Federal Reserve Board of Governors

Statement on Longer-Run Goals and Monetary Policy Strategy

As adopted effective January 24, 2012

Following careful deliberations at its recent meetings, the Federal Open Market Committee (FOMC) has reached broad agreement on the following principles regarding its longer-run goals and monetary policy strategy. The Committee intends to reaffirm these principles and to make adjustments as appropriate at its annual organizational meeting each January.

The FOMC is firmly committed to fulfilling its statutory mandate from the Congress of promoting maximum employment, stable prices, and moderate long-term interest rates. The Committee seeks to explain its monetary policy decisions to the public as clearly as possible. Such clarity facilitates well-informed decisionmaking by households and businesses, reduces economic and financial uncertainty, increases the effectiveness of monetary policy, and enhances transparency and accountability, which are essential in a democratic society.

Inflation, employment, and long-term interest rates fluctuate over time in response to economic and financial disturbances. Moreover, monetary policy actions tend to influence economic activity and prices with a lag. Therefore, the Committee's policy decisions reflect its longer-run goals, its medium-term outlook, and its assessments of the balance of risks, including risks to the financial system that could impede the attainment of the Committee's goals.

The inflation rate over the longer run is primarily determined by monetary policy, and hence the Committee has the ability to specify a longer-run goal for inflation. The Committee judges that inflation at the rate of 2 percent, as measured by the annual change in the price index for personal consumption expenditures, is most consistent over the longer run with the Federal Reserve's statutory mandate. Communicating this inflation goal clearly to the public helps keep longer-term inflation expectations firmly anchored, thereby fostering price stability and moderate long-term interest rates and enhancing the Committee's ability to promote maximum employment in the face of significant economic disturbances.

The maximum level of employment is largely determined by nonmonetary factors that affect the structure and dynamics of the labor market. These factors may change over time and may not be directly measurable. Consequently, it would not be appropriate to specify a fixed goal for employment; rather, the Committee's policy decisions must be informed by assessments of the maximum level of employment, recognizing that such assessments are necessarily uncertain and subject to revision. The Committee considers a wide range of indicators in making these assessments. Information about Committee participants' estimates of the longer-run normal rates of output growth and unemployment is published four times per year in the FOMC's Summary of Economic Projections. For example, in the most recent projections, FOMC participants' estimates of the longer-run normal rate of unemployment had a central tendency of 5.2 percent to 6.0 percent, roughly unchanged from last January but substantially higher than the corresponding interval several years earlier.

In setting monetary policy, the Committee seeks to mitigate deviations of inflation from its longer-run goal and deviations of employment from the Committee's assessments of its maximum level. These objectives are generally complementary. However, under circumstances in which the Committee judges that the objectives are not complementary, it follows a balanced approach in promoting them, taking into account the magnitude of the deviations and the potentially different time horizons over which employment and inflation are projected to return to levels judged consistent with its mandate.

Statement on Longer-Run Goals and Monetary Policy Strategy

Adopted effective January 24, 2012; as amended effective August 22, 2025

The Federal Open Market Committee (FOMC) is firmly committed to fulfilling its statutory mandate from Congress of promoting maximum employment, stable prices, and moderate long-term interest rates. The Committee seeks to explain its monetary policy decisions to the public as clearly as possible. Such clarity facilitates well-informed decisionmaking by households and businesses, reduces economic and financial uncertainty, increases the effectiveness of monetary policy, and enhances transparency and accountability, which are essential in a democratic society.

The Committee's monetary policy strategy is designed to promote maximum employment and stable prices across a broad range of economic conditions. Employment, inflation, and long-term interest rates fluctuate over time in response to economic and financial disturbances. Monetary policy plays an important role in stabilizing the economy in response to these disturbances. The Committee's primary means of adjusting the stance of monetary policy is through changes in the target range for the federal funds rate. The Committee is prepared to use its full range of tools to achieve its maximum employment and price stability goals, particularly if the federal funds rate is constrained by its effective lower bound.

Durably achieving maximum employment fosters broad-based economic opportunities and benefits for all Americans. The Committee views maximum employment as the highest level of employment that can be achieved on a sustained basis in a context of price stability. The maximum level of employment is not directly measurable and changes over time owing largely to nonmonetary factors that affect the structure and dynamics of the labor market. Consequently, it would not be appropriate to specify a fixed goal for employment; rather, the Committee's policy decisions must be informed by assessments of the maximum level of employment, recognizing that such assessments are necessarily uncertain and subject to revision. The Committee considers a wide range of indicators in making these assessments.

Price stability is essential for a sound and stable economy and supports the well-being of all Americans. The inflation rate over the longer run is primarily determined by monetary policy, and hence the Committee can specify a longer-run goal for inflation. The Committee reaffirms its judgment that inflation at the rate of 2 percent, as measured by the annual change in the price index for personal consumption expenditures, is most consistent over the longer run with the Federal Reserve's statutory maximum employment and price stability mandates. The Committee judges that longer-term

inflation expectations that are well anchored at 2 percent foster price stability and moderate long-term interest rates and enhance the Committee's ability to promote maximum employment in the face of significant economic disturbances. The Committee is prepared to act forcefully to ensure that longer-term inflation expectations remain well anchored.

Monetary policy actions tend to influence economic activity, employment, and prices with a lag. Moreover, sustainably achieving maximum employment and price stability depends on a stable financial system. Therefore, the Committee's policy decisions reflect its longer-run goals, its medium-term outlook, and its assessments of the balance of risks, including risks to the financial system that could impede the attainment of the Committee's goals.

The Committee's employment and inflation objectives are generally complementary. However, if the Committee judges that the objectives are not complementary, it follows a balanced approach in promoting them, taking into account the extent of departures from its goals and the potentially different time horizons over which employment and inflation are projected to return to levels judged consistent with its mandate. The Committee recognizes that employment may at times run above real-time assessments of maximum employment without necessarily creating risks to price stability.

The Committee intends to review these principles and to make adjustments as appropriate at its annual organizational meeting each January, and to undertake roughly every 5 years a thorough public review of its monetary policy strategy, tools, and communication practices.

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Why Are Interest Rates So Low? Causes and Implications

Remarks by

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Board of Governors of the Federal Reserve System

at the

Economic Club of New York

New York, New York

October 17, 2016

I am grateful to the Economic Club of New York for inviting me to speak today. My subject is the historically low level of interest rates, a topic not far from the minds of many in this audience and of many others in the United States and all over the world.[1]

Notwithstanding the increase in the federal funds rate last December, the federal funds rate remains at a very low level. Policy rates of many other major central banks are lower still--even negative in some cases, even in countries long famous for their conservative monetary policies. Long-term interest rates in many countries are also remarkably low, suggesting that participants in financial markets expect policy rates to remain depressed for years to come. My main objective today will be to present a quantitative assessment of some possible factors behind low interest rates--and also of factors that could contribute to higher interest rates in the future.

Now, I am sure that the reaction of many of you may be, "Well, if you and your Fed colleagues dislike low interest rates, why not just go ahead and raise them? You are the Federal Reserve, after all." One of my goals today is to convince you that it is not that simple, and that changes in factors over which the Federal Reserve has little influence--such as technological innovation and demographics--are important factors contributing to both short- and long-term interest rates being so low at present.

There are at least three reasons why we should be concerned about such low interest rates. First, and most worrying, is the possibility that low long-term interest rates are a signal that the economy's long-run growth prospects are dim. Later, I will go into

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[1] I am grateful to John Roberts and Robert Tetlow of the Federal Reserve Board staff for their assistance. Views expressed are mine and are not necessarily those of the Federal Reserve Board or the Federal Open Market Committee.

more detail on the link between economic growth and interest rates. One theme that will emerge is that depressed long-term growth prospects put sustained downward pressure on interest rates. To the extent that low long-term interest rates tell us that the outlook for economic growth is poor, all of us should be very concerned, for--as we all know--economic growth lies at the heart of our nation's, and the world's, future prosperity.

A second concern is that low interest rates make the economy more vulnerable to adverse shocks that can put it in a recession. That is the problem of what used to be called the *zero lower bound* on interest rates. In light of several countries currently operating with negative interest rates, we now refer not to the zero lower bound, but to the *effective lower bound*, a number that is close to zero but negative. Operating close to the effective lower bound limits the room for central banks to combat recessions using their conventional interest rate tool--that is, by cutting the policy interest rate. And while unconventional monetary policies--such as asset purchases, balance sheet policies, and forward guidance--can provide additional accommodation, it is reasonable to think these alternatives are not perfect substitutes for conventional policy. The limitation on monetary policy imposed by low trend interest rates could therefore lead to longer and deeper recessions when the economy is hit by negative shocks.

And the third concern is that low interest rates may also threaten financial stability as some investors reach for yield and compressed net interest margins make it harder for some financial institutions to build up capital buffers. I should say that while this is a reason for concern and bears continual monitoring, the evidence so far does not suggest a heightened threat of financial instability in the post-financial-crisis United States stemming from ultralow interest rates. However, I note that a year ago the Fed did

issue warnings--successful warnings--about the dangers of excessive leveraged lending, and concerns about financial stability are clearly on the minds of some members of the Federal Open Market Committee, FOMC.

Those are three powerful reasons to prefer interest rates that are higher than current rates. But, of course, Fed interest rates are kept very low at the moment because of the need to maintain aggregate demand at levels that will support the attainment of our dual policy goals of maximum sustainable employment and price stability, defined as the rate of inflation in the price level of personal consumption expenditures (or PCE) being at our target level of 2 percent.

That the actual federal funds rate has to be so low for the Fed to meet its objectives suggests that the equilibrium interest rate--that is, the federal funds rate that will prevail in the longer run, once cyclical and other transitory factors have played out--has fallen.[2] Let me turn now to my main focus, namely an assessment of why the equilibrium interest rate is so low.

To frame this discussion, it is useful to think about the real interest rate as the price that equilibrates the economy's supply of saving with the economy's demand for investment. To explain why interest rates are low, we look for factors that are boosting saving, depressing investment, or both.[3] For those of you lucky enough to remember the economics you learned many years ago, we are looking at a point that is on the IS curve--

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[2] More formally, my Federal Reserve colleagues Thomas Laubach and John Williams (2003) have developed a statistical procedure that decomposes the movement in interest rates into the contribution of long-run and short-run factors. They conclude that the long-run component of the level of the real federal funds rate is currently very low--around 1/4 percent--compared with a pre-2000 average of 2-1/2 percent. Other assessments have reached similar conclusions. See Holston, Laubach, and Williams (forthcoming); Johannsen and Mertens (2016); and Kiley (2015). However, it is important to note that there is a great deal of statistical uncertainty around all of these estimates.

[3] While the analysis that follows relates to interest rates in the long run, these factors are also important determinants of interest rates in the short run.

the investment-equals-saving curve. And because we are considering the long-run equilibrium interest rate, we are looking at the interest rate that equilibrates investment and saving when the economy is at full employment, as it is assumed to be in the long run.

I will look at four major forces that have affected the balance between saving and investment in recent years and then consider some that may be amenable to the influence of economic policy.

The economy's growth prospects must be at the top of the list. Among the factors affecting economic growth, gains in productivity and growth of the labor force are particularly important. Second, an increase in the average age of the population is likely pushing up household saving in the U.S. economy. Third, investment has been weak in recent years, especially given the low levels of interest rates. Fourth and finally, developments abroad, notably a slowing in the trend pace of foreign economic growth, may be affecting U.S. interest rates.

To assess the empirical importance of these factors in explaining low long-run equilibrium interest rates, I will rely heavily on simulations that the Board of Governors' staff have run with one of our main econometric models, the FRB/US model. This model, which is used extensively in policy analyses at the Fed, has many advantages, including its firm empirical grounding, and the fact that it is detailed enough to make it possible to consider a wide range of factors within its structure.

Going through the four major forces I just mentioned, I will look first at the effect that slower trend economic growth, both on account of the decline in productivity growth as well as lower labor force growth, may be having on interest rates. Starting with

productivity, gains in labor productivity have been meager in recent years. One broad measure of business-sector productivity has risen only 1-1/4 percent per year over the past 10 years in the United States and only 1/2 percent, on average, over the past 5 years. By contrast, over the 30 years from 1976 to 2005, productivity rose a bit more than 2 percent per year. Although the jury is still out on what is behind the latest slowdown in productivity gains, prominent scholars such as Robert Gordon and John Fernald suggest that smaller increases in productivity are the result of a slowdown in innovation that is likely to persist for some time.[4]

Lower long-run trend productivity growth, and thus lower trend output growth, affects the balance between saving and investment through a variety of channels. A slower pace of innovation means that there will be fewer profitable opportunities in which to invest, which will tend to push down investment demand. Lower productivity growth also reduces the future income prospects of households, lowering their consumption spending today and boosting their demand for savings. Thus, slower productivity growth implies both lower investment and higher savings, both of which tend to push down interest rates.[5]

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[4] See Gordon (2016) and Fernald and Wang (2015).

