



Economic Letter

Inflation Expectations Have Become More Anchored Over Time

by J. Scott Davis

► The experiences of the 1970s show that when inflation expectations become unanchored, they may become self-fulfilling, or in the words of former Federal Reserve Chairman Paul Volcker, “inflation feeds in part on itself.”

The Organization of Arab Petroleum Exporting Countries imposed an oil embargo on the United States in October 1973 in response to U.S. support of Israel during the Yom Kippur War. The embargo was lifted in March 1974, and although it lasted less than six months, the effects on inflation and inflation expectations in the United States would persist for a decade.

Oil prices spiked, increasing by more than 350 percent from June 1973 to June 1974, propelling a sharp increase in U.S. inflation (*Chart 1*). Consumer prices jumped 12 percent in 1974, from a 3 percent rise in 1972. Although the 1973 oil price shock was transitory—the price of oil declined over the next two years—inflation proved more persistent. After exceeding 5 percent in 1973, it didn’t fall below that level again until 1982.

The experiences of the 1970s show that when inflation expectations become unanchored, they may become self-fulfilling, or in the words of former Federal Reserve Chairman Paul Volcker, “inflation feeds in part on itself.” This helps explain how a transitory oil price spike in 1973—along with a second oil shock in the late 1970s (associated with the 1979 Iranian Revolution)—could lead to a decade of high inflation. Over the past 30 years, Federal Reserve policy has succeeded in better anchoring infla-

tion expectations, producing diminished expectations that a short-term shock leads to sustained high inflation.

Understanding Expectations

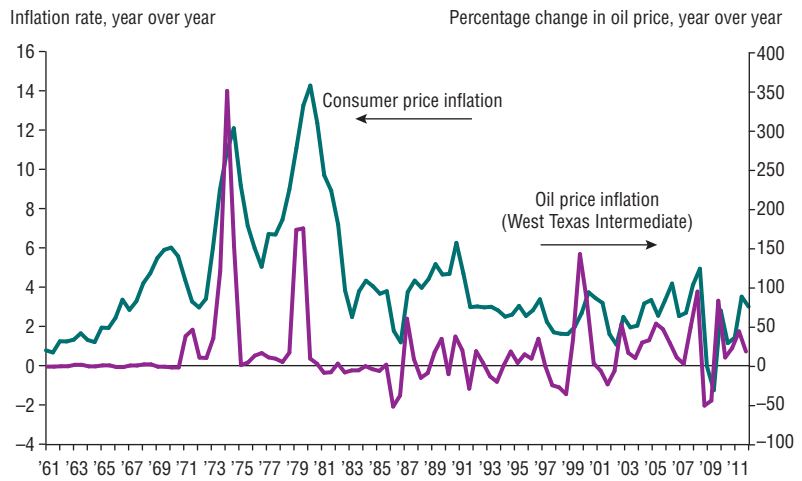
The 1970s forced economists to re-examine their macroeconomic models, resulting in a better understanding of the role of inflation expectations in the price-setting process. When a business establishes prices that will remain fixed for several periods, it must factor in not only input costs today, but also an expectation of what these costs will be in the future. Similarly, when a worker signs a labor contract stipulating the wage rate over the next few periods, it must reflect not only today’s cost of living but also the expected cost of living over the life of the agreement.

This leads to an interesting phenomenon where the expectation of future higher prices may prompt higher prices now. If a business expects that high inflation in the future will mean increasing costs, it may attempt to compensate by raising prices now. Likewise, when a worker expects rising consumer prices in the future, higher wages may be demanded now. Both cause prices to increase today, resulting in higher inflation. Inflation expectations may become self-fulfilling.

The year-over-year percentage change in oil price is again plotted in

► While a number of factors, such as an oil embargo, can temporarily help boost prices, only loose monetary policy can generate a sustained price rise over the medium to long run.

Chart 1 | 1973 Oil Price Shock Leads to a Decade of High Inflation



SOURCES: Haver Analytics; Bureau of Labor Statistics.

