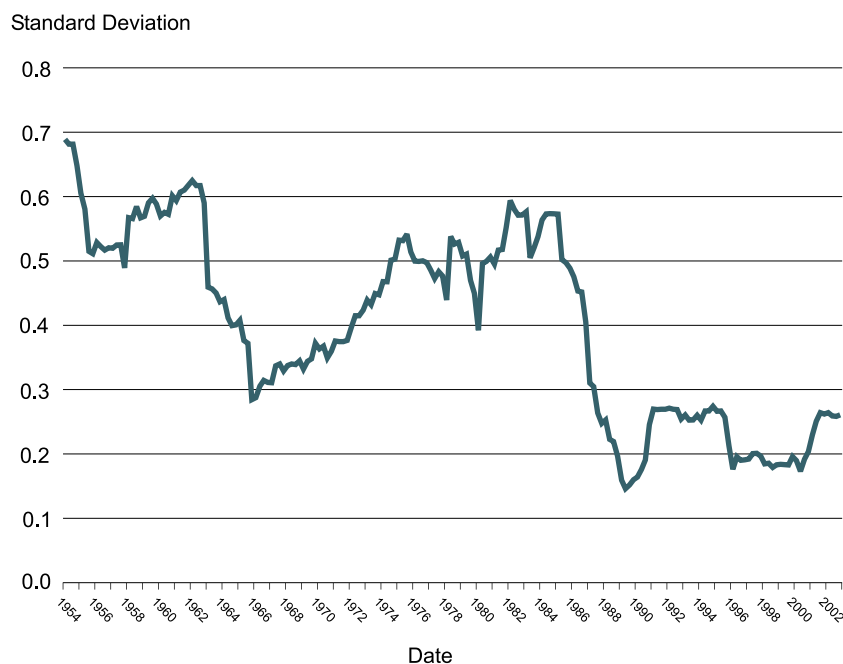
The increased stability of the U.S. economy is apparent in many macroeconomic series, not just real GDP growth. A recent paper by James Stock and Mark Watson examined the volatility of 168 macroeconomic variables, including output, employment, consumption, and investment. They find that volatility has declined broadly across many measures of economic activity. Typically, standard deviations are 30 percent to 40 percent lower now compared with what they were in the 1970s and early 1980s. In addition to the volatility of real variables, the volatility of inflation has also fallen. For example, the volatility of inflation, as measured by the standard deviation of the GDP deflator, averaged 0.39 percent in the 1960s, then rose to 0.53 percent in the 1970s and 0.60 percent in the 1980s, before falling to 0.24 percent in the 1990s.

State-level data for the U.S. show a similar decline in volatility over the postwar period. My recent work with Gerald Carlino and Robert DeFina investigated the volatility of employment across U.S. states and industries. We found that employment volatility has declined for virtually all states and across major industries

TABLE**Volatility by Decade**

		1950s	1960s	1970s	1980s	1990s
Real GDP Growth	Std %	0.63	0.38	0.48	0.42	0.25
	cv	1.47	0.83	1.35	1.31	0.74
Unemployment	Std %	1.28	1.08	1.16	1.48	1.05
	cv	0.28	0.23	0.19	0.20	0.18
GDP Deflator Inflation	Std %	0.74	0.39	0.53	0.60	0.24
	cv	1.18	0.63	0.32	0.53	0.43

cv is the coefficient of variation, defined as the standard deviation divided by mean.

FIGURE 2**Standard Deviation of Real GDP Growth (percentage points)**

within states. Greater stability has occurred across all regions of the country and across different industries and sectors of the economy. In short, the decline in volatility is a widespread phenomenon for the U.S. economy.

Figure 2 suggests that volatility dropped abruptly in the 1980s, and much of the analysis on the increased stability of the U.S. economy suggests that the drop in volatility can be characterized as a sharp break that occurred in the 1980s. In fact, various statistical methods suggest that the drop in volatility occurred sometime around the first quarter of 1984.² But one might argue instead that the

² Research that puts the break in volatility as occurring right around 1984 includes that of Chang-Jin Kim and Charles Nelson, Margaret McConnell and Gabriel Perez-Quiros, and James Stock and Mark Watson.

decline in volatility is a long-term phenomenon. Perhaps volatility was declining in the 1950s and 1960s, was interrupted in the 1970s, then resumed in the 1980s. Olivier Blanchard and John Simon (2001) suggest that the drop in the volatility of real GDP growth over the postwar period is best described by such a long-term trend phenomenon. Whether the decline in the volatility of real GDP growth is best described as a long-term trend or a sharp one-time break remains an open question.