[5] These effects are what we would expect from our textbook models; they are also at work in the FRB/US model being used here. The empirical evidence on the link between trend growth and long-run equilibrium interest rates is mixed. Laubach and Williams (2003) find evidence of a link that is consistent with the predictions of models such as FRB/US. However, in their well-known paper, Hamilton et al. (2016) conclude that while "the theoretical presumption that there is a link between aggregate growth and real rates is very strong," the empirical link between the real equilibrium interest rate and real GDP growth is weak. As stressed by Hamilton et al. there a great deal of uncertainty over the relationship between growth and interest rates, likely, in part because of the multitude of shocks to which the economy is subject. A structural model, such as FRB/US, provides one method of estimating the link between growth and interest rates by examining the reaction of the interest rate to a clearly defined shock to the trend growth rate. However, this reaction occurs within the model economy, and is therefore subject to the particular structure and assumptions of the FRB/US model.

In addition to a slower pace of innovation, it is also likely that demographic changes will weigh on U.S. economic growth in the years ahead, as they have in the recent past. In particular, a rising fraction of the population is entering retirement. According to some estimates, the effects of this population aging will trim about 1/4 percentage point from labor force growth in coming years.[6]

Lower trend increases in productivity and slower labor force growth imply lower overall economic growth in the years ahead. This view is consistent with the most recent Summary of Economic Projections of the FOMC, in which the median value for the rate of growth in real gross domestic product (GDP) in the longer run is just 1-3/4 percent, compared with an average growth rate from 1990 to 2005 of around 3 percent.[7]

We can use simulations of the FRB/US model to infer the consequences of such a slowdown in longer-run GDP growth for the equilibrium federal funds rate. Those simulations suggest that the slowdown to the 1-3/4 percent pace anticipated in the Summary of Economic Projections would eventually trim about 120 basis points from the longer-run equilibrium federal funds rate.[8]

Let me move now to the second major development on my list. In addition to its effects on labor force growth, the aging of the population is likely to boost aggregate household saving. This increase is because the ranks of those approaching retirement in the United States (and in other advanced economies) are growing, and that group typically has above-average saving rates.[9] One recent study by Federal Reserve

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[6] See, for example, Aaronson et al (2014).
[7] See Board of Governors of the Federal Reserve System (2016).
[8] Details of the simulations are included in an Appendix to the speech.
[9] See Gagnon, Johannsen, and Lopez-Salido (2016); Rachel and Smith (2015); and Carvalho, Ferrero, and Necchio (2016).

economists suggests that population aging--through its effects on saving--could be pushing down the longer-run equilibrium federal funds rate relative to its level in the 1980s by as much as 75 basis points.[10]

In addition to slower growth and demographic changes, a third factor that may be pushing down interest rates in the United States is weak investment. Analysis with the FRB/US model suggests that, given how low interest rates have been in recent years, investment should have been considerably higher in the past couple of years. According to the model, this shortfall in investment has depressed the long-run equilibrium federal funds rate by about 60 basis points.

Investment may be low for a number of reasons. One is that greater perceived uncertainty could also make firms more hesitant to invest. Another possibility is that the economy is simply less capital intensive than it was in earlier decades.[11]

Fourth on my list are developments abroad: Many of the factors depressing U.S. interest rates have also been working to lower foreign interest rates. To take just one example, many advanced foreign economies face a slowdown in longer-term growth prospects that is similar to that in the United States, with similar implications for equilibrium interest rates in the longer run. In the FRB/US model, lower interest rates abroad put upward pressure on the foreign exchange value of the dollar and thus lower net exports. FRB/US simulations suggest that a reduction in the equilibrium federal funds rate of about 30 basis points would be required to offset the effects in the United States of a reduction in foreign growth prospects similar to what we have seen in the United States.

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[10] See Gagnon, Johannsen, and Lopez-Salido (2016), figure 12.
[11] See Summers (2014, 2015, 2016). See also Hilsenrath and Davis (2016).

The first figure shows the effects of these four factors. You will see that each factor is considered separately; there is no attempt to add them together. That is because the broad factors we are considering here could well overlap--particularly the link between slower growth and the remaining three factors. Still, the comparison gives us a notion of the relative importance of some of the leading explanations for the decline in interest rates.

I started by noting the costs of low interest rates, including the limits on the ability of monetary policy to respond to recessions, and possible risks to financial stability. Now that we have some notion of where lower interest rates might be coming from, I want to turn to the question of what might contribute to raising longer-run *equilibrium* interest rates.[12]

One development that would boost the equilibrium interest rate would be a further waning in the investor precaution that seems to have been holding back investment--in Keynesian terms, an improvement in animal spirits. The first bar in the second slide illustrates the effects on the longer-run equilibrium federal funds rate of an increase in business-sector investment equal to 1 percent of GDP. As can be seen, such a rebound in investment would raise the equilibrium funds rate by 30 basis points, according to the FRB/US model. In addition, higher investment would improve the longer-run growth prospects of the U.S. economy, although the effects in this particular case are fairly small, with real GDP growth about 0.1 percentage point higher on account of the higher investment.

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[12] By emphasizing "longer-run *equilibrium*" interest rates, I am excluding monetary policy (which is unlikely to have major effects on the equilibrium real interest rate), and thereby also relating to concerns about monetary policy being the only game in town.

Over the years, many economists--some of them textbook authors--have noted that expansionary fiscal policy could raise equilibrium interest rates.[13] To illustrate this possibility, the next two bars on the slide show the estimated effect on interest rates of two possible expansionary fiscal policies, one that boosts government spending by 1 percent of GDP and another that cuts taxes by a similar amount. According to the FRB/US model, both policies, if sustained, would lead to a substantial increase in the equilibrium federal funds rate. Higher spending of this amount would raise equilibrium interest rates by about 50 basis points; lower taxes would raise equilibrium rates by 40 basis points. I should note that the FRB/US model does not contain a great deal of detail about taxes and government spending. These are thus the effects of very broad changes in income taxes and government spending, and not those of any specific, detailed, policy measures.

It is important to emphasize that these estimates are from just one model and other models may give different results. Still, I think these implications of fiscal policy measures are qualitatively correct--they are a standard result in many models, including the simplest textbook IS-LM model.

Stimulative fiscal policies such as these could be beneficial if the economy confronted a recession. Of course, it would be important to ensure that any fiscal policy changes during a recession did not compromise long-run fiscal sustainability.

Government policies that boost the economy's long-run growth rate would be an even better means of raising the equilibrium interest rate. This is a point I have also made in the past.[14] While there is disagreement about what the most effective policies

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[13] See, for example, Kocherlakota (2015, 2016) and Summers (2016).
[14] For instance, in Fischer, 2016.

would be, some combination of more encouragement for private investment, improved public infrastructure, better education, and more effective regulation is likely to promote faster growth of productivity and living standards--and also to reduce the probability that the economy and, particularly, the central bank will in the future have to contend with the effective lower bound.

In summary, a variety of factors have been holding down interest rates and may continue to do so for some time. But economic policy can help offset the forces driving down longer-run equilibrium interest rates. Some of these policies may also help boost the economy's growth potential.

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Appendix

Here we review the simulations that underlie the estimates of the effects of various economic disturbances for their implications for the long-run equilibrium real federal funds rate, using simulations of the staff's FRB/US model. We first provide background on the methodology we use. We then review the nature of the shocks that are discussed in the speech and show the effects of those shocks on the long-run federal funds rate. Finally, we provide details about the results shown in the figures.

1. Background

Our point of departure is a definition of the equilibrium interest rate that corresponds with the *neutral rate of interest*. In particular, we use the definition of the neutral rate of interest that Chair Yellen used in a 2015 speech: "the real rate consistent with the economy achieving maximum employment and price stability over the medium term," which, in an elaboration in a footnote, is said to be "usually thought of as independent of the cyclical disturbances that routinely buffet the economy . . . [that] fade away after a few years."[1] The sort of disturbances being captured under the rubric of shifts in r* are thus rarer and more persistent than the usual business cycle phenomena and are associated with the "various adjustment processes that are unusually drawn out by historical standards . . . [and have] slow-moving influences on both aggregate demand and supply."[2] This definition corresponds reasonably closely with the (possibly time-varying) intercept of a Taylor-type rule in that the standard arguments of the

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[1] See Yellen (2015a), paragraph 15 and footnote 4.

[2] See Yellen (2015a), footnote 4. Other definitions of the neutral rate used by the Chair in her public communications include the short-term real interest rate "that would be neither expansionary nor contractionary if the economy was operating near potential" (Yellen, 2015c, 2016) and the short-term real interest rate "that would be consistent with real GDP expanding in line with potential" (Yellen, 2015b). There may be circumstances in which the nuances of these definitions would matter, but, for our purposes, we can take them as one and the same.

Taylor (1999) rule--the output gap and the deviation of inflation from target--can be thought of as capturing the influence of the drivers of monetary policy at business cycle frequencies, with the longer-lasting (lower-frequency) determinants of the level of the policy rate being subsumed into movements in r*.[3]

Using this definition of r*, we identify several economic disturbances that have long-lasting consequences for the savings-investment balance of the U.S. economy. We shock the FRB/US model with each of these disturbances and compute what long-lasting (but not necessarily permanent) shift in the intercept of the Taylor (1999) rule is the best perturbation to the rule.

The thought experiment behind the simulations is as follows. We assume that the public views the Taylor (1999) rule as a good approximation of the conduct of monetary policy, and, accordingly, they price assets and formulate expenditure decisions on the expectation that this policy will prevail. Then policymakers identify that the economy is encountering a shock with durable implications for the savings-investment balance of the economy. At this point, policymakers communicate to the public a long-lasting shift to the intercept of the rule. Private-sector agents are assumed to understand this communication, and find it credible, and thus adjust their expectations accordingly.

2. The shocks

All simulations were carried out using the database from the public release of the FRB/US model, starting in 2036:Q1, at which time the economy is in steady state.[4]

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[3] Williams (2016) defines the *natural rate of interest* as the short-term real rate "that balances monetary policy so that it is neither accommodative nor contractionary in terms of growth and inflation." This description is close to that of the neutral rate (but not the natural rate) in the main text and in note 2 but adds a reference to inflation, which does not appear in definitions of the neutral rate.

[4] See Board of Governors (2016).

Accordingly, the effective lower bound on nominal interest rates is never a binding constraint under these circumstances. Consistent with the definition of a steady state, at the start of the simulations, the output gap is closed, the unemployment rate is equal to its natural rate of 4.8 percent, inflation is 2 percent, the nominal federal funds rate is 3 percent, the 10-year Treasury bond rate is 3.5 percent, and potential output growth is 2 percent. Except as otherwise noted, tax rates are held fixed at their baseline levels for four years, after which fiscal policy is allowed to respond by gradually adjusting the federal personal income tax rate to stabilize the ratio of federal government fiscal deficits to gross domestic product (GDP) at its assumed baseline target level. In all instances, monetary policy is assumed to be governed by the (non-inertial) Taylor (1999) rule, with an intercept shift where applicable.

Table A.1 summarizes the effects of several shocks on the long-run equilibrium real federal funds rate in the FRB/US model. The details of how these shocks were implemented follow.

Labor force. The growth rate of the U.S. population (variable N16 in the FRB/US model) is assumed to climb over the course of a year to a pace that is 1 percentage point faster than in the baseline, with commensurate effects on the labor force, employment, potential output, and actual output. The elevated pace of population growth lasts for 20 years before returning to baseline rates over the succeeding 5 years.

Productivity. The growth rate of total factor productivity (HMFPT) is increased 0.7 percentage point, which implies an acceleration in labor productivity (output per worker hour) of 1.0 percentage point. The shock lasts for 40 years before fading out at a moderate pace.

Investment. Sequences of shocks to the FRB/US model's three equations for business fixed investment--producer durables (EPD), intellectual property (EPI), and nonresidential structures (EPS)--are constructed such that the total increase in gross fixed capital investment equals 1 percent of GDP for 25 years. Thereafter, the shocks fade at a moderate rate over time. The shocks are scaled such that the split between the three components is about equal to their relative shares of GDP since 2001.

Cost of capital. Relative to its average over the period from 2000 to 2007, the financial cost of capital (RPD) has declined by about two percentage points, according to the FRB/US model database. That should have produced a boom in investment, which seems not to have happened. This shock computes the magnitude of this "missing effect" by simulating the effect of an increase in the financial cost of capital. RPD affects the user cost of capital for the model's four investment categories: equipment, intellectual property, nonresidential structures and inventories. Those, in turn, influence target rates of investment, all else equal. The shock lasts for 20 years before fading out at a moderate pace.

Foreign interest rates. The equilibrium real interest rate in (trade-weighted) foreign economies (FRSTAR) is assumed to decline by 1 percentage point for an indefinite period. This decline has the effect of reducing both foreign long- and short-term interest rates by a comparable amount.

Government spending. An increase in the level of federal expenditures on goods (EGFO) equal to 1 percent of GDP is sustained for 25 years and then phased out at a moderate pace thereafter. All other components of government spending are held at their baseline levels. The federal personal income tax rate is held at baseline for 10 years, and

then the model's fiscal policy reaction function is allowed to adjust the tax rate so as to return the ratio of federal deficits to GDP to its previous target level. The government-debt-to-GDP ratio is therefore allowed to permanently increase.

Tax cut. The model's fiscal policy reaction function is suspended for 10 years, similar to the case of the government spending shock described previously. A sequence of shocks to the FRB/US model's equation for the average federal personal income tax rate (TRFP) is constructed such that the resulting decrease in taxes increases the federal budget deficit very similarly to the government spending shock described previously, in order to make the two simulations of comparable magnitude. After 10 years, the personal federal tax rate is allowed to adjust to bring the ratio of government deficits to GDP back to the baseline target level. The government-debt-to-GDP ratio is permanently increased.

