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Big Shocks Travel Fast: Why Policy Lags May Be Shorter Than You Think

Remarks by

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Thank you. Whenever I get such a warm welcome, I always say to myself, “Waller, they really aren’t here for you or your sparkling personality. They’re here for your outlook.”¹ Which is fine, because accurately communicating my economic outlook is an important part of my job. Tonight, in addition to providing new information about my outlook based on new data, I also want to clarify my views on how the economy has been operating over time and my view of appropriate monetary policy. Doing so can help the public anticipate how I will react to new developments, not just at the next meeting of the Federal Open Market Committee (FOMC), but further into the future. That’s crucial, because monetary policy works mostly by influencing the public’s view of financial and economic conditions well into the future, affecting spending and investment decisions. Whether I say so or not, every time I speak, I am trying to better explain how and why I make policy decisions.

My plan is to cover three issues. First, by looking over the past few FOMC meetings, I want to describe how my outlook has been shaped by both economic data and uncertainty—what we have learned at each point and what we don’t yet know about the economy. Second, I will discuss how I think about lags with which policy affects economic activity and inflation and the impact on the appropriate path of policy. And third, I will review the recent data and discuss how I see policy evolving over the remainder of this year.

Recent Policy Actions

At the June meeting, I supported keeping the policy rate unchanged. Based only on the economic data that was coming in showing a tight labor market and stubbornly

¹ The views expressed here are my own and are not necessarily those of my colleagues on the Federal Open Market Committee.

high inflation, I believe that raising the policy rate 25 basis points was justified. However, I had lingering doubts about when or if an abrupt tightening of credit conditions would occur. I viewed the lingering effects of the banking stresses from March as a downside risk to cause a tightening of credit conditions. Although there did not appear to be a lot of evidence that a substantial credit crunch was in the works, I felt that waiting another six weeks was prudent risk management. In the end, I believed that risk management concerns slightly outweighed hiking based on the incoming data.

I also felt more comfortable with this decision given that the median of the Summary of Economic Projections (SEP) signaled two additional rate hikes by the end of this year. Early in March, prior to the March FOMC meeting, I had planned to raise my terminal rate 50 basis points given the hot data that had come in at that point. But then came the turmoil in the banking sector. My thought was that credit conditions were going to tighten a lot as a result of the banking turmoil. I believed this tightening would effectively replace some of the tightening that otherwise would have been needed through monetary policy. The net result was that in the March SEP, I left my projection of the terminal policy rate unchanged from December. But by June, there was little evidence that credit conditions were tightening more than would be expected as a result of monetary policy that had already tightened significantly. This led me to believe policy needed to be tighter relative to what I thought in March. So, I marked up my projected path for the federal funds rate at the end of 2023 by 50 basis points.

So why did I walk you through this evolution of my thinking of the appropriate setting of policy? First, it highlights how the appropriate setting for monetary policy shifts over time. Second, it shows that managing uncertainty and risks is a big part of my

job. Third, I hope it allows you to better consider how policymakers will adjust the setting of policy in response to incoming data going forward.

Monetary Policy Lags

A second issue for the FOMC is how long it takes for changes in monetary policy to affect economic activity and inflation. As reported in the minutes of various FOMC meetings, the Committee often discusses these lags. There is a wide range of views among researchers and policymakers as to how long it takes for the full effect of monetary policy to register in the economy.

What I would like to discuss is expectations for how long it will take for last year's sizable monetary policy tightening to show up in the economic data. While there is no consensus on an exact length of time, traditional rules of thumb say that the maximum effect of an unexpected policy change, what economists call a "shock," on the real economy is between 12 and 24 months. There is tremendous uncertainty around this estimate. Furthermore, commentary sometimes treats lagged effects as a "Wile E. Coyote" moment where nothing happens for a long time and then wham...off the cliff we go as the full force of past policy actions suddenly take effect.

When considering applying this 12- to 24-month rule to last year's policy actions, we need to ask two questions: (1) When did the policy shock occur? (2) Does the size of the shock matter? What I want to do in the next few minutes is push back against the view that the bulk of the effects from last year's policy hikes have yet to hit the economy.