Since the swings in real output growth have become smaller over time, the declines in real GDP growth during recessions are not as large (see Figure 1). Chang-Jin Kim and Charles Nelson calculated the average growth rate of real output in recessions and in expansions. They found that the difference in average growth rates between recessions and expansions has

declined over time. Thus, recessions are not as severe and booms are not as pronounced today as they have been in the past.

Blanchard and Simon's calculations demonstrate that recessions have become shorter. They estimated models for the pre-1981 and post-1981 U.S. economy, then simulated these models to generate many alternative histories for the U.S. economy in the pre-1981 and post-1981 eras. Their estimated models imply that, on average, expansions would have lasted 17 quarters in the pre-1981 period and 51 quarters in the post-1981 period. In the data, the average length of expansions was 19 quarters before 1981 and 36 quarters after 1981. Their analysis suggests that it is more than just an absence of large shocks hitting the economy, such as sharp increases in oil prices, that is responsible for the lower volatility experienced since the mid-1980s. Something is structurally different about the economy or monetary or fiscal policy.

WHY HAS ECONOMIC VOLATILITY DECLINED?

There are many theories about why the economy has become more stable. Economists have been attempting to quantify the contribution of these potential causes to the decline in volatility. Research to date indicates that improved monetary policy accounts for perhaps 20 percent of the decline in real output growth volatility since the mid-1980s. The remainder of the drop in volatility can be attributed to various non-policy factors and to plain good luck in the form of smaller shocks. Fiscal policy has not been found to be a factor in the decrease in volatility.

Inventories. A prominent hypothesis about the drop in volatility of real output growth is that improvements in information technology have

allowed firms to better manage their inventories, thereby making production and output less volatile. Inventory behavior is a natural avenue to explore when looking for root causes of the increased stability of the economy because inventories appear to play a large role in the business cycle. For example, almost half of the fall in U.S. production during recessions can be explained by a reduction in net inventory investment, even though net inventory investment is, on average, only about 0.5 percent of GDP.³

Evidence presented in recent work by James Kahn, Margaret McConnell, and Gabriel Perez-Quiros suggests that most of the reduction in the volatility of real GDP can be explained by a reduction in the volatility of output in the durable goods sector. Further, the volatility of durable goods output — that is, production — dropped much more than did the volatility of durable goods sales. Changes in inventory management must account for this difference, since production equals sales plus inventories. Changes in demand now appear to lead to smaller swings in production than they did 30 years ago, which implies that swings in inventory investment now contribute less to swings in production. Kahn, McConnell, and Perez-Quiros argue that inventory investment is now better able to anticipate sales and thus has led to less volatile production.

Other researchers are unconvinced by the theory that inventory management has improved to the extent that the economy is now more stable. They find statistically significant drops in the volatility of total sales *and* the volatility of sales

of durable goods. In addition, the finding that the variance of production has fallen more than the variance of sales is sensitive to how longer run trends are removed from the data. On balance, the contribution of inventory management to the decline in volatility of real output growth remains unsettled. For example, recent work by Aubhik Khan and Julia Thomas shows how just-in-time-inventory methods can actually increase the volatility of real output. Firms that hold low levels

of manufacturing employment was about 1.7 times that of services employment. By the mid-1990s, this volatility gap had fallen, though manufacturing employment was still 1.25 times as volatile as services employment.

We might expect that the overall economy would become less volatile as employment shifted from manufacturing to services. Carlino, DeFina, and I found that the shift in employment toward services played a role in the decline in employment

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of inventories have to adjust production more frequently, which, in their model, tends to increase the volatility of real GDP.

Employment Shift from Manufacturing to Services. The changing structure of the U.S. economy away from manufacturing and toward services is often cited as another potential explanation for the increased stability of the economy. Historically, the manufacturing sector of the economy has been more volatile than the services sector. However, manufacturing's share of total employment has declined relative to services' share of total employment.⁴ For example, manufacturing's share of total employment was 26 percent in 1950 but had fallen to 17 percent by 1990. Services' share of employment rose from 12 percent in 1950 to 24 percent in 1990. In the early 1950s, the volatility of manu-

facturing employment was about 1.7 times that of services employment. By the mid-1990s, this volatility gap had fallen, though manufacturing employment was still 1.25 times as volatile as services employment. We might expect that the overall economy would become less volatile as employment shifted from manufacturing to services. Carlino, DeFina, and I found that the shift in employment toward services played a role in the decline in employment volatility, though the role appears to be small. Adherents of the view that volatility dropped sharply in 1984 are unlikely to accept the manufacturing-to-services-shift theory because it doesn't get the timing right. We saw that the volatility of real output growth dropped sharply in the early 1980s. But the shift in employment from manufacturing to services has been a gradual process over the last 50 years. So the industry-shift theory would more likely support the notion of a gradual decline in output volatility rather than a sharp drop.