Table A.1
Summary of Shocks Affecting the Neutral Rate of Interest

	Shock	FRB/US Mnemonic	Specification of shock	Δrr^*
1	Population growth	N16	1 ppt, 20 years	1.15
2	Productivity growth	HMFPT	1 ppt, 40 years	0.85
3	Investment	EPD, EPS, EPI	1 pct of GDP, 25 years	0.29
4	Cost of capital	RPD	2 ppts, 20 years	0.63
5	Foreign interest rates	FRSTAR	1 ppt, indefinitely	0.27
6	Government spending	EGFO	1 pct of GDP, 25 years	0.50
7	Tax cut	TRFP	Deficits as in line 6	0.41

* In the current context, rr^* is defined as the intercept of the Taylor (1999) rule.

3. Calculations for figures

Figure 1: Effects on the long-run equilibrium federal funds rate

Slower growth. The slower growth of 1-1/4 percentage points in this scenario assumes that labor force growth is 1/4 percentage point lower and that labor productivity growth is 1 percentage point lower. According to table A.1, an increase of 1 percentage point in labor force growth would raise the equilibrium real federal funds rate by 1.15 percentage points. The contribution of the slower labor force growth to the equilibrium federal funds rate is therefore negative 0.25 x 1.15, or negative 30 basis points. Similarly, the contribution of slower productivity growth is negative 1.00 x 0.85 = negative 85 basis points, for a total effect of negative 115 basis points.

Demographics. As explained in the text, the effect of demographics on the equilibrium federal funds rate is based on the study of Gagnon, Johannsen, and Lopez-Salido (2016), who emphasize that demographic changes since the 1980s would imply a reduction of 125 basis points in the equilibrium federal funds rate. However, this number includes the effects of demographics on the labor force, which have already been included in the growth effect. As suggested by figure 12 of Gagnon, Johannsen, and Lopez-Salido (2016), adjusting for the effects of employment would trim about 50 basis points from the total effect (the distance between the solid-blue and dashed-green lines as of 2015). Thus, in Gagnon, Johannsen, and Lopez-Salido (2016), the effects excluding those via labor force growth are about negative 75 basis points.

Lower investment. This experiment corresponds to the cost of capital shock discussed in section 2, with the sign reversed. As can be seen in line 4 of table A.1, the

"missing effects" of a 2 percentage point decrease in the financial cost of capital would have lowered the equilibrium real funds rate by 63 basis points.

Slower foreign growth. Here, we assume that foreign trend GDP growth has fallen as much as U.S. trend GDP growth and thus has had a similar effect on interest rates--namely, 115 basis points. That assumption would imply a reduction in the (U.S.) equilibrium federal funds rate of negative 1.15 x 0.27, or negative 30 basis points.

Figure 2: Long-run effects of animal spirits and fiscal policy on interest rates

This figure shows the effects of shocks that lead to 1 percentage point shifts in each of the variables indicated. These simulations can be found directly in table A.1. Thus, the animal spirits shock in figure 2 corresponds to the investment shock shown in line 3 of table A.1. And the government spending and tax cut simulations shown in figure 2 line up with the simulations shown in lines 6 and 7 of table A.1.

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Why Are Interest Rates So Low? Causes and Implications

Remarks by

Vice Chairman Stanley Fischer

Board of Governors of the Federal Reserve System

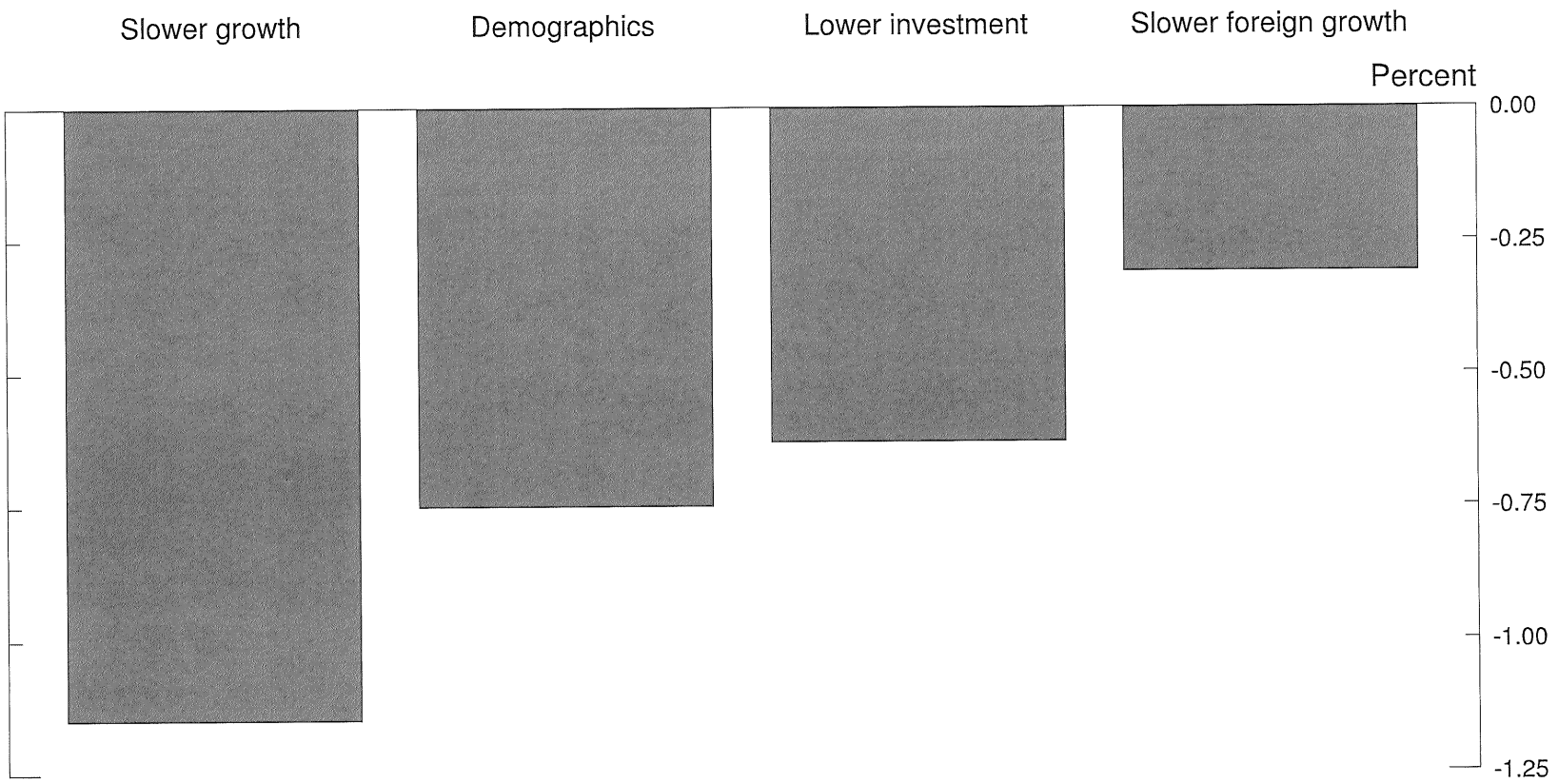
at the

Economic Club of New York

New York, New York

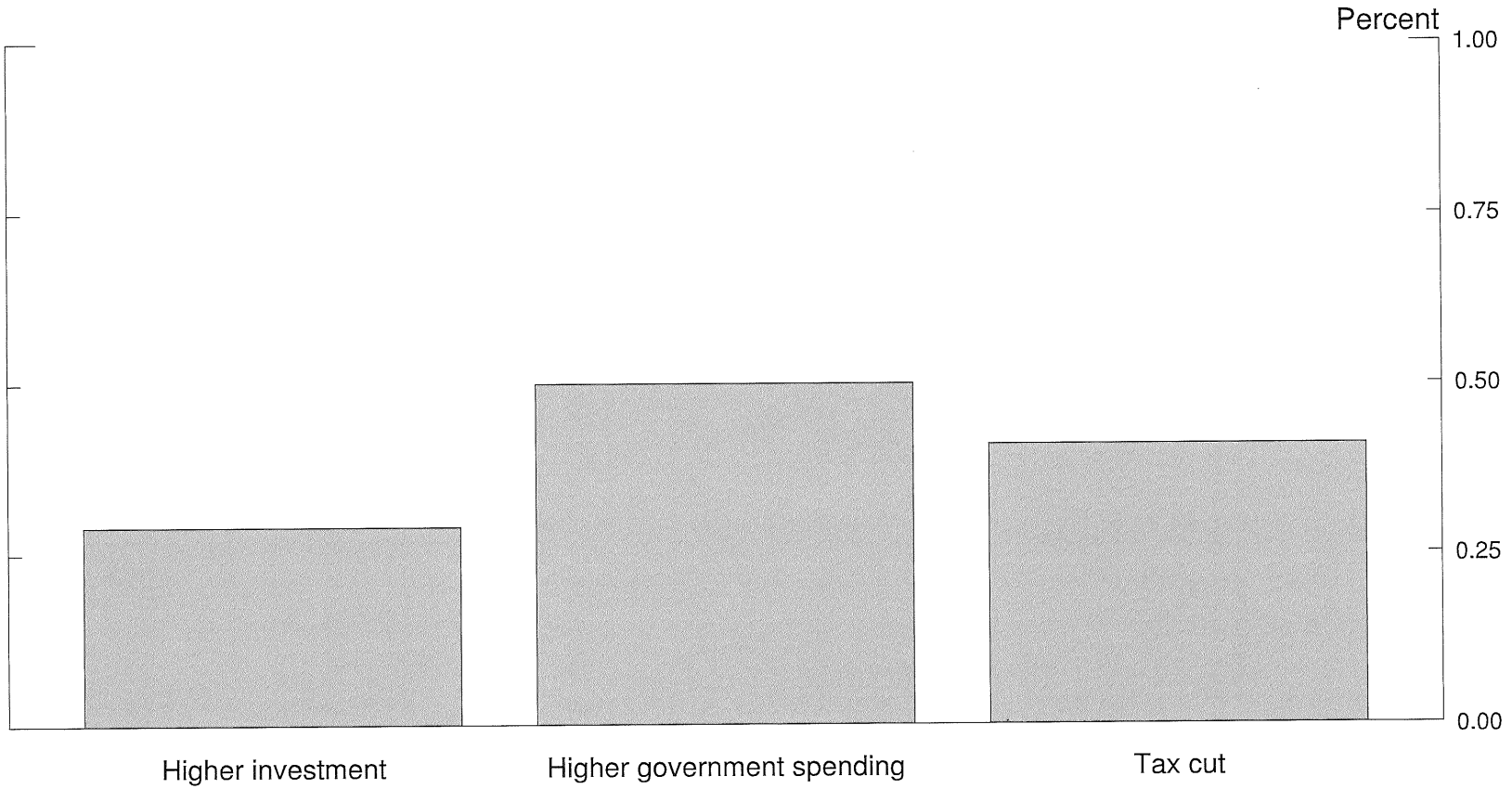
October 17, 2016

Figure 1. Effects on the Long-Run Equilibrium Federal Funds Rate



Source: Calculations by Federal Reserve Board staff based on simulation results from the Board s FRB/US model. Details are provided in the appendix.

Figure 2. Long-Run Effects of Animal Spirits and Fiscal Policy on Interest Rates



Note: Shocks scaled to 1 percent of gross domestic product.

Source: Calculations by Federal Reserve Board staff based on simulation results from the Board s FRB/US model. Details are provided in the appendix.

FRBSF ECONOMIC LETTER

2016-23 | August 15, 2016

Monetary Policy in a Low R-star World

BY JOHN C. WILLIAMS

Central banks and governments around the world must be able to adapt policy to changing economic circumstances. The time has come to critically reassess prevailing policy frameworks and consider adjustments to handle new challenges, specifically those related to a low natural real rate of interest. While price level or nominal GDP targeting by monetary authorities are options, fiscal and other policies must also take on some of the burden to help sustain economic growth and stability.

As nature abhors a vacuum, so monetary policy abhors stasis. Instead of being a rigid set of precepts, it follows the adage, that which survives is that which is most adaptive to change. Over the past century, monetary policy strategies have evolved in response to changing realities, from the panics and depressions of the late 19th and early 20th centuries that led to the creation of the Federal Reserve to the Great Depression, from Bretton Woods and subsequent battles to contain inflation to the dominance of inflation targeting today (Williams 2014, 2015a).

In the wake of the global financial crisis, monetary policy has continued to evolve, in this latest incarnation battling low inflation and stagnation via unconventional monetary policy actions like quantitative easing and near-zero or even negative interest rates. As we move forward, economic conditions require that central banks and governments throughout the world carefully reexamine their policy frameworks and consider further adjustments in terms of monetary policy strategy—both in its own right and as it relates to other policy arenas—to successfully navigate these new seas.

