

Examining Long and Variable Lags in Monetary Policy

May 24, 2023

By [Bill Dupor](#)

KEY TAKEAWAYS

- The term “long and variable lags,” initially coined by economist Milton Friedman, has appeared prominently in the way that central bankers talk about the impact of monetary policy.
- It can take changes in interest rates some time to affect the macroeconomy (the lag is long), and that time can differ unpredictably across episodes (the lag is variable).
- One reason for these lags could be that many transactions have prices (which affect inflation) and quantities (which affect employment and output) agreed upon well in advance.

During the press conference following the November 2022 Federal Open Market Committee meeting, Federal Reserve Chair Jerome Powell discussed the idea that monetary policy involves “long and variable lags.”¹ Between Chair Powell and reporters at that press conference, the word “lag” or variations of it were mentioned a combined 17 times. In recent months, other Fed officials have used the long-and-variable-lag terminology as well.²

This language is also prominent among central bankers outside the U.S. For instance, later in November 2022, Reserve Bank of India Deputy Governor Michael Patra pointed out that monetary policy operates with long and variable lags.³ And in February 2023, Bank of England Monetary Policy Committee member Catherine Mann described several determinants of these long and variable lags, for example, the degree to which an assessment is backward- or forward-looking when expectations are formed.⁴

Given the term’s appearance in recent communications from central bankers about monetary policy, this article will examine some key questions about what long and variable lags are, what causes them, where the concept originated, and what they may look like today.

What are long and variable lags in monetary policy all about?

The concept starts with the idea of cause and effect. In the U.S. economy, the relevant event (or “cause”) is an adjustment in monetary policy, usually raising or lowering the target range for the federal funds rate. This event, in turn, prompts another one (the “effect”), for example, changes in the inflation rate, the employment level, output growth or other macroeconomic outcomes.

Of course, many elements—the availability of production factors (such as oil), consumer and business optimism or pessimism about the future, and the number of new ideas that might generate economic growth, for example—influence the state of the macroeconomy. But policymakers and the public are particularly interested in the causal effect of monetary policy on the macroeconomy because, in most

developed economies, central banks control such policy and because it has important effects on inflation, output and employment.

Observers have noted that it takes some time for an adjustment in monetary policy, as implemented by central banks through interest rate changes, to affect the macroeconomy—the so-called long lag. The lag is not only long, but it is also variable; that is, the time between cause and effect can differ from episode to episode in a way that is difficult to predict.

Where does the concept originate?

Economists Milton Friedman and Anna J. Schwartz studied long historical spans of monetary policy and the macroeconomy in the U.S. and U.K. and described the importance of long and variable lags.⁵ In his book *A Program for Monetary Stability*, Friedman writes, “There is much evidence that monetary changes have their effect only after a considerable lag and over a long period and that the lag is rather variable.”⁶

Friedman then quantifies such lags in monetary policy (although he characterizes this policy as operating through changes in the money supply, or “stock,” rather than through changes in interest rates) for the period he and Schwartz had studied, which covered the mid-19th to the mid-20th centuries.

On the lagged effects of monetary policy, Friedman wrote that, averaged over the 18 business cycles they studied, “peaks in the rate of change in the stock of money tend to precede peaks in general business by about 16 months and troughs in the rate of change in the stock of money to precede troughs in general business by about 12 months.” Moreover, he found a similar relationship applied to inflation. Today, we would associate what Friedman called “general business” with measures like employment level, consumption and real gross domestic product.

On the variability of lags, Friedman wrote that “the recorded lead has varied between 6 and 29 months at peaks and between 4 and 22 months at troughs.” For Friedman, the variability is the crux of the problem.

What was Friedman’s takeaway from this historical analysis?

Friedman is said to have described the issue of long and variable lags using the analogy of a shower with unreliable controls for the hot and cold water. A person turning on the shower might adjust the controls trying to achieve a comfortably warm setting. If the shower hasn’t been used recently, the water in the pipes may initially be freezing cold (i.e., there’s a lag from cold to warm). The person might respond by cranking up the hot water. The shower-taker—after another lag—may unexpectedly find themselves scalding. The person turns down the hot water, and the cycle repeats.

With long and, in particular, variable lags in monetary policy, central bankers can find themselves in an analogous situation when trying to combat either an inflationary episode or a recession. Friedman concluded that, because of long and variable lags, trying to control economic activity or inflation using active monetary policy⁷ was essentially unachievable.