Let me start by setting the stage with how the economic models that estimate these lags are developed. Some of this discussion may be a bit geeky, so bear with me. Economists typically use linear or log-linear statistical models that capture how past

changes in a variable affect the current realization of that variable. The impact of past realizations of an economic variable on current values is estimated using constant coefficients. For example, if gross domestic product (GDP) increased at a 1 percent annual rate last quarter, a model might estimate that 0.9 of that increase will carry through to GDP in the current quarter and .8 of it will carry forward into the next quarter. These estimates of 0.9 and 0.8 are constant across time and are independent of how big the change is in GDP last quarter—if last quarter's GDP increased at a 2 percent rate, 0.9 of that would carry through to the current quarter and 0.8 of it would carry forward into the next quarter. In short, the speed at which past changes feed into current and future values does not change over time and does not depend on the size of past changes.

Once these models are estimated using historical data, the policy exercise then is to feed an unexpected, temporary 25 basis point increase in the federal funds rate into this system of linear equations and simulate the effects on key economic variables. The idea is to capture a causal response of the economy to the policy shock. Based on this process, we can trace out the change over time in a variable, say GDP. Economists call this an impulse response function.

Typically, these impulse response functions illustrate how the variables move relative to their long-run values. The impulse response functions are normally hump-shaped—there is a small effect initially and the effect grows over time with the maximal impact occurring several quarters after the policy surprise. After the peak impact, the effect of the policy change on the real economy fades away, with the variables returning to their long run steady state values. The hump-shaped impulse response function illustrates that there are lagged effects from a policy surprise. There are a wide variety of

statistical models one can use for this exercise but looking across these models, one gets the rule of thumb that the maximal effects of monetary policy changes will hit the economy with a 12-month to 24-month lag.

There are two key takeaways from this discussion. First, the hump-shaped response means there are no “cliff effects”—a policy change is not associated with a long period of no effect that is then followed by an abrupt change in the variable. Second, economic variables respond sluggishly to unexpected policy changes and the sluggishness is what generates a lagged response to a policy action. There are many explanations as to why households and businesses respond sluggishly, such as adjustment costs, sticky prices and wages, nominal contracts, habit persistence in consumption, or the fact that there is an option value of waiting when deciding to invest.

Given this basic description of how lags are estimated, let me now turn to my questions. First, when did the policy shock occur? In these statistical models, it occurs when there is an unexpected change in the federal funds rate. In short, from the point of view of the model, the FOMC wakes up one morning and surprises markets with a 25-basis point hike.² While this is a fun exercise to see what happens, it doesn't really capture how monetary policy works in practice. Only rarely do policymakers try to surprise markets, and in fact, we usually specify our policy intentions well ahead of time through the use of forward guidance. As I said earlier, forward guidance is one of the purposes of this speech. Forward guidance is used to signal future policy actions and,

² Typically, economists look at the difference between the actual policy rate change and the expected change from federal funds rate futures. So, if the FOMC raised the policy rate by 25-basis points and the market expected a 10-basis point hike (meaning the market pricing reflected a 40 percent probability of a 25 basis point hike and 60 percent probability of no change) this would correspond to a policy surprise of 15 basis points.

when it is credible, financial markets price those expected actions into today's interest rates. By instantly pricing in future policy, promised rate hikes *immediately* affect many of the costs of financing for households and firms, even though the actual policy rate hasn't moved. As a result, policy tightening occurs with the *announcement* of policy tightening, not when the rate change actually happens.

As an illustration, look at how the two-year Treasury yield moved between late 2021 and March 2022, a time when the FOMC was talking about lifting the policy target range above zero. I have argued in the past that the two-year Treasury yield is a good proxy for the stance of monetary policy and captures announcement effects.³ The 2-year yield went from 25 basis points in September 2021 to around 200 basis points by the March 2022 FOMC meeting. Even though we had not raised the policy rate nor did we get the policy rate up to 200 basis points until August 2022, the markets priced in a nearly 200 basis point increase in the expected policy rate before we actually raised it. This forward guidance effectively shaved off about 6 months from the usual 12- to 24-month lag that one might conjecture would be needed to see the 200 basis points of actual tightening affect the economy.⁴ That is, forward guidance shortens the lag time between when the policy rate changes and when the effects of actual policy tightening occur.