All the economic world's a stage: The roles of monetary and fiscal policy

To set the stage, we must look at pre-crisis views of the roles of monetary and fiscal policy. The inflation wars of the 1970s and 1980s led to a broad consensus on two fronts among academics and policymakers: First, central banks are responsible and accountable for price stability, which was often acknowledged through the formal adoption of an inflation targeting framework. Second, monetary policy should play the lead role in stabilizing inflation and employment, while fiscal policy plays a supporting role through mechanisms like automatic stabilizers and ad hoc fiscal stimulus during recessions. In this mindset, fiscal policy should focus primarily on longer-run goals such as economic efficiency and equity. The consensus on these two is evinced by countless research papers dedicated to monetary policy strategy and implementation in the past quarter-century, compared with a relative handful on the design of countercyclical fiscal policy.

In the post-financial crisis world, however, new realities pose significant challenges for the conduct of monetary policy. Foremost is the significant decline in the natural rate of interest, or r* (r-star), over the past quarter-century to historically low levels. Our understanding of the economy and monetary policy are underpinned by the concept of the natural interest rate—that is, the short-term real (inflation-adjusted) interest rate that balances monetary policy so that it is neither accommodative nor

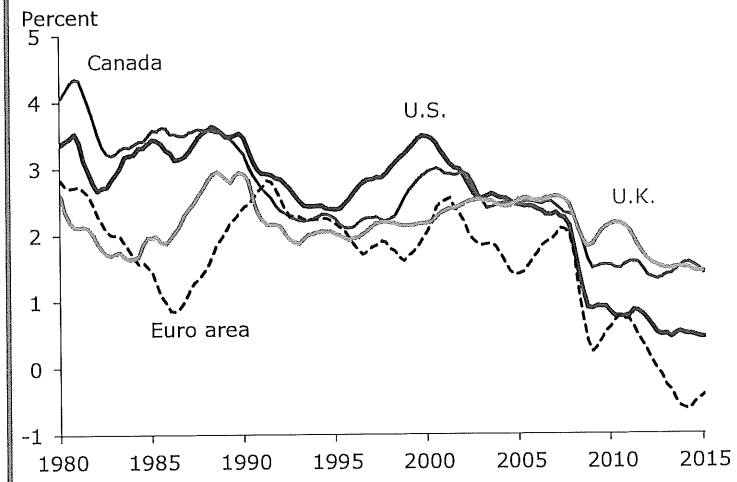
contractionary in terms of growth and inflation. In this *Letter*, I focus on the medium-term value of the natural rate—essentially what inflation-adjusted interest rates will be in an economy at full strength.

While a central bank sets its short-term interest rate, r-star is a function of the economy that is beyond its influence. The new challenge for central banks is how to deliver stable inflation in a low r-star world. This conundrum shares some characteristics and common roots with the theory of secular stagnation; in both scenarios, interest rates, growth, and inflation are persistently low (Summers 2015).

How low can rates stay?

A variety of economic factors have pushed natural interest rates very low and they appear poised to stay that way (Williams 2015b, Laubach and Williams 2015, Hamilton et al. 2015, Kiley 2015, Lubik and Matthes 2015). This is the case not just for the United States but for other advanced economies as well. Figure 1 shows estimates of the inflation-adjusted natural rate for four major economies: the United States, Canada, the euro area, and the United Kingdom (Holston, Laubach, and Williams 2016). In 1990, estimates ranged from about 2½ to 3½%. By 2007, on the eve of the global financial crisis, these had all declined to between 2 and 2½%. By 2015, all four estimates had dropped sharply, to 1½% for Canada and the United Kingdom, nearly zero for the United States, and below zero for the euro area.

Figure 1
Estimated inflation-adjusted natural rates of interest



Source: Holston, Laubach, and Williams (2016); data are four-quarter moving averages.

The underlying determinants for these declines are related to the global supply and demand for funds, including shifting demographics, slower trend productivity and economic growth, emerging markets seeking large reserves of safe assets, and a more general global savings glut (Council of Economic Advisers 2015, International Monetary Fund 2014, Rachel and Smith 2015, Caballero, Farhi, and Gourinchas 2016). The key takeaway from these global trends is that interest rates are going to stay lower than we've come to expect in the past. This does not mean they will be zero, but when juxtaposed with pre-recession normal short-term interest rates of, say, 4 to 4½%, it may be jarring to see the underlying r-star guiding us towards a new normal of 3 to 3½%—or even lower. Importantly, this future low level of interest rates is not due to easy monetary policy; instead, it is the rate expected to prevail when the economy is at full strength and the stance of monetary policy is neutral.

The critical implication of a lower natural rate of interest is that conventional monetary policy has less room to stimulate the economy during an economic downturn, owing to a lower bound on how low interest rates can go. This will necessitate a greater reliance on unconventional tools like central bank balance sheets, forward guidance, and potentially even negative policy rates. In this new normal, recessions will tend to be longer and deeper, recoveries slower, and the risks of unacceptably low inflation and the ultimate loss of the nominal anchor will be higher (Reifschneider and Williams 2000). We have

already gotten a first taste of the effects of a low r-star, with uncomfortably low inflation and growth despite very low interest rates. Unfortunately, if the status quo endures, the future is likely to hold more of the same—with the possibility of even more severe challenges to maintaining price and economic stability.

Low r-star and strategies for mitigation

To avoid this fate, central banks and governments should critically reassess the efficacy of their current approaches and carefully consider redesigning economic policy strategies to better cope with a low r-star environment. This includes considering fiscal and other policies aimed at raising the natural interest rate, as well as alternative monetary and fiscal policies that are more likely to succeed in the face of a low natural rate.

Taking each of those in turn, I'll start with policies aimed at raising r-star by affecting its underlying determinants. One potential avenue is to increase longer-run growth and prosperity through greater long-term investments in education, public and private capital, and research and development. Despite growing skepticism and endless column inches questioning whether college is worth the cost, the return on investment in post-secondary education is as high as ever (Autor 2014, Daly and Cao 2015). Likewise, returns on infrastructure and research and development investment are very high on average (Jones and Williams 1998, 2000, Fernald 1999).

Turning to policies that can help stabilize the economy during a downturn, countercyclical fiscal policy should be our equivalent of a first responder to recessions, working hand-in-hand with monetary policy. Instead, it has too often been stuck in a stop-and-go cycle, at times complementing monetary policy, at times working against it. This is not unique to the United States; Japan, and Europe have also fallen victim to fiscal consolidation in the midst of an economic downturn or incomplete recovery.

One solution to this problem is to design stronger, more predictable, systematic adjustments of fiscal policy that support the economy during recessions and recoveries (Williams 2009, Elmendorf 2011, 2016). These already exist in the form of programs such as unemployment insurance but are limited in size and scope. Some possible ideas for the United States include Social Security and income tax rates that move up or down in relation to the national unemployment rate, or federal grants to states that operate in the same way. Such approaches could be designed to be revenue-neutral over the business cycle; they also could avoid past debates over fiscal stimulus by separating decisions on countercyclical policy from longer-run decisions about the appropriate role of the government and tax system. Indeed, economists across the political spectrum have championed these ideas (Elmendorf and Furman 2008, Taylor 2000, 2009).

Finally, monetary policy frameworks should be critically reevaluated to identify potential improvements in the context of a low r-star. Although targeting a low inflation rate generally has been successful at taming inflation in the past, it is not as well-suited for a low r-star era. There is simply not enough room for central banks to cut interest rates in response to an economic downturn when both natural rates and inflation are very low.

Two alternatives can be considered together or in isolation to address this issue. First, the most direct attack on low r-star would be for central banks to pursue a somewhat higher inflation target. This would imply a higher average level of interest rates and thereby give monetary policy more room to maneuver

(Williams 2009; Blanchard, Dell'Ariccia, and Mauro 2010; Ball 2014). The logic of this approach argues that a 1 percentage point increase in the inflation target would offset the deleterious effects of an equal-sized *decline* in r-star. Of course, this approach would need to balance the purported benefits against the costs and challenges of achieving and maintaining a somewhat higher inflation rate.

Second, inflation targeting could be replaced by a flexible price-level or nominal GDP targeting framework, where the central bank targets a steadily growing level of prices or nominal GDP, rather than the rate of inflation. These approaches have a number of potential advantages over standard inflation targeting. For one, they may be better suited to periods when the lower bound constrains interest rates because they automatically deliver the "lower for longer" policy prescription the situation calls for (Eggertsson and Woodford 2003). In addition, nominal GDP targeting has a built-in protection against debt deflation (Koenig 2013, Sheedy 2014). Finally, in a nominal GDP targeting regime, a decline in r-star caused by slower trend growth automatically leads to a higher rate of trend inflation, providing a larger buffer to respond to economic downturns. Of course, these approaches also have potential disadvantages and must be carefully scrutinized when considering their relative costs and benefits.

In stressing the need to study and consider new approaches to fiscal and monetary policy, I am not advocating an abrupt reversal of course; after all, you don't change horses in the middle of a stream. And in monetary policy, "abrupt" and "disrupt" have more than merely resonance of sound in common. But *now* is the time for experts and policymakers around the world to carefully investigate the pros and cons of these proposals.

Conclusion

Economics rarely has the benefit of a crystal ball. But in this case, we are seeing the future now and have the opportunity to prepare for the challenges related to persistently low natural real rates of interest. Thoroughly reviewing the key aspects of inflation targeting is certainly necessary, and could go a long way towards mitigating the obstructions posed by low r-star. But that is where monetary policy meets the boundaries of its influence. We've come to the point on the path where central banks must share responsibilities. There are limits to what monetary policy can and, indeed, should do. The burden must also fall on fiscal and other policies to do their part to help create conditions conducive to economic stability.

Policymakers don't often cite Machiavelli, but in this instance, the analogy is potent (and, perhaps, a portent). In *The Prince*, fortune is compared to a river; in times of turbulence it wreaks havoc, flooding and destroying everything in its way. But in calm and sedate weather, people can build dams and stem the tide of destruction. In other words, we can wait for the next storm and hope for better outcomes or prepare for them now and be ready.

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FRBSF Economic Letter

Research from
the Federal Reserve
Bank of San Francisco

2025-10 | April 21, 2025

Underlying Trends in the U.S. Neutral Interest Rate

Carlos Carvalho, Andrea Ferrero, Felipe Mazin, and Fernanda Nechio

After a prolonged decline, U.S. inflation-adjusted interest rates have increased somewhat since the pandemic—possibly implying a higher new normal. As central banks attempt to tame the post-pandemic inflationary bout, whether real rates will fall back closer to pre-pandemic levels will ultimately depend on the trends in their long-term underlying determinants. Estimates suggest that the pre-pandemic downward pressures from global factors and from U.S. population aging have faded, while fiscal conditions continue to put upward pressure on U.S. real rates.

Interest rates in advanced economies exhibited a pronounced and persistent decline between 1990 and the onset of the COVID-19 pandemic. Since then, however, short-term real rates have remained much higher, as central banks worldwide have tightened monetary policy to fight the post-pandemic inflationary bout. Whether advanced economies will return to low interest rates once central banks bring inflation back to their goals is a key economic question, with important implications for monetary policy.

An answer to this question ultimately depends on the underlying long-term trends that determine the movements of interest rates. In this *Economic Letter*, we study one set of such trends, focusing on the role of changing demographics as a potential driver of long-term movements in U.S. interest rates. Our estimates also consider the important interplay between demographic trends in the United States and abroad. This interaction accounts for how much the flow of investment from other countries, along with trends in its underlying long-term rate determinants, can affect U.S. interest rates. While our analysis aims to focus on the role of demographics, our estimates also consider other potential long-term drivers of real interest rates highlighted by past research, most notably productivity growth and fiscal conditions.

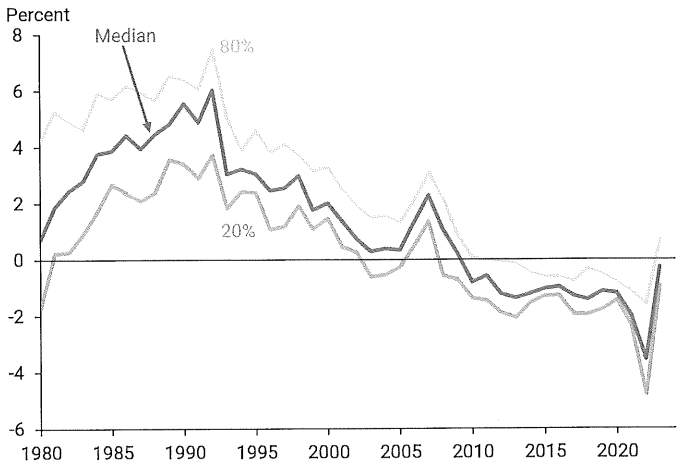
Our findings—based on our research in Carvalho et al. 2025—suggest that demographic trends and other global factors explain the bulk of the decline in U.S. real interest rates between 1990 and 2019. Since then, however, the downward pressure from global trends and population aging has declined, while fiscal variables have put upward pressure on interest rates.

Underlying trends driving real interest rates

Figure 1 reports inflation-adjusted, also known as *real*, interest rates across a range of advanced economies between 1980 and 2023. The figure shows the median real rate as well as the 20th and 80th percentiles in our sample. The patterns are striking, with the median real rate declining from nearly 6% in the early 1990s to close to −2% by 2019. Since then, the median rate has increased somewhat to near zero.

The persistent decline in interest rates has been interpreted by some as evidence that the *neutral rate of interest* declined during the pre-pandemic period. This rate, also known as r^* (r-star), is the inflation-adjusted interest rate that is consistent with the full use of economic resources and steady inflation near the Fed's inflation goal, absent transitory business cycle shocks to the economy.