Oil Prices. Another potential factor contributing to the increased stability of the U.S. economy is the behavior of oil prices. Sharp increases in oil prices have been shown to be associated with most postwar recessions.⁵ Prior to the mid-1980s, there were major oil supply disruptions associated with the Suez crisis in 1956, the Arab-Israeli war in 1973, the Iranian revolution in 1978, and the Iran-Iraq war in 1980. Since the

⁴However, manufacturing's share of total output has stayed at about the same level over the postwar period. Although manufacturing's share of employment has decreased over time, manufacturing workers have become relatively more productive.

⁵See the 1983 paper by James Hamilton.

³ See the *Business Review* article by Aubhik Khan for a discussion of the role of inventory investment in business cycles.

Iran-Iraq war, the only significant supply disruption occurred in 1990 just prior to the Persian Gulf war. However, it is also the case that oil prices have been much more variable since 1980 than before, which makes it difficult to analyze the effect of oil prices on the post-1980 economy. This is because, in the post-1980 period, demand conditions have much more of an immediate effect on oil prices than they did pre-1980. As a consequence, it is more difficult to identify the types of oil-price shocks that can lead to downturns in economic activity.

James Stock and Mark Watson, using a statistical model, found that oil-price shocks are not a major contributor to the decline in output growth volatility. In fact, because the price of oil has been more variable in the post-1980 period, they found that oil prices tend to push up economic volatility after the mid-1980s. Sylvain Leduc and I used a model of the U.S. economy with an oil sector to examine the decline in economic volatility since the mid-1980s. We also found that oil-price shocks played almost no role in the increased stability of the economy.

Productivity Shocks. Economists have identified productivity growth as a factor that plays an important role in the lower volatility of real GDP growth. The relevant measure is total factor productivity (TFP), a broad measure of technical change. TFP growth, growth in capital stock (plant and equipment), and growth in total hours worked in production are combined to determine output growth. So TFP is the part of output growth unexplained by growth in capital stock and hours worked. If the volatility of both capital growth and hours worked is unchanged, lower volatility of TFP growth translates into lower volatility of real output growth. Indeed, a plot of the volatility of TFP growth shows a pattern that broadly mimics that of

real output growth volatility (Figure 3). Volatility of TFP growth was high in the 1970s, then fell dramatically after the early 1980s.

How much does the volatility of TFP growth contribute to the decline in real output growth volatility? Estimates vary. Leduc and I found that lower TFP volatility accounted

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for about 80 percent of the drop in real output volatility in our model of the U.S. economy. Using state-level employment data, Carlino, DeFina, and I set TFP's contribution to the decline in employment volatility at a minimum of 4 percent to a maximum of 36 percent. Stock and Watson attributed about 15 percent of the decline in real GDP volatility to the decline in volatility of labor productivity in their model. These results suggest that the volatility of productivity is an important part of the story of the decline in real output volatility. But it is not the whole story.