Addressing the feasibility of a policy that targets the price level, Friedman wrote: “I find it virtually impossible to conceive of an effective procedure when there is little basis for knowing whether the lag between action and effect will be 4 months or 29 months or somewhere in between.”⁸

Does the long-and-variable-lag phenomenon occur the same way today as it did in the period Friedman studied?

Asset prices, such as stock prices and interest rates on government bonds, generally respond to changes in monetary policy within hours or minutes. These prices also often respond quickly to forces that affect expectations about monetary policy, such as speeches by central bank officials and data releases (for example, monthly employment and price data) that might help determine the course of future monetary policy.

While asset prices respond quickly, the prices of goods and services (which are reflected in inflation) and real economic activity (which is reflected in employment and output) have longer and more variably lagged responses. There is even variability in opinion about the amount of variability in these lags. For instance, Federal Reserve Bank of Atlanta President Raphael Bostic wrote in November 2022 that “a large body of research tells us it can take 18 months to two years or more for tighter monetary policy to materially affect inflation.”⁹ In contrast, in a January 2023 speech at the Council on Foreign Relations, Federal Reserve Gov. Christopher Waller stated his view that, more recently, lags tend to be nine to 12 months.¹⁰

What causes monetary policy to have long and variable lags?

One reason for long and variable lags is that many economic transactions involve prices and quantities that are agreed upon months in advance by the buyer and seller. Consider a toy company placing an order with a manufacturer in the summer for the upcoming holiday sales season, or a homeowner signing an agreement with a contractor for a remodeling project that might start six months later.

Suppose such agreements occur in advance of an unanticipated monetary policy change. Then, the contribution of those dollar prices (which affect inflation) and real quantities (which affect employment and output) will not be influenced by the new interest rate (or stock of money, to use Friedman’s framework) in the economy in the short run. In contrast, agreements with short horizons will be affected by the policy change more quickly, as will the longer-horizon agreements that are set after the policy change. The full impact of the monetary policy change on inflation, employment and output will be realized over time.

Putting contract length aside, some economists have argued that lags following a change in monetary policy reflect the presence of “inattentiveness” among businesses and consumers toward the overall macroeconomic environment. For example, some firms must incur costs to develop pricing plans for the goods they sell. To avoid accruing this cost many times in a year, they may set price plans only once and behave inattentively the rest of the year. As such, their pricing behavior will be unresponsive to changes in monetary policy outside that limited price-planning window. This potentially contributes to lags being long and variable.

Notes

1. See the [transcript of Chair Powell’s Nov. 2, 2022, press conference \(PDF\)](#).
2. Examples include a [February 2023 interview that Cleveland Fed President Loretta Mester gave to The Wall Street Journal](#) and a [speech that Fed Gov. Lisa D. Cook delivered at the Peterson Institute for International Economics in October 2022](#).
3. See his Nov. 12, 2022, speech, “[Lost in Transmission? Financial Markets and Monetary Policy](#).”
4. See her Feb. 23, 2023, speech, “[Expectations, Lags, and the Transmission of Monetary Policy](#)” (PDF).
5. See Milton Friedman and Anna J. Schwartz’s *A Monetary History of the United States, 1867-1960* (Princeton University Press, 1963) and *Monetary Trends in the United States and the United*

- Kingdom: Their Relation to Income, Prices, and Interest Rates, 1867-1975* (University of Chicago Press, 1982).
6. See Friedman's *A Program for Monetary Stability* (Fordham University Press, 1960).
 7. Central bank action to actively counteract slowdowns or declines in economic activity is called countercyclical monetary policy.
 8. Again, see Friedman's *A Program for Monetary Stability* (Fordham University Press, 1960).
 9. See Atlanta Fed President Raphael Bostic's Nov. 15, 2022, article, "[On Long and Variable Lags in Monetary Policy.](#)"
 10. See Fed Gov. Christopher Waller's [Jan. 20, 2023, speech at the Council on Foreign Relations.](#)

About the Author

Bill Dupor

Bill Dupor is an economist and vice president at the Federal Reserve Bank of St. Louis. His research interests include fiscal policy and dynamic economics. He joined the St. Louis Fed in 2013. [Read more about the author and his work.](#)