Figure 1
Real short-term interest rates across advanced economies



Source: OECD, World Bank, AMECO, IMF, and authors' calculations.

R-star is an important input for monetary policy decisions that influence interest rates through the federal funds rate (Williams 2016). Setting the real federal funds rate too high relative to r-star for an extended period could contribute to the economy falling short of the central bank's inflation goal or cause real GDP growth to fall below potential growth. In contrast, setting the real federal funds rate too low relative to r-star for an extended period could contribute to the economy overshooting the inflation goal. Therefore, changes to r-star affect the level of the desired policy rate and, consequently, other interest rates in the economy.

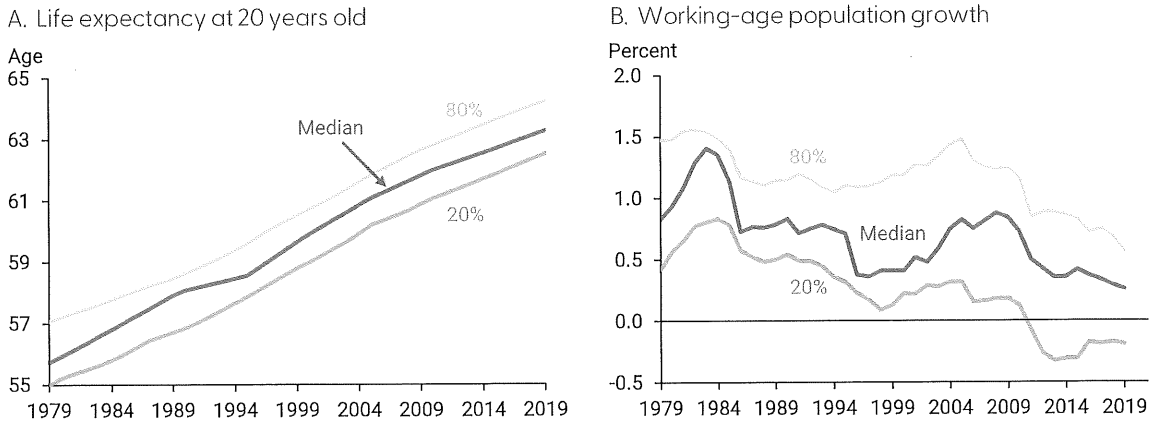
Understanding the drivers behind the pre-pandemic decline in r-star is key to assessing how future real rates will behave and should give some insights into whether the recent increase in real rates is here to stay. Unfortunately, r-star is not directly observable—it must be inferred using available economic data.

Other research has used various models and empirical methodologies to infer r-star and its main economic drivers. For example, our own previous work showed how changing demographics can affect r-star and how population aging has likely put downward pressure on the U.S. natural rate (Carvalho, Ferrero, and Nechio 2017).

During the pre-pandemic period, the world went through a dramatic demographic transition. In most advanced economies, actual and expected longevity have generally increased steadily since the 1980s, while the median retirement age has changed little, leading to longer retirement periods. Meanwhile, population growth rates are declining and, in some countries, even becoming negative. Figure 2 reports median life expectancy and population growth, along with the 20th and 80th percentiles for the same set of advanced economies considered in Figure 1. Both panels show remarkable population aging over the past few decades.

Intuitively, a simple way to think about how aging and other potential drivers may affect r-star is associated with their effects on saving and investment decisions made by households, businesses, and governments.

Figure 2
Life expectancy and population growth in selected advanced economies



Source: United Nations World Population Prospects.

An increase in savings would increase the pool of resources available in the economy, which would put downward pressure on equilibrium real rates and, hence, on r-star. In contrast, an increase in investments and spending relative to savings would tend to push up r-star.

Population aging and a lengthier retirement period may raise overall household incentives to save throughout their life cycle to better prepare for their retirement period. This effect could be even stronger if people believe that public retirement programs will not be able to bear the additional burden generated by an aging population. At the same time, a larger share of retirees in the economy could raise overall spending. Therefore, the effects of aging could, in principle, put either downward or upward pressure on r-star (see Carvalho et al. 2017 for details).

Holston, Laubach, and Williams (2017) focused on another potential driver—the role of the decline in productivity and economic growth—and found that these declines also reduced r-star domestically. In contrast, Rachel and Summers (2019) argued that pre-pandemic fiscal spending helped offset the effects of demographics and productivity by putting upward pressure on r-star. Lower productivity and GDP growth could limit investment opportunities and put downward pressure on r-star, while increasing public spending and debt means that the government has less savings, which would put upward pressure on r-star.

In a world with open economies, where savings and investments can flow from one country to another, policymakers need to consider both domestic and international trends behind desired savings and investments. For example, population aging abroad could help raise foreign savings, which may be redirected to the United States, raising the pool of domestic savings and helping push U.S. r-star down. Therefore, estimates of the relationship between these and other economic trends on r-star in any country must also consider developments and trends abroad.

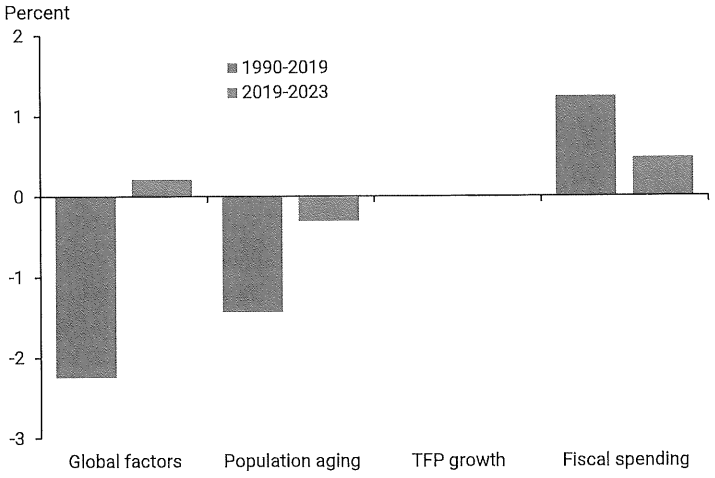
Contributions of trends to the U.S. real rate before and since the pandemic

To estimate the effects of underlying trends on U.S. interest rates, we rely on estimates reported in Carvalho et al. (2025). That paper uses a statistical model, known as an error correction model, to estimate long-run relationships between real rates and their underlying trends across a panel of advanced open economies. Our sample includes annual data from 1979 to 2019 for Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, the United Kingdom, and the United States. Because savings and investments can flow across borders in open economies, both domestic and international factors are likely to have an impact on domestic real interest rates. Therefore, our estimates include potential domestic drivers of r-star and rely on a weighting scheme to account for the degree of each country's financial integration. Moreover, the estimates also include a "global rate," which corresponds to the average real interest rate faced by each country in the sample. The average global rate is meant to summarize and proxy for the effects of potential international trends.

We apply the estimated average relationships between real rates and the potential drivers of r-star from Carvalho et al. (2025) to the changes in real rates and potential drivers in the United States before and since the pandemic, while also accounting for the degree of U.S. financial integration. This approach allows us to calculate the contributions of each potential driver to the movements of U.S. real rates in the long term. For brevity, we focus here on population aging, productivity growth, and fiscal spending.

Figure 3 reports the contributions of potential trends behind U.S. r-star before the pandemic (blue bars) and since the pandemic (red bars). The bulk of the pre-pandemic decline in U.S. real rates can be associated with both domestic and foreign developments. International factors, as captured by the global rate, and U.S. population aging contributed significantly to pushing U.S. real rates down. In contrast, fiscal spending put upward pressure on U.S. real rates.

Figure 3
Estimated contributions to U.S. real interest rate changes



Source: Authors' calculations based on Carvalho et al. (2025).

Since 2019, however, international factors have put upward pressure on U.S. real rates. Population aging has continued to put a modest downward pressure on U.S. real rates, while fiscal spending has continued to put upward pressure on U.S. rates. In both periods, the estimates suggest that TFP has played a very minor role in driving r-star.

Comparing the blue and red bars suggests some important changes to the dynamics of underlying drivers of U.S. r-star. However, some caveats to this comparison are worth mentioning. First, the empirical method of Carvalho et al. (2025) is meant to uncover long-term relationships, so the short number of years since the pandemic makes the recent comparisons more sensitive to temporary influences. Second, the pandemic likely affected some of the underlying trends we focus on. For example, health challenges related to the pandemic could have some impact on population aging statistics. Similarly, government spending increased worldwide through policies aimed to mitigate the economic effects of the pandemic. Third, for simplicity, we considered only a few potential drivers of r-star here. Carvalho et al. (2025) provide an extensive discussion of other factors and a brief summary of other research on these issues. Finally, our findings may not fully reflect future trends behind r-star because those trends can be affected by shocks and changes to countries' financial integration.

Conclusion

The estimates reported in this *Letter* suggest that both domestic and foreign factors have contributed to the persistent pre-pandemic decline in r-star, the long-run U.S. neutral interest rate. U.S. population aging was an important factor pushing r-star down. Global trends also contributed to this persistent decline, while fiscal spending somewhat offset the downward trend. Following a decline that lasted approximately three decades, the evidence suggests a recent shift in the key factors driving r-star, potentially raising its post-pandemic estimates. In an environment of high uncertainty, however, only time will tell whether these shifts will persist and whether r-star will remain elevated.

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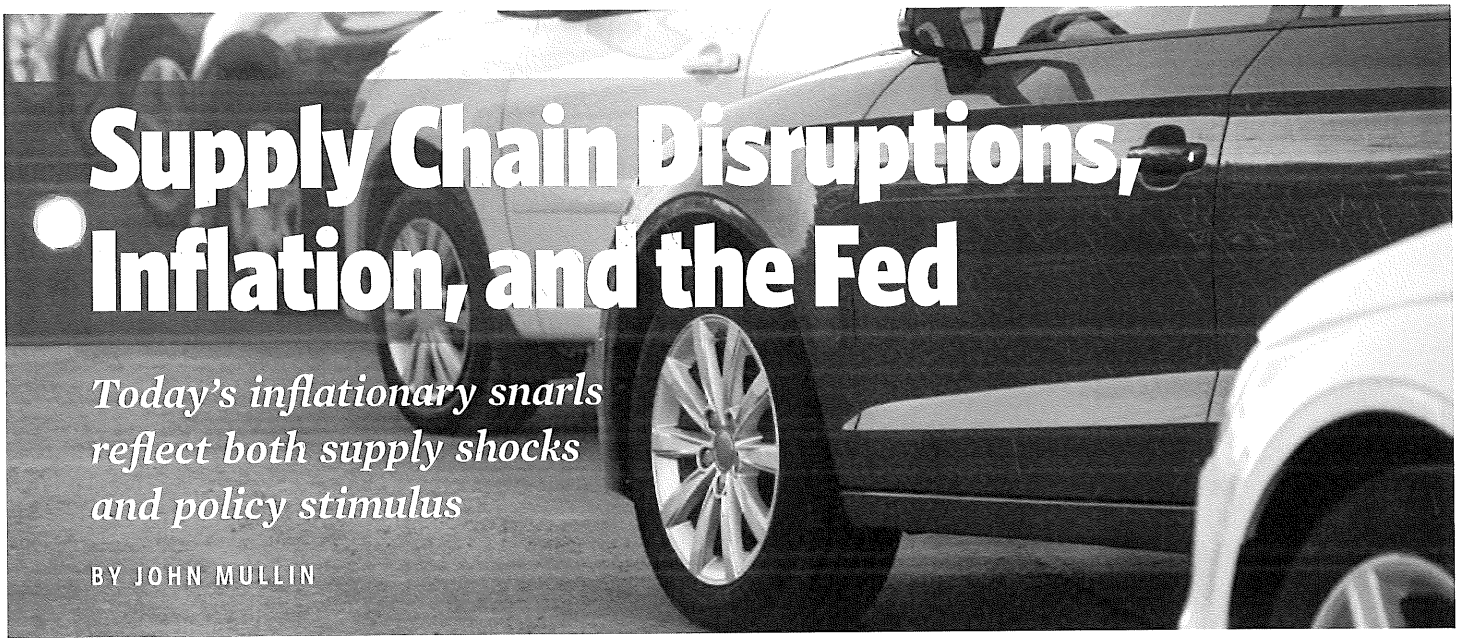


Supply Chain Disruptions, Inflation, and the Fed

Today's inflationary snarls reflect both supply shocks and policy stimulus

BY JOHN MULLIN

Used cars became a hot commodity during the pandemic, with their prices increasing by roughly 50 percent between January 2020 and December 2021. The spike in used car prices was a prominent example of how global supply chain disruptions have contributed to U.S. inflation. It also highlighted the complexity of global supply and demand relationships.

In the early stages of the COVID-19 pandemic, many U.S. and European auto manufacturers shut down production to help stop the disease's spread. Semiconductor producers, concentrated in Asia, responded by shifting production toward chips for electronic devices such as computers and games. As the pandemic progressed, demand increased in these other markets as homebound consumers shifted their spending away from services such as restaurant meals and travel and toward consumer durables.

Later in 2020, when U.S. auto manufacturers resumed production, they faced chip supply shortages. The shortages not only reflected pandemic-related production shutdowns in Asia, they also reflected a reluctance on the part of chip manufacturers to shift production back to chips used in auto production and away from the relatively lucrative market for chips used in electronic devices.