Chart 2, alongside one-year-ahead inflation expectations, as measured by the Federal Reserve Bank of Philadelphia's Livingston Survey. The survey has recorded year-ahead inflation expectations since 1946 and is the longest-running such measure. Inflation expectations, which had risen slightly since the mid-1960s, jumped dramatically in 1973, exceeding 6 percent for the first time late that year and not declining below that level until 1983. Interestingly, even

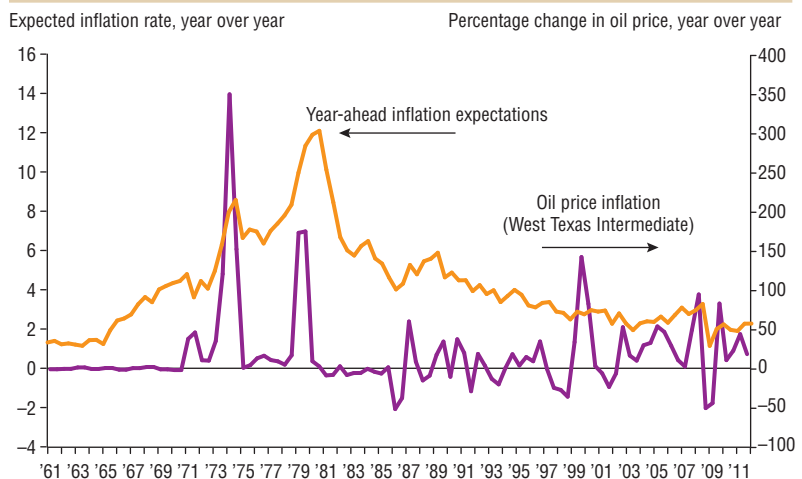
after the oil price shock abated, inflation expectations didn't decline.

The 1973 oil price shock and the subsequent Fed policy response unanchored inflation expectations through the self-fulfilling nature of expectations.

A Monetary Phenomenon

Nobel laureate economist Milton Friedman said that "inflation is always and everywhere a monetary phenomenon." Friedman was careful to qualify that

Chart 2 | Inflation Expectations Remain High for a Decade After 1973 Oil Price Shock



SOURCES: Haver Analytics; Bureau of Labor Statistics; Federal Reserve Bank of Philadelphia.

inflation is a “steady and sustained rise in prices.” While a number of factors, such as an oil embargo, can temporarily help boost prices, only loose monetary policy can generate a sustained price rise over the medium to long run.

Movements in current inflation may be driven by a number of factors unrelated to monetary policy; however, monetary policy should drive inflation expectations over the long run. Thus, when U.S. inflation expectations become unanchored and stay unanchored for a decade, it is because the Fed allowed it to happen.

In late 1979, at the start of the Volcker chairmanship, the central bank raised interest rates and pushed the economy into a major recession to bring down inflation—unemployment exceeded 10 percent. More important, the actions convinced the public that the Fed was serious about maintaining low inflation.¹ In one of his first congressional testimonies, Volcker said:

“Inflation feeds in part on itself, so part of the job of returning to a more stable and more productive economy must be to break the grip of inflationary expectations.”²

Since inflation expectations may be self-fulfilling, a central bank must ensure that such expectations are well-anchored if it is to deliver a low and stable inflation environment. Measuring the anchoring of inflation expectations and how that anchoring changed over time are important issues.

Measuring Inflation Anchoring

One way to gauge such anchoring is calculating the responsiveness of expected inflation in the next few years to a shock to current inflation. If expectations are well-anchored, the response will be minimal.