Now let me turn to the second question, whether the size of the shock matters for estimating lags in policy. In the standard linear models used for these exercises, the size

³ See Christopher J. Waller (2022), "Reflections on Monetary Policy in 2021," speech delivered at the 2022 Hoover Institution Monetary Conference, Stanford, Calif., May 6, <https://www.federalreserve.gov/newsevents/speech/waller20220506a.htm>.

⁴ Recent analysis by Fed economists shows the announcement effects of policy have in fact led to a shortening in monetary policy lags. See Taeyoung Doh and Andrew T. Foerster (2022), "Have Lags in Monetary Policy Transmission Shortened?" Federal Reserve Bank of Kansas City, *Economic Bulletin*, December 21, <https://www.kansascityfed.org/research/economic-bulletin/have-lags-in-monetary-policy-transmission-shortened/>.

of the shock doesn't matter. The size of the shock basically scales the effect proportionately without changing the timing of when past changes affect current values of a variable.

What I am going to argue is that the size of the shock may lead to changes in economic behavior that change the coefficients in the statistical models. In less jargony words, the degree of sluggish behavior of economic variables to a policy surprise is not constant but can change with the size and nature of the shock.⁵

There are a lot of reasons to think that “big shocks travel fast,” meaning they elicit a change in economic behavior that would not be associated with small shocks. In the past year the FOMC has raised rates faster than it has in forty years, so we should be skeptical about whether statistical models based on historical experience will be reliable in estimating lags for such an unusual event. To support this line of reasoning, let me use some examples to illustrate the concept that big shocks travel fast.

First, a large area of economic research focuses on the idea of “rational inattention.”⁶ The basic idea is that households and firms have a limited amount of attention that they can dedicate to processing information. It is costly and time consuming to constantly adjust behavior and portfolios in response to small changes in prices or interest rates. Consequently, people must decide which data to focus on and how often they look at it. Because households and firms “rationally ignore” certain data

⁵ Most economists will recognize this application of the Lucas Critique.

⁶ See the recent survey article by Bartosz Maćkowiak, Filip Matějka, and Mirko Wiederholt (2023), “Rational Inattention: A Review,” *Journal of Economic Literature*, vol. 61 (March), pp. 226–73, <https://doi.org/10.1257/jel.20211524>.

and only look at them infrequently, their behavior looks sluggish in how they respond to small shocks.

But this sluggishness does not apply when big shocks hit. For example, large changes in interest rates will get a lot of attention and have a much faster and dramatic impact on consumption, saving and portfolio allocation. The apparently “sluggish behavior” based on small shocks disappears, and households and firms change their behavior much more quickly. Big changes in policy rates will tend to cause more rapid changes in behavior, which implies monetary policy lags will be shorter when changes to the policy rate are large and rapid.

As a second example, consider the frequency at which firms change their prices. Data show that firms typically adjust their prices once a year, which is usually interpreted to mean that prices are “sticky.” However, recent evidence shows that because of the big inflation shock that occurred over the past two years, prices have changed more frequently as firms tried to keep their relative prices in line with rapidly changing market conditions. This fact has important implications for the Phillips curve model that economists use to link unemployment and inflation. The shift in frequency of price setting will affect the slope (the coefficient), which indicates how sensitive inflation is to a change in unemployment.

I addressed this issue in a speech earlier this year.⁷ Using historical data, where the frequency of price adjustment was about once a year, this had the effect of pinning down the slope of the Phillips curve. The Phillips curve was estimated to be very flat.

⁷See Christopher J. Waller (2023), “The Unstable Phillips Curve,” speech delivered at Macroeconomics and Monetary Policy, a conference sponsored by the Federal Reserve Bank of San Francisco, San Francisco, Calif., March 31, <https://www.federalreserve.gov/newsevents/speech/waller20230331a.htm>.

The implication is that unemployment has to increase a lot to bring inflation down by a small amount. But, with the more frequent price changes lately, the Phillips curve has steepened. This steepening implies that monetary policy will affect inflation faster and with less effect on the unemployment rate than would occur if price changes were slower. So once again, the lags between changes in monetary policy and inflation should be shorter than historical experience tells us, and as is reflected in models.