The diminished supply of new cars in the U.S. market provided support for higher used car prices. (See chart.) Since used cars comprise roughly 4 percent of the basket that makes up the consumer price index (CPI), the 50 percent cumulative price increase for the category increased the overall CPI by a cumulative 2 percentage points. According to an analysis by Richmond Fed economist Alex Wolman, the increase in motor vehicle prices ranked as one of the "main culprits" of the U.S. inflationary increase through November 2021.

The used car example illustrates the limited ability of monetary policy to control inflation's short-run trajectory. "It's true that inflation is a monetary phenomenon, in the sense that monetary policy has the ability to control inflation over the medium to long run," says Wolman. "However, even when monetary policy is being successful at controlling inflation, unusual shocks to supply and demand for particular goods and services move inflation around from month to month."

The U.S. economy has indeed faced a string of unusual supply and demand shocks since the pandemic's onset — most of which have tended to boost inflation. But this fact does not necessarily let the Fed off the hook.

A MIX OF SUPPLY AND DEMAND SHOCKS

Since the onset of the pandemic, the U.S. economy has been hit by a series of supply and demand shocks. The first of these, of course, was the pandemic itself. Several early analyses of the pandemic characterized it as a combined supply-demand shock. For example, an NBER working paper in February by Martin Eichenbaum of Northwestern University, Sergio Rebelo of Northwestern University's Kellogg School of Management, and Mathias Trabandt of Goethe University Frankfurt presented a model of epidemics in which COVID-19 "acts like a negative shock to the demand for consumption and the supply of labor."

The view of the pandemic as a combination of negative supply and demand shocks found support in the data. For instance, a 2020 paper by Geert Bekaert of Columbia University, Eric Engstrom of the Fed Board of Governors, and Andrey Ermolov of Fordham University employed statistical methods to "extract aggregate demand and supply shocks for the US economy" during the early stages of the pandemic. The paper estimated that negative aggregate supply and demand shocks both contributed substantially to the initial output decline in 2020.

During the initial stages of the pandemic, there was much concern among economists and policymakers that the pandemic's initial negative effect on aggregate demand could be exacerbated by job destruction and firm closures. This concern was reflected in an *American Economic Review* article by Veronica Guerrieri of the University of Chicago's Booth School of Business, Guido Lorenzoni of Northwestern University, Ludwig Straub of Harvard University, and Iván Werning of Massachusetts Institute of Technology, which presented "a theory of Keynesian supply shocks: supply

shocks that trigger changes in aggregate demand larger than the shocks themselves." Their preferred policy responses included many of the measures implemented by U.S. policymakers, such as emergency loans, enhanced social insurance payments, and accommodative monetary policy.

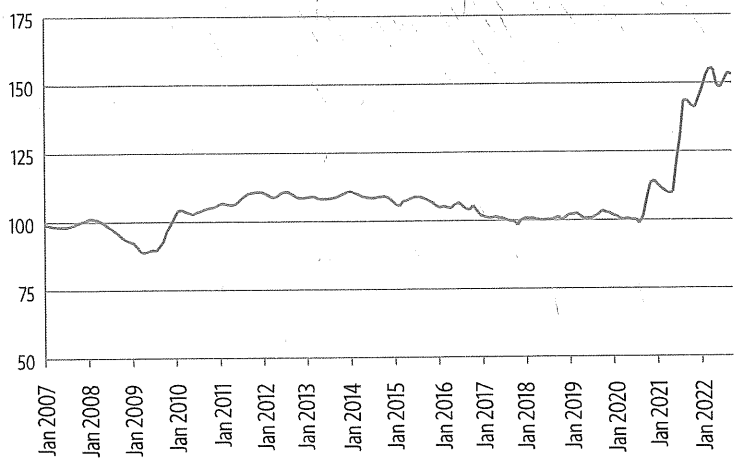
It did not take long for these measures to show results. One of their initial effects was to boost the U.S. personal savings rate. Bank accounts grew rapidly during 2020 as people received stimulus payments from the Internal Revenue Service and enhanced unemployment insurance checks — some received more from these benefits than they had been earning from their former jobs — while drastically reducing their spending on dining, entertainment, and travel. Flush with cash, many consumers quickly started to buy consumer durables.

"There was a huge surge in consumer goods demand, because households were simply unable to spend their cash on going out for a meal or going to the cinema or going on holiday," says Christopher Williamson, chief business economist at IHS Markit, a provider of data and research affiliated with S&P Global. "So, a whole lot of us spent a lot of time ordering new computers, furniture, and bicycles."

In retrospect, there is a broad consensus among economists and policymakers that the combination of increased fiscal spending and an aggressively accommodative monetary policy ultimately overshot the mark by providing excessive economic stimulus. To the extent that they did, the policies arguably constituted a second major shock to the U.S. economy. The Russian invasion of Ukraine in February of this year imposed a third major shock by restricting global oil and grain supplies, causing spikes in the two commodities' prices, which had been already increasing since mid-2020. The combination of the three shocks — the pandemic, the expansionary policy overshoot, and war — left analysts with a hard-to-identify stew in which pandemic-related foreign plant closures, heightened consumer durables demand, and increased global commodity prices have put tremendous strains on global supply networks.

Used Cars Become Hot Commodities

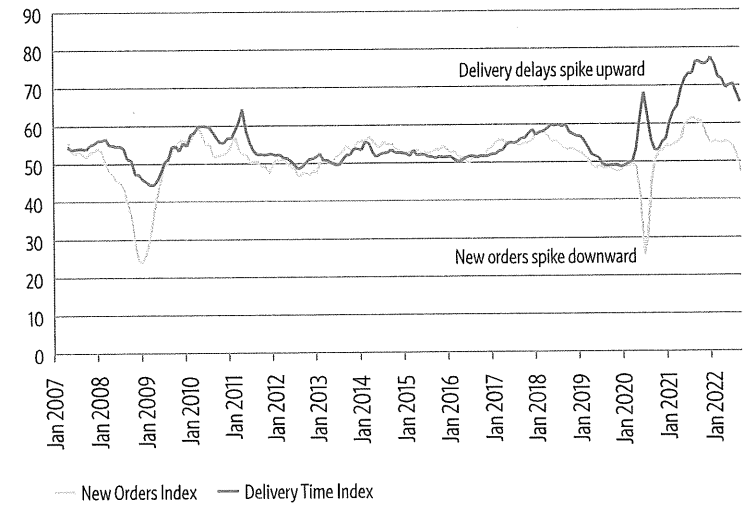
Consumer Price Index for Used Cars and Trucks (Rebased, December 2006 = 100)



SOURCE: Bureau of Labor Statistics via FRED

Unprecedented Delivery Delays

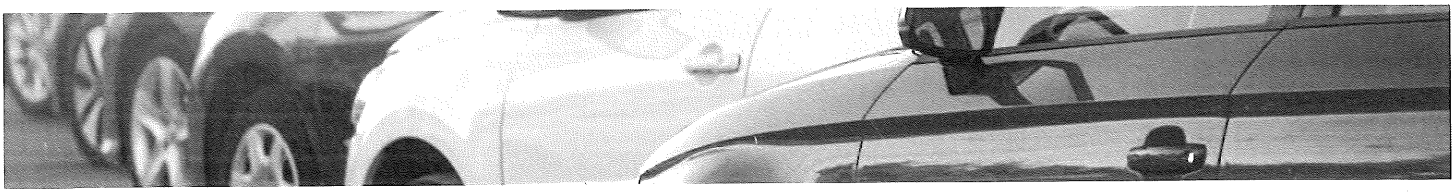
JPMorgan Purchasing Managers Indices: Delivery Time Index and New Orders Index



SOURCE: S&P Global

SUPPLY CHAIN DISRUPTIONS

There is no precedent in recent history for the supply chain disruptions that currently afflict the global economy. The scope of the problem is seen, among other places, in the recent behavior of the JPMorgan Global Purchasing Managers Indices (PMI) delivery time index, which provides a measure of delivery delays around the globe. Ordinarily, the delivery index tends to closely track the JPMorgan PMI new orders index. For example, when the new orders index declined during the 2008-2009 recession, the delivery index declined as well; and when the new orders index subsequently recovered, the delivery index followed suit. This positive correlation is just what one would expect for economic cycles that are driven primarily by fluctuations in aggregate demand: Weak demand means shorter waiting times; strong demand means longer waiting times. (See chart.)



In contrast, the two indexes moved in dramatically divergent directions at the onset of the pandemic. The new orders index plunged, signaling a collapse in aggregate demand, but the delivery time index spiked upward. This negative correlation is just what one would expect for an economic cycle driven by a combination of negative supply and demand shocks.

Supply disruptions (as reflected in the delivery time index) became even more pronounced as aggregate demand (as reflected in the new orders index) recovered. The new orders index peaked in mid-2021, and subsequently declined. Nevertheless, the delivery time index has remained near its historical peak, signaling continued supply problems.

Global companies reported reduced production due to staff shortages that peaked during each of the pandemic's various waves, according to data from S&P Global. Each wave of staff shortages gave rise to a follow-on wave of materials shortages.

Transportation snarls exacerbated the problems caused by plant closures, further disrupting global supply chains. "There were a lot of port closures — notably in China," says Williamson. "With restrictions heavily in place, the ports just couldn't function as efficiently as they could before. And it's not just ships going into ports, but trucks bringing containers in and out of the ports. A lot of containers ended up in the wrong places. It produced unprecedented congestion."

By late 2021, shipping a container through U.S. ports took more than three times longer than it normally did. The congestion at Chinese ports only worsened recently due to COVID-19 lockdowns in Shanghai and other ports. Shipping costs have remained elevated, and port congestion has had numerous effects that may have been hard to predict. California farmers, for instance, have been having a difficult time finding container capacity to export tree nuts, produce, and dairy products.

Of all the supply problems that have arisen during the pandemic, semiconductor shortages have had some of the most widespread effects. In many cases, semiconductors account for only a small part of a product's total cost. Yet they often have no close substitutes, making them indispensable to the production process. Because of this, semiconductor shortages can have an outsized effect on final-product supply shortages and the inflationary pressures they create. Recent research by economists at the St. Louis Fed indicated that the problem extended far beyond the auto industry to a broad range of other U.S. manufacturing industries. Comparing 56 industries that use semiconductors as a direct input with 170 industries that do not, they found substantially higher price changes in the semiconductor-dependent industries during 2021.

Additional research from the St. Louis Fed shows that price pressures tended to be greatest in U.S. industries with heightened exposure to foreign countries experiencing particularly severe supply bottlenecks, as measured by indexes of work backlogs and supplier delivery times. Some of the largest exposures were in the U.S. motor vehicles, petroleum, basic metals, and electrical equipment industries.

HOW MUCH INFLATION CAME FROM WHERE?

A natural question is the extent to which increased inflation is due to overly accommodative macroeconomic policies versus the supply-side shocks caused by the COVID-19 pandemic and, more recently, the war in Ukraine. The multiplicity of shocks and their staggered arrival times make this a difficult question to answer definitively.

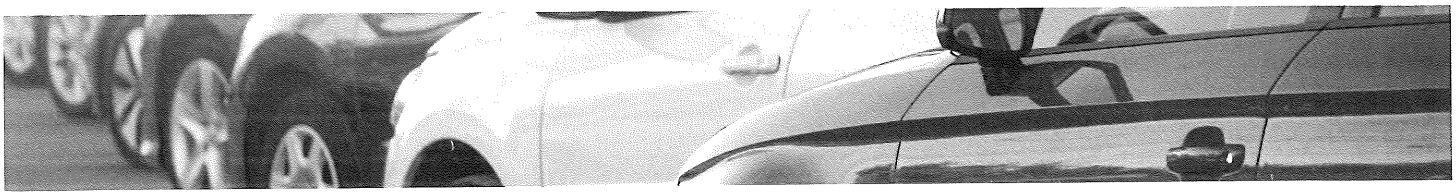
Researchers have responded to the challenge by taking a variety of approaches. One such effort was undertaken by the Richmond Fed's Alex Wolman in a recent working paper, "Relative Price Shocks and Inflation," which he co-authored with Francisco Ruge-Murcia of McGill University. Within the context of a more general analysis of the relationship between relative price shocks and inflation, the researchers presented a model that they used to break down the behavior of U.S. inflation from March 2021 through November 2021 into contributions from supply-side shocks versus overly accommodative monetary policy.

In the model, the monetary authorities do not attempt to stabilize the prices of individual goods and services, nor do they attempt to constrain overall inflation to an extremely narrow range in the short run. "If the relative price of used cars needs to go sky high because of supply disruptions, the way that's going to happen at first is for the prices of used cars to go sky high," says Wolman. "It's not going to happen by having the prices of all of the other goods in the economy decline all at once." Thus, sector-specific supply shocks can affect the economy-wide rate of inflation on a month-by-month basis, even under a monetary regime marked by low inflation and policy stability.

Over the model's long-term horizon, however, monetary policy does stabilize inflation. Although the central bank allows unusually large relative price shocks to pass through to inflation, those shocks are — by definition — unusual, so inflation tends to remain close to the Fed's target.