The Federal Reserve Bank of Cleveland publishes a series of market-based inflation expectations, extracted from bond yields. This dataset contains measures of inflation one year ahead, two years ahead, three years ahead, all the way up to 30 years. The data are available monthly, starting in January 1982.³

Many factors unrelated to monetary policy can affect inflation in the short run. Thus, when measuring the anchoring of inflation expectations, it is best to

exclude short-run, transitory fluctuations and focus on long-run expectations of inflation. To do that, a useful tool is the “five-year-ahead, five-year-forward” measure—the expected rate of inflation over a five-year period beginning five years from now. Temporary shocks, such as droughts and oil supply shocks, will wash out within the next five years. Using Cleveland Fed measures of the five-year-ahead and 10-year-ahead expected inflation rates, it is possible to back out the five-year-ahead, five-year-forward rate—a good measure of long-run inflation expectations.⁴

Measures of both inflation shocks and the corresponding revisions or updates of long-run inflation expectations can be calculated. The “shock” that could potentially unanchor long-run inflation expectations will be a surprise in the current inflation rate. The surprise, or unexpected component, of inflation is calculated as the difference between the actual inflation rate over the past year and the Cleveland Fed’s measure of the one-year-ahead expected inflation rate, one year ago.

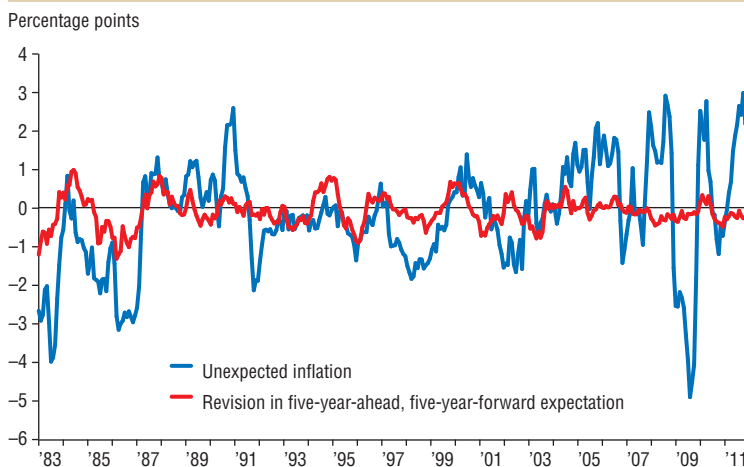
Revisions to long-run inflation expectations for the same time period are the difference between the five-year-ahead, five-year-forward expected inflation rate at a particular time and the six-year-ahead, five-year-forward expected inflation rate one year earlier. Although

the inflation expectations are measured at different times, both of the five-year-forward rates refer to the same five-year period, so the difference between the two mainly reflects new information, such as the surprise in the current inflation rate.

A plot of the changes in the five-year-ahead, five-year-forward expected inflation rate shows that during the early part of the 1983–2011 period, long-run inflation expectations were quite variable and highly correlated with unexpected inflation (*Chart 3*). For instance, in early 1984, when inflation turned out to be almost 1 percentage point higher than expected, the expectation of long-run inflation also increased by nearly 1 percentage point. A few years later, in 1986, when inflation turned out to be 3 percentage points lower than expected, people reduced their expectations of long-run inflation by 1 percentage point.

The chart shows that over this nearly 30-year sample, long-run inflation expectations became less volatile and less responsive to surprises in current inflation. For example, between 2008 and 2011, unexpected inflation fluctuated: 3 percent in 2008, negative 5 percent in 2009, 3 percent in early 2010, negative 2 percent later in 2010 and 3 percent in 2011—yet, long-run inflation expectations over this period, as measured by revisions in the five-year-ahead, five-year-forward rate, barely moved.

Chart 3 Long-Run Expectations No Longer Respond to Current Inflation Surprises



SOURCES: Haver Analytics; Bureau of Labor Statistics; Federal Reserve Bank of Cleveland.

Table 1

Inflation Expectations Become More Anchored Over Time

	Years	γ	95 percent confidence region
Full sample	1983–2011	0.11	0.08–0.14
	1982–89	0.28	0.22–0.34
Subsamples	1990–99	0.18	0.10–0.25
	2000–11	0.03	0.00–0.06

NOTE: γ equaling zero indicates perfectly anchored inflation expectations.