What is the implication of this economic research? The effects of policy tightening last year are feeding through to market interest rates faster than typically thought because of announcement effects, and on top of this we have had policy rate changes that have been more dramatic and faster than in the past which most likely has led to a more rapid adjustment in the behavior of households and firms. These two points suggest that the effects of the large policy changes that we undertook last year should hit economic activity and inflation much faster than is typically predicted.

If one believes the bulk of the effects from last year's tightening have passed through the economy already, then we can't expect much more slowing of demand and inflation from that tightening. To me, this means that the policy tightening we have conducted this year has been appropriate and also that more policy tightening will be needed to bring inflation back to our 2 percent target. Pausing rate hikes now, because you are waiting for long and variable lags to arrive, may leave you standing on the platform waiting for a train that has already left the station.

Economic Outlook

Let me now turn to my third topic: how I see things standing today. Economic activity reportedly grew 2 percent in the first quarter, and based on economic data

through early July, the Atlanta Fed's GDP projection suggests growth was a touch higher in the second quarter. Recent Institute for Supply Management surveys suggest some continued slowing in the manufacturing sector, but activity outside that sector is still growing at a solid pace.

Turning to the labor market, it has been very tight for a long time and the most recent jobs report showed that employers added 209,000 jobs in June. This number came in a little lower than expected, and it is down noticeably from this time last year. Meanwhile, data on job openings showed some welcome signs of cooling. The ratio of job vacancies to the number of people counted as unemployed has declined on balance so far this year, and the number of people quitting their jobs, which I tend to think of as moving for higher wages, has moved down from its peak last year. However, despite these welcome signs of softening, the labor market is still very robust. Job growth is still well above the pre-pandemic average, the unemployment rate remains quite low, and wage growth continues to be above what would support returning inflation to 2 percent.

Yesterday, we received new data on consumer price index (CPI) inflation. After 5 consecutive monthly readings of core inflation of 0.4 percent or above, this rate dropped by half in June, to 0.2 percent. This is welcome news, but one data point does not make a trend. Inflation briefly slowed in the summer of 2021 before getting much worse, so I am going to need to see this improvement sustained before I am confident that inflation has decelerated.

In terms of the latest banking data, the Federal Reserve's weekly release of assets and liabilities of commercial banks (the H.8 data release) suggests that banks are responding in a way that is consistent with monetary policy tightening but not banking

stress. For example, growth in core loans on banks' books has decelerated since late 2022, as banks tightened lending standards and demand slowed amid lagged effects from monetary policy tightening. The deceleration in core loan balances was especially pronounced in early 2023 even before the Silicon Valley Bank collapse and has continued afterwards. And we did see discrete effects in deposit outflows in mid-March, but those flows have stabilized. Moreover, banks have been able to replace core deposit outflows with large time deposits, Federal Home Loan Bank advances and other sources of funding. These actions are leading to a slowdown in credit growth, but one that is in line with monetary policy tightening.

So, what does this mean for monetary policy? With the banking sector sound and resilient, fighting inflation remains my top priority, and I believe we will get there. What will get us there is setting the stance of policy at a level that will continue to help bring supply and demand in the economy into better balance. While I expect inflation to eventually settle near our 2 percent target because of our policy actions, we have to make sure what we saw in yesterday's inflation report feeds through broadly across goods and services and that we do not revert back to what has been persistently high core inflation. The robust strength of the labor market and the solid overall performance of the U.S. economy gives us room to tighten policy further.

As things stand now, my outlook for the stance of monetary policy that will get inflation near the FOMC's 2 percent target is roughly consistent with the FOMC's economic projections in June. I see two more 25-basis-point hikes in the target range over the four remaining meetings this year as necessary to keep inflation moving toward our target. Furthermore, I believe we will need to keep policy restrictive for some time in

order to have inflation settle down around our 2% target. Since the June meeting, with another month of data to evaluate lending conditions, I am more confident that the banking turmoil is not going to result in a significant problem for the economy, and I see no reason why the first of those two hikes should not occur at our meeting later this month. From there, I will need to see how the data come in. If inflation does not continue to show progress and there are no suggestions of a significant slowdown in economic activity, then a second 25-basis-point hike should come sooner rather than later, but that decision is for the future.