Wolman and Ruge-Murcia found that the inflationary increase during the period between March 2020 and November 2021 was roughly four-fifths due to supply-side shocks, with the single largest supply-side shock coming from the vehicle sector. Overly accommodative monetary policy explained the remaining one-fifth of the inflation overshoot. Although the model does not explicitly incorporate fiscal policy, Wolman believes that, in practice, their calculation of monetary policy's contribution to inflation most likely captures the combined inflationary contributions of both monetary *and* fiscal policy. "My view is that there was a big expansionary fiscal shock, and that if the Fed had followed its usual policy rule, it would have chosen a much higher interest rate than it actually did," says Wolman. "To the extent that the Fed did not raise rates in response to the fiscal stimulus, it's going to show up in our model as a monetary policy shock."

Recent research by economists at the New York Fed broadly concurs with Wolman's finding that the inflationary increase seen during 2021 owed much to supply-side factors



such as production and shipping bottlenecks and higher input prices. They also agreed in the assessment that loose monetary policy played a secondary role, concluding that the global nature of recent supply shocks suggests that "domestic monetary policy actions would have only a limited effect on these sources of inflationary pressures."

But these two studies come with an important caveat: They only cover the period through late 2021, when U.S. inflation was still behaving much like it had during 1995-2019 — a period of low and stable inflation in which relatively high monthly inflation readings were mostly accounted for by large price increases in a small share of goods and services. More recent data have deviated from this pattern. "Not only has inflation continued to be high," says Wolman, "it has also been associated with a larger share of goods with large price increases." To Wolman, this increased inflationary breadth raises concern that inflation may be becoming more of a monetary phenomenon and less a supply-side phenomenon.

Ana Maria Santacreu of the St. Louis Fed has taken a variety of approaches to understanding the recent increase in inflation. "We've done a lot of things from different angles," she says. "There's no one method that can tell us, 'how much is demand, and how much is supply?'" While some of her research has pointed to the importance of supply-side factors, she has also found evidence suggesting that expansionary fiscal policies have played an important role. She recently co-authored a working paper that examined recent increases in inflation across a sample of advanced and emerging economies. The researchers found that expansionary fiscal policies tended to increase consumption but had only a limited impact on the supply of goods as measured by industrial production indexes. "We take the results as evidence that fiscal policies contributed to inflationary mismatches between demand and supply," says Santacreu.

A MONETARY POLICY CONUNDRUM

Pinning down the precise sources of current inflationary pressure has important implications for policy. To the extent that increased inflation reflects overly stimulative policy, the antidote is apparent: Reverse course and revert to policies more consistent with past periods in which inflation was stabilized. To the extent that increased inflation reflects supply-side shocks, however, the usual tools of aggregate demand management are likely to offer little help.

In the wake of the global oil price shocks of the 1970s, economists devoted much effort to understanding the optimal monetary policy response to supply shocks. Unfortunately, however, the consensus conclusion was that the standard tools of monetary and fiscal policy are not well designed to address supply shocks. Edward Gramlich of the University of Michigan provided a summary of this viewpoint in a 1979 article that appeared in *Brookings Papers on Economic Activity*. He concluded that supply shocks are very costly, no matter what the policy response: "If their unemployment impact is minimized by accommodating policies, the shock-induced inflation can linger for several years. If their inflationary impact is minimized by an immediate recession, the cost in terms of high unemployment is sizable."

As a practical matter, economists have often advocated some degree of accommodation in response to aggregate supply shocks. But the prescription for accommodation typically rests on the assumption of an economy initially at equilibrium — that is, one with stable inflation and full employment. While that was likely the case at the onset of the pandemic, it certainly was not the case when global energy and grain supplies were disrupted at the onset of the war in Ukraine. Indeed, year-over-year U.S. inflation had already hit a nearly 40-year record before that point.

While monetary policy is generally not an effective avenue for alleviating supply shocks, companies and governments are likely to take measures designed to soften such blows in the future. Undoubtedly, changing perceptions of risk will cause some firms to reassess their supply chains, just as Japanese automakers did after their supply networks were heavily disrupted by the 2011 Tōhoku earthquake. Indeed, even before the pandemic, many companies had been already reassessing their reliance on foreign value chains, due to, among other things, increased labor costs in China and the growing importance of "speed-to-market" as a competitive factor.

Calls for government policies to decrease dependency on global supply chains have come from many circles in the United States, Europe, and Japan. Treasury Secretary Janet Yellen, for example, has raised the prospect of "friend- shoring" policies. Similarly, officials from France and Germany have spoken of "reshoring projects" and "minimizing one-sided dependencies." Within the United States, the costs and benefits of such policies will continue to be debated among researchers and politicians, while Fed officials focus on the appropriate extent of monetary tightening or accommodation. **EF**

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What Can We Learn from the Pandemic and the War about Supply Shocks, Inflation, and Monetary Policy?

Remarks by

Lael Brainard

Vice Chair

Board of Governors of the Federal Reserve System

Prepared for the conference volume of the

21st BIS Annual Conference
Central Banking after the Pandemic: Challenges Ahead

Bank for International Settlements
Basel, Switzerland

Policymakers and researchers have begun reassessing certain features of the economy and monetary policy in light of recent experience. After several decades in which supply was highly elastic and inflation was low and relatively stable, a series of supply shocks associated with the pandemic and Russia's war against Ukraine have contributed to high inflation, in combination with a very rapid recovery in demand. The experience with the pandemic and the war highlights the challenges for monetary policy in responding to a protracted series of adverse supply shocks. In addition, to the extent that the lower elasticity of supply we have seen recently could become more common due to challenges such as demographics, deglobalization, and climate change, it could herald a shift to an environment characterized by more volatile inflation compared with the preceding few decades.[1]

Inflation in the United States and many countries around the world is very high (figure 1). While both demand and supply are contributing to high inflation, it is the relative inelasticity of supply in key sectors that most clearly distinguishes the pandemic- and war-affected period of the past three years from the preceding 30 years of the Great Moderation.[2] Interestingly,

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[1] I am grateful to Kurt Lewis of the Federal Reserve Board for his assistance in preparing this text and to Kenneth Eva for preparing the figures. This text updates the views that I discussed as part of a panel at the BIS Annual Meeting on June 24, 2022. These views are my own and do not necessarily reflect those of the Federal Reserve Board or the Federal Open Market Committee.

[2] Research has generated a range of estimates on the contributions from supply and demand factors. For example, Shapiro (2022) finds that demand factors are responsible for about one-third of the surge in inflation above the pre-pandemic trend, while di Giovanni and others (2022) find a number closer to two-thirds. See Adam Shapiro (2022), "How Much Do Supply and Demand Drive Inflation?" FRBSF Economic Letter 2022-15 (San Francisco: Federal Reserve Bank of San Francisco, June), https://www.frbsf.org/economic-research/publications/economic-letter/2022/june/how-much-do-supply-and-demand-drive-inflation; and Julian di Giovanni, Sebnem Kalemli-Ozcan, Alvaro Silva, and Muhammed Yildirim (2022), "Global Supply Chain Pressures, International Trade, and Inflation," paper presented at the ECB Forum on Central Banking 2022, Sintra, Portugal, June 27–29, https://www.ecb.europa.eu/pub/conferences/ecbforum/shared/pdf/2022/Kalemli-Oezcan_paper.pdf.

inflation is broadly higher throughout much of the global economy, and even jurisdictions that began raising rates forcefully in 2021 have not stemmed the global inflationary tide.[3]

In the United States, as a result of significant fiscal and monetary support, the level of private domestic final purchases recovered extremely rapidly in 2020 and 2021 to levels consistent with the pre-pandemic trend before moving below trend in 2022 (figure 2). Although demand came in near the pre-pandemic trend on an aggregate level, the pandemic induced a shift in composition that concentrated large increases in demand in certain sectors where the supply response was constrained. The shift in consumption from services to goods was so pronounced that—despite plunging at the onset of the pandemic in March 2020—real spending on goods had already risen nearly 4 percent above its pre-pandemic trend by June of that year. While a very slow rotation back toward pre-pandemic patterns of consumption has been under way for over a year, it remains incomplete more than two and a half years after the initial shutdown: In the most recent data, the level of goods spending remains 6 percent above the level implied by its pre-pandemic trend, while services spending remains a little more than 2 percent below its pre-pandemic trend (figure 3).

The supply shocks to goods, labor, and commodities have been accompanied by unusually high volatility in monthly inflation readings since the beginning of the pandemic. Since March 2020, the standard deviation of month-over-month core inflation has been 0.22 percentage point—a level of variation not seen in a 31-month period since the 1970s and more than double the standard deviation in monthly core inflation from 1990 to 2019. The initial

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[3] The median year-to-date total policy rate hike within the group of Brazil, Hungary, New Zealand, Norway, Peru, Poland, and South Korea is 6 percentage points. All of these countries began forceful rate hikes in 2021, and the cumulative hikes have taken policy rates in some of these countries above 10 percent. Despite this, through September 2022 core inflation in these countries was 9.5 percent year-over-year, rising 3.5 percentage points since March. See Economist (2022), "Even Super-Tight Policy Is Not Bringing Down Inflation," October 28, https://www.economist.com/finance-and-economics/2022/10/23/even-super-tight-policy-is-not-bringing-down-inflation.

drivers of this high variation in monthly core inflation readings were a sharp drop in prices and subsequent bounceback in the first months of the pandemic, followed by a couple of bursts lasting three to four months each. The first burst occurred around reopening in the spring of 2021, and the second occurred amid the effects of the Delta and Omicron COVID-19 variants in the autumn of 2021 (figure 4).[4]

The evidence suggests that high concentrations of demand in sectors such as appliances, housing, and motor vehicles—where supply was constrained by the effects of the pandemic—played an important role initially in generating inflationary pressures. Acute constraints on shipping and on the supply of nonsubstitutable intermediate inputs like semiconductors were compounded by acute constraints on labor supply associated with the effects of the Delta and Omicron variants and later compounded further by sharp commodities supply shocks associated with Russia's war on Ukraine.

The standard monetary policy prescription is to "look through" supply shocks, such as commodities price shocks or shutdowns of ports or semiconductor plants, that are not assessed to leave a lasting imprint on potential output.[5] In contrast, if supply shocks durably lower potential output such that the economy is operating above potential, monetary policy tightening is necessary to bring demand into alignment with the economy's reduced productive capacity.

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[4] Pandemic fiscal measures played an important role in boosting demand, but the rapid deceleration of inflation over the summer of 2021 and subsequent rebound in inflation from October through the end of the year do not line up well with the fiscal demand impulse projected by most forecasters. For example, the Brookings Institution projected a smooth demand impulse from the American Rescue Plan that peaked at the end of last year. See Wendy Edelberg and Louise Sheiner (2021), "The Macroeconomic Implications of Biden's $1.9 Trillion Fiscal Package," Brookings Institution, *Up Front* (blog), January 28, https://www.brookings.edu/blog/up-front/2021/01/28/the-macroeconomic-implications-of-bidens-1-9-trillion-fiscal-package.

[5] See, for instance, Martin Bodenstein, Christopher J. Erceg, and Luca Guerrieri (2008), "Optimal Monetary Policy with Distinct Core and Headline Inflation Rates," *Journal of Monetary Economics,* vol. 55 (October), pp. S18–33.

Importantly, and separately from the implications for potential output, monetary policy should respond strongly if supply shocks risk de-anchoring inflation expectations.[6]

Although these tenets of monetary policy sound relatively straightforward in theory, they are challenging to assess and implement in practice. It is difficult to assess potential output and the output gap in real time, as has been extensively documented by research.[7] This is especially true in an environment of high uncertainty. The level of uncertainty around the output gap varies considerably over time, and research suggests that more muted policy reactions are warranted when uncertainty about the output gap is high.[8] The unexpectedly long-lasting global pandemic and the sharp disruptions to commodities associated with Russia's war against Ukraine have contributed to substantial uncertainty (figure 5).

Even so, the drawn-out sequence of shocks to the supply of labor, commodities, and key intermediate inputs, such as semiconductors, blurred the lines about what constitutes a temporary shock as opposed to a persistent shock to potential output. Even when each individual supply shock fades over time and behaves like a temporary shock on its own, a drawn-out sequence of adverse supply shocks that has the cumulative effect of constraining potential output for an extended period is likely to call for monetary policy tightening to restore balance between demand and supply.

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[6] Ricardo Reis makes the case that both these factors would have prescribed tighter policy in the current environment. See Ricardo Reis (2022), "The Burst of High Inflation in 2021–22: How and Why Did We Get Here?" CEPR Discussion Paper Series DP17514 (London: Centre for Economic Policy Research, July), https://cepr.org/publications/dp17514.

[7] See Athanasios Orphanides and Simon van Norden (2002), "The Unreliability of Output-Gap Estimates in Real Time," *Review of Economics and Statistics,* vol. 84 (November), pp. 569–83.

[8] For discussions of the time-varying nature of output gap uncertainty, see Travis J. Berge (2020), "Time-Varying Uncertainty of the Federal Reserve's Output Gap Estimate," Finance and Economics Discussion Series 2020-012 (Washington: Board of Governors of the Federal Reserve System, February; revised April 2021), https://doi.org/10.17016/FEDS.2020.012r1; and Rochelle M. Edge and Jeremy B. Rudd (2016), "Real-Time Properties of the Federal Reserve's Output Gap," *Review of Economics and Statistics,* vol. 98 (October), pp. 785–91. For a discussion of tempering the policy response to the output gap in response to increased uncertainty, see Athanasios Orphanides (2003), "Monetary Policy Evaluation with Noisy Information," *Journal of Monetary Economics,* vol. 50 (April), pp. 605–31.