THE CONTRIBUTION OF FISCAL AND MONETARY POLICY TO INCREASED STABILITY

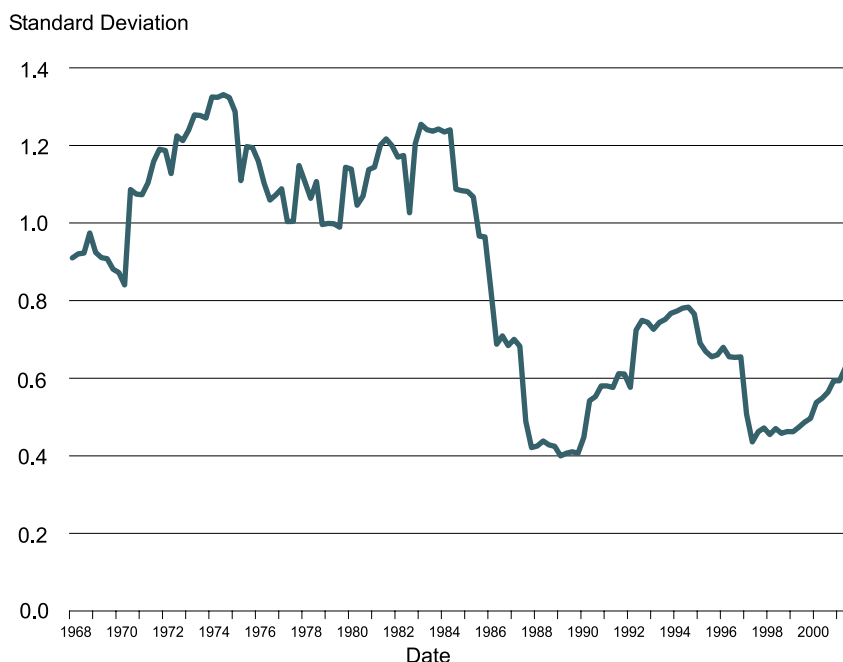
The nonpolicy factors discussed above are unable to account for the entire drop in the volatility of real output growth since 1984. It is possible that better monetary and fiscal policy since the mid-1980s has played a measurably important role in the increased

stability of the U.S. economy. It turns out, though, that any role for policy in the recent stabilization of the economy most likely came through monetary policy, since most observers find little role for fiscal policy.

Fiscal Policy. The primary ways in which fiscal policy could play a role in stabilizing the economy are through taxing and spending. Income taxes can work like an automatic stabilizer. When incomes are high, taxes are high, and after-tax incomes are relatively low. When income is low, taxes are low, and after-tax income is relatively high. Thus, income taxes have a stabilizing effect on after-tax incomes and so may be an influence that stabilizes spending. However, fiscal stabilizers such as taxes were at about the same level in 1995 as they were in the 1960s. So, tax policy is unlikely to be much of a factor in the economic stabilization that occurred from the 1960s through the 1990s.

Fiscal policy may also help stabilize the economy through countercyclical spending policies — increasing government spending when economic growth is weak and cutting back on government spending when economic growth is strong. However, countercyclical fiscal policy does not seem any more a factor in the economy's performance after the mid-1980s than before. For example, the discretionary stimulus packages submitted by Presidents Bush and Clinton in 1992 and 1993 were defeated by Congress. In addition, discretionary stimulus packages are not a usual feature of the federal budget in nonrecessionary times. On balance, there is little prima facie evidence that fiscal policy has played a significant role in the increased stability of the U.S. economy since the mid-1980s.

Monetary Policy. Monetary policy underwent a significant change in the early 1980s as part of an effort

FIGURE 3**Standard Deviation of TFP Growth
(percentage points)**

to bring high and rising inflation under control. Could this anti-inflation monetary policy also lead to a more stable overall economy? In the 1980s and 1990s, it appears that the Fed responded more aggressively to movements in inflation. By not letting inflation get too high, the Fed may have mitigated, or eliminated, boom-bust cycles that led to wide swings in real GDP growth in the pre-1980s period and hence a more unstable economy.

The more aggressive monetary policy response to inflation can be seen in Figure 4, which plots the CPI inflation rate and the federal funds rate, the interest rate the Fed controls in setting its policy. Note, for example, that the federal funds rate was 4.8 percent in 1968 when the inflation rate had accelerated to 4 percent. Compare this with 1989, when inflation had again accelerated

to 4 percent, but the federal funds rate was 9.7 percent. Thus, the same level of inflation was associated with a fed funds rate that was twice as high, suggesting that monetary policy was conducted differently after 1980. Monetary policymakers were willing to raise interest rates more aggressively to combat rising inflation to try to rein it in before it got too high. The Fed was trying to avoid the simultaneous high inflation and low real output growth that occurred in the 1970s.