SOURCE: Author's calculations.

The statistical methodology of ordinary least-squares regression allows analysis of the relationship between two or more variables. This “averaging” tool helps measure how short-run surprises affect long-term inflation expectations. For example, if inflation over the past year is 1 percentage point higher than expected, the least-squares regression results show that people tend to raise their long-run expectations by some number γ of percentage points—for 1983–2011, γ is 0.11 (Table 1). This means that, on average over the period 1983 to 2011, a 1 percentage point surprise in the inflation rate raised long-term inflation expectations by 0.11 percentage points. The smaller the value of γ , the more anchored are long-run inflation expectations—if γ is not significantly different from zero, then long-run expectations are perfectly anchored.

Anchoring of inflation expectations over the past 30 years has changed markedly, as shown by the results in the bottom half of Table 1. In the 1980s,

confronted with a 1 percentage point higher-than-anticipated inflation rate, people boosted their expectations for long-run inflation by 0.28 percentage points. However, since 2000, people raise their expectations by about 0.03 percentage points following a similar surprise, suggesting that long-run expectations are almost perfectly anchored.

As few as 30 years ago, long-run inflation expectations were quite responsive to short-term shocks. Over the ensuing period, the Fed has been better able to anchor such expectations so that now long-run expectations barely change following a series of dramatic, but ultimately transitory, inflation surprises.

Davis is a research economist in the Research Department of the Federal Reserve Bank of Dallas.

Notes

¹ For a detailed account of how stabilizing inflation expectations was the primary concern of the Fed of the early 1980s, see “The Incredible Volcker Disinflation,” by Marvin Goodfriend and Robert King, *Journal of Monetary Economics*, vol. 52, no. 5, 2005, pp. 981–1015.

² Statement by Paul Volcker, Chairman, Board of Governors of the Federal Reserve System, before the Joint Economic Committee of the U.S. Congress, Oct. 17, 1979, reprinted in *Federal Reserve Bulletin*, vol. 65, November 1979, pp. 888–90.

³ The data, as well as working papers and articles describing the data, are available online from the Federal Reserve Bank of Cleveland website, www.clevelandfed.org/research/data/inflation_expectations.

⁴ If $\pi_{t,t+10yr}^e$ is the 10-year-ahead expected inflation rate at time t and $\pi_{t,t+5yr}^e$ is the five-year-ahead expected inflation rate, then the five-year-ahead, five-year-forward rate at time t , $\pi_{t,t+5yr,t+10yr}^e = 2\pi_{t,t+10yr}^e - \pi_{t,t+5yr}^e$. So, for instance, if the 10-year-ahead expectation is 6 percent and the five-year-ahead is 5 percent, then the expected inflation rate over the five years beginning five years from now is 7 percent.

DALLAS FED



Economic Letter

is published by the Federal Reserve Bank of Dallas. The views expressed are those of the authors and should not be attributed to the Federal Reserve Bank of Dallas or the Federal Reserve System.

Articles may be reprinted on the condition that the source is credited and a copy is provided to the Research Department of the Federal Reserve Bank of Dallas.

Economic Letter is available free of charge by writing the Public Affairs Department, Federal Reserve Bank of Dallas, P.O. Box 655906, Dallas, TX 75265-5906; by fax at 214-922-5268; or by telephone at 214-922-5254. This publication is available on the Dallas Fed website, www.dallasfed.org.

Richard W. Fisher, *President and Chief Executive Officer*
Helen E. Holcomb, *First Vice President and Chief Operating Officer*
Harvey Rosenblum, *Executive Vice President and Director of Research*
E. Ann Worthy, *Senior Vice President, Banking Supervision*
Mine Yücel, *Director of Research Publications*
Anthony Murphy, *Executive Editor*
Michael Weiss, *Editor*
Jennifer Afflerbach, *Associate Editor*
Ellah Piña, *Graphic Designer*

FEDERAL RESERVE BANK OF DALLAS
 2200 N. PEARL ST., DALLAS, TX 75201