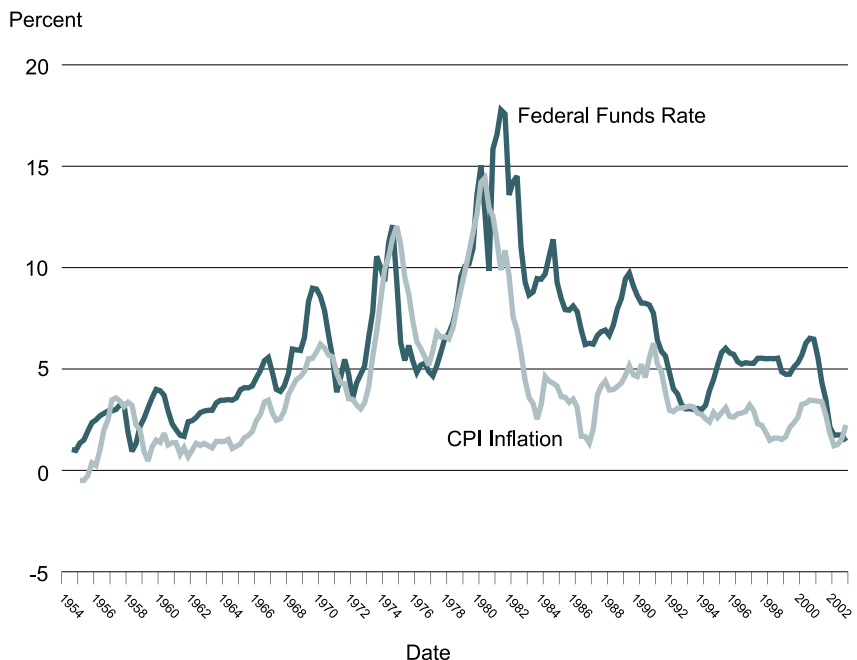
More thorough analysis of the data suggests that indeed monetary policy shifted toward more aggressive inflation fighting around 1979, roughly coinciding with the start of Paul Volcker's tenure as Chairman of the Federal Reserve. A recent paper by Richard Clarida, Jordi Gali, and Mark Gertler found that the Fed did not raise interest rates enough in response

to rising inflation in the pre-1979 era to keep from feeding inflationary pressures. Post-1979, they found that the Fed moved interest rates much more strongly in response to changes in inflation. Sylvain Leduc, Tom Stark, and I also found that easy monetary policy before 1979 contributed to persistently high inflation. Our analysis showed that, after 1979, the Fed was much more effective in using monetary policy to keep inflation under control.⁶

However, a recent paper by Chris Sims and Tao Zha argues that the only period since 1950 with a noticeably different monetary policy is the monetarist experiment of 1979-82, in which the Fed targeted monetary aggregates. Otherwise, monetary policy in the 1970s and post-1982 looks very similar. Sims and Zha do find that the period since 1982 is characterized by a decrease in the volatility of shocks hitting the economy. But their analysis suggests that if the volatility of shocks increases, the volatility of the overall economy could return to its pre-1980s level.

A somewhat different story is told in a recent paper by Athanasios Orphanides. He found that the Fed overstimulated the economy in the pre-1979 era, largely because it had difficulty in measuring how much real output was above or below the level it would be with everyone fully employed, that is, its potential level. If output is above its potential, monetary policymakers might decide to raise interest rates in order to slow down the economy. If output is below potential, policymakers may want to lower interest rates to stimulate growth. However, monetary policy cannot keep output growing above its potential rate indefinitely. Such a policy would eventually result in rising inflation. Orphanides

⁶ See also Sylvain Leduc's *Business Review* article.

FIGURE 4**CPI Inflation and Federal Funds Rate**

suggests that the Fed believed the economy was performing much worse than its potential in the 1970s and so engaged in a stimulative policy that resulted in high inflation. The Fed mismeasured the gap between actual output and potential output because it had not yet realized that potential output growth had slowed from what it was in the 1960s.

These studies found that monetary policy contributed to the high inflation of the pre-1979 era. Could such a policy have destabilized the economy and resulted in higher volatility of real output growth? If monetary policymakers do not raise short-term interest rates at least as much as the expected increase in inflation, the result can be even higher inflation that must eventually be reined in by higher interest rates and, most likely, slower economic growth.

To see this, consider the effect of interest rates on the economy.

A lower real interest rate — that is, the difference between the nominal interest rate and the expected rate of inflation — can help stimulate the economy because it gives people less of an incentive to save today and more of an incentive to spend today.

Suppose the nominal interest rate is 5 percent and expected inflation is 3 percent, so that the real interest rate is 2 percent. A dollar saved today will be worth \$1.05 in one year. But since prices are expected to rise 3 percent, \$1 saved today will buy only 1.02 units of goods and services in one year ($\$1.05/\$1.03 = 1.02$ units). If expected inflation rises to 4 percent and the nominal interest rate stays at 5 percent, the real interest rate falls to 1 percent. Then \$1 will buy only 1.01 units of goods and services in one year ($\$1.05/\$1.04 = 1.01$ units). So a dollar saved today will buy less in the future. Hence, lower real interest rates suggest a smaller incentive to save and

a greater incentive to spend. Note that if the nominal rate had increased the same amount as expected inflation, there would have been no change in the real rate and no change in the units that could be purchased.

Back to monetary policy. Suppose that expected inflation rises 1 percent, and, in response, policymakers raise the federal funds rate 0.5 percent. As a consequence, the real federal funds rate — the federal funds rate less expected inflation — falls 0.5 percent. This stimulates spending and tends to reinforce inflation.

Research by Clarida, Gali, and Gertler, and research that I carried out with Leduc and Stark found precisely this type of policy behavior in the U.S. prior to 1979: Policymakers increased short-term nominal interest rates less than one-for-one with the rise in expected inflation. If policymakers truly want to slow down the economy, the fed funds rate must increase more than one-for-one with the rise in expected inflation, so that the real interest rate rises. The higher real interest rate then helps slow current spending and economic growth. After 1979, short-term nominal interest rates rose more than one-for-one with a rise in expected inflation.

These findings suggest that monetary policy was destabilizing for the economy in the earlier period and stabilizing in the later period. This change in monetary policy that occurred around 1979 could be a significant factor in explaining the drop in economic volatility in the 1980s.

Several studies have attempted to quantify how much the change in monetary policy contributed to the increased stability of the U.S. economy after the mid-1980s. Stock and Watson used a model called a structural VAR to estimate how much monetary policy matters for increased economic stability. Under various

assumptions about how certain features of the model match features of the U.S. economy, they find that from 20 percent to 30 percent of the drop in the volatility of real output growth can be attributed to the change in monetary policy. Carlino, DeFina, and I used a statistical model to measure how much monetary policy matters for the decline in U.S. employment volatility. We put an upper bound of 60 percent on monetary policy's contribution to the variation in employment volatility.

In recent work, Sylvain Leduc and I took a different approach by simulating a fully calibrated model of the U.S. economy under different assumptions about the behavior of monetary policy. Our model is a more explicit description of the economy than Stock and Watson's VAR, but it does not capture the short-run dynamics of the data as well. The benefit of our approach is that the way in which people respond to changes in monetary policy can be fully worked out in the model, so policy's contributions to the change in volatility can be more precisely quantified. We found that the change in monetary policy accounts for only about 15 percent of the drop in the volatility of real output growth — a contribution smaller than that reported by Stock and Watson.

HOW MUCH IS UNEXPLAINED?

The policy and nonpolicy factors discussed above are among the principal channels economists have looked at in trying to determine why the economy has become more stable since the mid-1980s. Measuring the

contribution of these factors to the decline in volatility depends on the model used, but to use a rough measure, we might say that these factors account for much of the decline in the volatility of real output growth since the mid-1980s. Still, a significant part of the decline in volatility remains unexplained. Stock and Watson refer

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to this remainder as “unexplained good luck.” It means that the economy was not buffeted by large and variable shocks in the 1980s and 1990s as it had been before.

What are these shocks?


They are unexpected and unmeasured events that affect the economy, such as weather, domestic and foreign political outcomes, and labor disputes. By their very nature, these shocks are difficult to identify and measure. A consequence of this large, unexplained good luck component of the decline in volatility is that the increased stability experienced by the U.S. economy since

the mid-1980s may be a temporary phenomenon. If the bad luck of the pre-1980 period were to return, economic volatility would, to some extent at least, increase.

The finding that improved monetary policy contributed to the increased stability of the economy suggests, though, that even if the unexplained bad luck of the pre-1980 period returns, the economy would not experience the same degree of volatility as before. Monetary policymakers seem more attuned to the dangers of the boom-bust cycles that may occur if inflation is not kept low and stable.

CONCLUSION

The shift in monetary policy toward stabilizing inflation seems to be an important part of the story behind the decline in economic volatility. The data indicate that keeping inflation low and stable seems to reduce economic volatility. Inflation-fighting policies appear to help reduce boom-bust cycles for the economy and promote steadier economic growth.

However, to the extent that a substantial fraction of the decline in economic volatility remains unaccounted for, it remains uncertain whether lower volatility is a permanent feature of the U.S. economy. It appears, though, that even should shocks that hit the economy become more variable, inflation-fighting monetary policy will help promote stability so that even if shocks similar to those of the pre-1980 period return, the economy would likely experience less overall volatility. 

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