In addition, a protracted series of supply shocks associated with an extended period of high inflation—as with the pandemic and the war—risks pushing the inflation expectations of households and businesses above levels consistent with the central bank's long-run inflation objective.[9] It is vital for monetary policy to keep inflation expectations anchored, because inflation expectations shape the behavior of households, businesses, and workers and enter directly into the inflation process. In the presence of a protracted series of supply shocks and high inflation, it is important for monetary policy to take a risk-management posture to avoid the risk of inflation expectations drifting above target. Even in the presence of pandemics and wars, central bankers have the responsibility to ensure that inflation expectations remain firmly anchored at levels consistent with our target.

In monitoring inflation expectations for purposes of risk management, not only the median but also the distribution of inflation expectations can provide important information about how inflation expectations may be changing.[10] Survey measures suggest that the median of longer-term inflation has remained within pre-pandemic ranges consistent with 2 percent inflation (figure 6). However, starting in 2021, there has been a greater dispersion than usual of views about future inflation in survey responses, as shown in figure 6. Although initially the increased dispersion reflected a rise in expectations for significantly above-target inflation, more

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[9] For two recent examples of assessing longer-term inflation expectations, see Michael T. Kiley (2022), "Anchored or Not: How Much Information Does 21st Century Data Contain on Inflation Dynamics?" Finance and Economics Discussion Series 2022-016 (Washington: Board of Governors of the Federal Reserve System, March), https://doi.org/10.17016/FEDS.2022.016; and Danilo Cascaldi-Garcia, Francesca Loria, and David López-Salido (2022), "Is Trend Inflation at Risk of Becoming Unanchored? The Role of Inflation Expectations," FEDS Notes (Washington: Board of Governors of the Federal Reserve System, March 31), https://doi.org/10.17016/2380-7172.3043.

[10] See, for example, Ricardo Reis (2021), "Losing the Inflation Anchor," *Brookings Papers on Economic Activity*, Fall, pp. 307–61, https://www.brookings.edu/wp-content/uploads/2021/09/15985-BPEA-BPEA-FA21_WEB_Reis.pdf. The Board's staff recently updated the Index of Common Inflation Expectations to include the 25th and 75th percentiles of inflation expectations over the next 12 months from the University of Michigan Surveys of Consumers.

recently, following substantial cumulative monetary policy tightening, the increased dispersion has also reflected increased expectations of no inflation or even disinflation. About one-fourth of respondents to the most recent University of Michigan Surveys of Consumers anticipate that prices are likely to be the same or below their current level 5 to 10 years in the future—roughly three times the average fraction that reported such expectations before the pandemic.

Finally, it is important to explore whether any features of the inelastic supply response associated with the pandemic and the war may have implications for potential growth and macroeconomic stability in the future.[11] In particular, despite the unprecedented pandemic policy support for businesses of all sizes that was directed at preserving the supply side of the economy, key sectors struggled to ramp up activity after reopening. The supply response was particularly impaired in sectors where supply chains are geographically fragmented and recurring foreign COVID-19 lockdowns have reduced the reliability of foreign supplies. While conditions have improved dramatically from some of the worst periods in 2021, measures like the Global Supply Chain Pressure Index from the Federal Reserve Bank of New York indicate that total supply chain pressures still are elevated relative to pre-pandemic levels (figure 7).

The supply disruptions in key goods and commodities sectors associated with the pandemic and Russia's war against Ukraine have highlighted the fragility of global supply chains and the risks of inelastic supply at moments of stress. Conditions have improved dramatically over the past year, judging by the return of the ISM Supplier Deliveries index to its pre-pandemic range of values (figure 8). That said, ongoing discussions about moving from "just in time" to "just in case" inventory management and from offshoring to "nearshoring" are raising

[11] See, for example, Agustín Carstens (2022), "The Return of Inflation," speech delivered at the International Center for Monetary and Banking Studies, Geneva, April 5, https://www.bis.org/speeches/sp220405.htm.

important questions about the extent to which businesses are likely to reconfigure global supply chains based on a reassessment of the tradeoff between cost efficiency and supply resilience.

Similarly, some have conjectured that the slow and incomplete recovery of the workforce over the course of the pandemic may be the beginning of a longer-term change in labor supply dynamics (figure 9).[12] In addition, the potential for more frequent and severe climate events, as we are already seeing, and for frictions in the energy transition could also lead to greater volatility of supply. Together, a combination of forces—the deglobalization of supply chains, the higher frequency and severity of climate disruptions, and demographic shifts—could lead to a period of lower supply elasticity and greater inflation volatility.

To conclude, the experience with the pandemic and the war highlights challenges for monetary policy in responding to supply shocks. A protracted series of adverse supply shocks could persistently weigh on potential output or could risk pushing inflation expectations above target in ways that call for monetary policy to tighten for risk-management reasons. More speculatively, it is possible that longer-term changes—such as those associated with labor supply, deglobalization, and climate change—could reduce the elasticity of supply and increase inflation volatility into the future.

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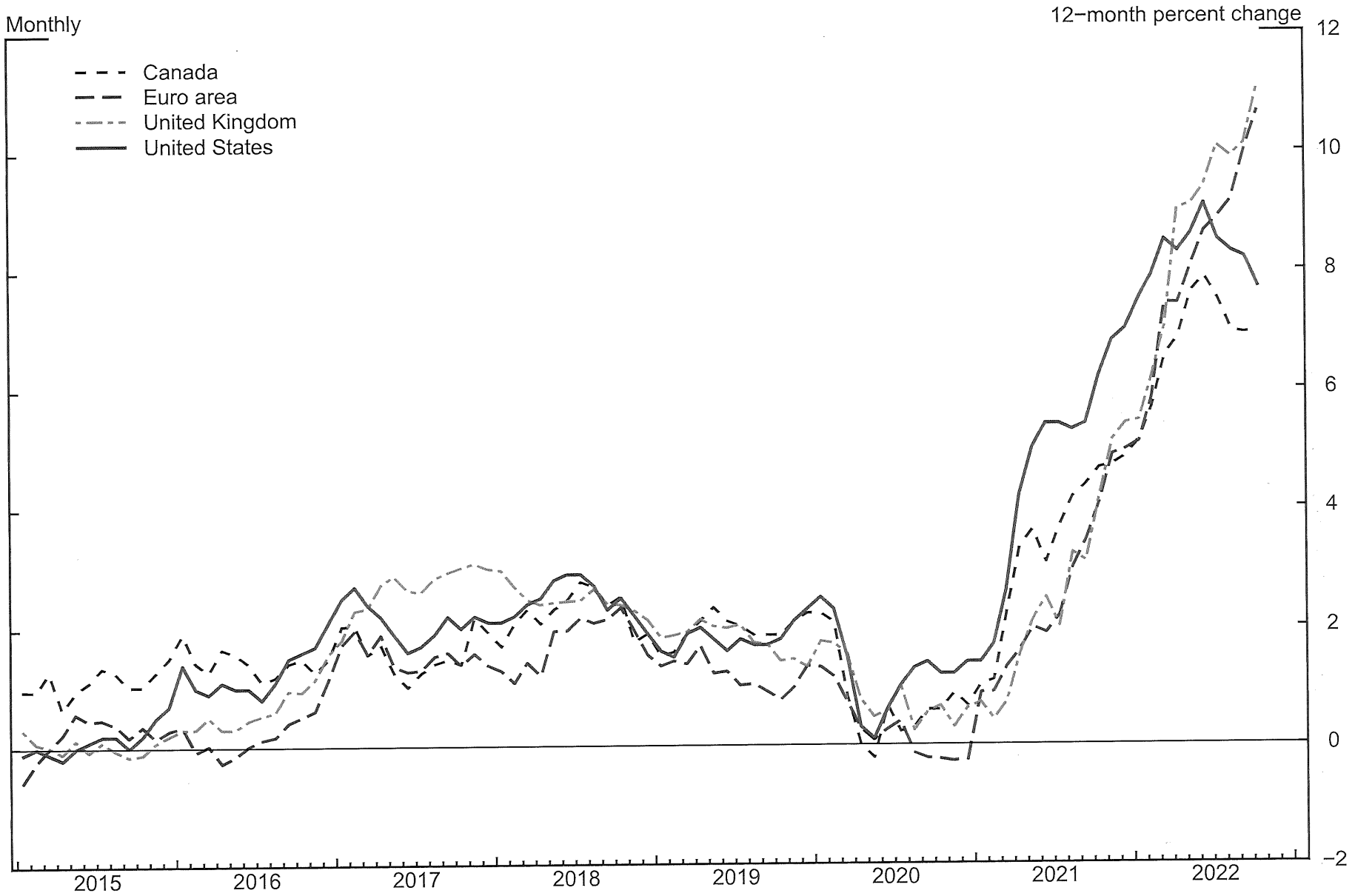
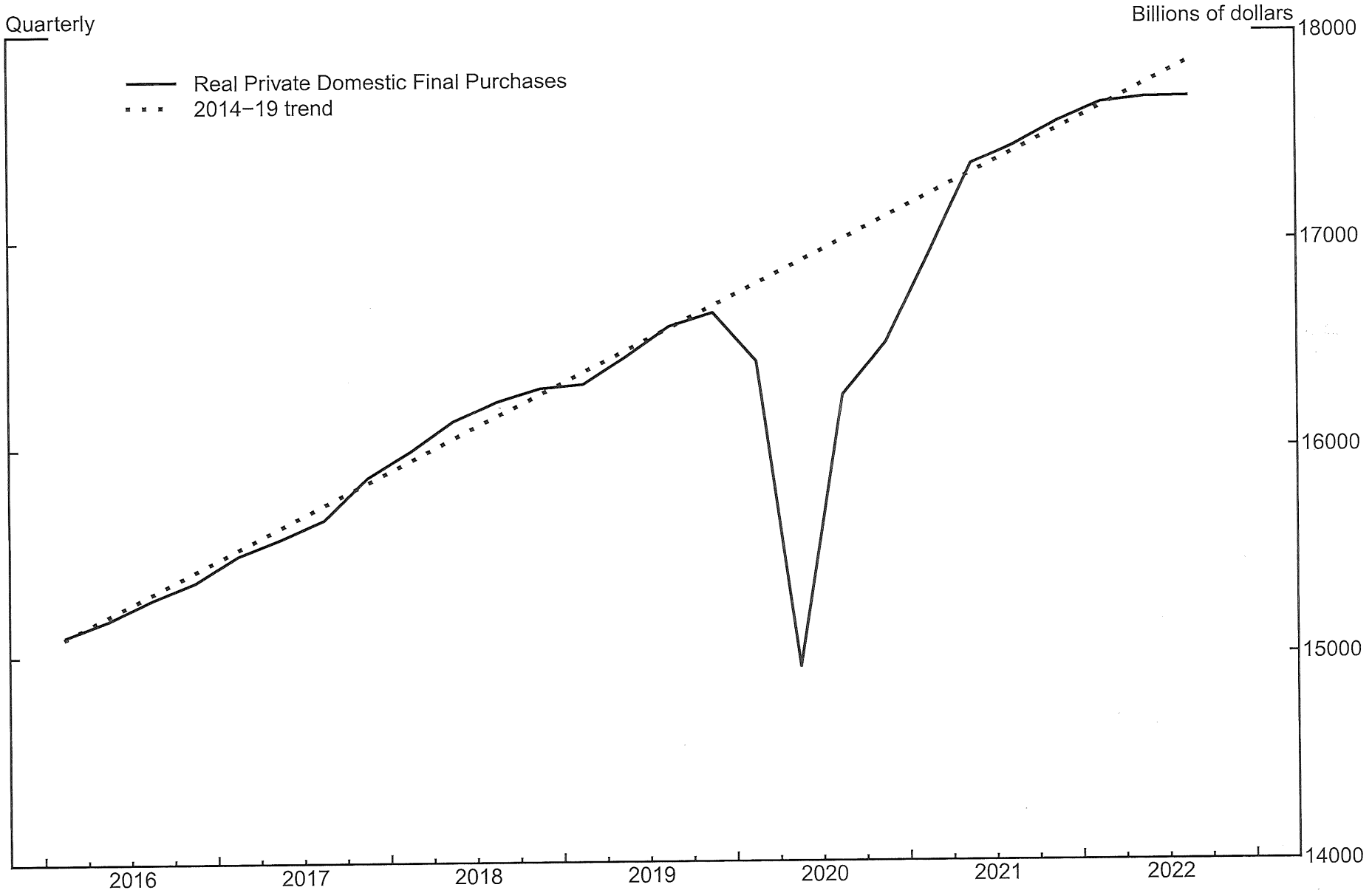
[12] See, for example, Charles Goodhart and Manoj Pradhan (2020), *The Great Demographic Reversal: Ageing Societies, Waning Inequality, and an Inflation Revival* (Cham, Switzerland: Palgrave Macmillan).

Figure 1. Headline Inflation for Selected Countries



Note: Data go through October 2022.
Source: Haver Analytics.

Figure 2. Real Private Domestic Final Purchases

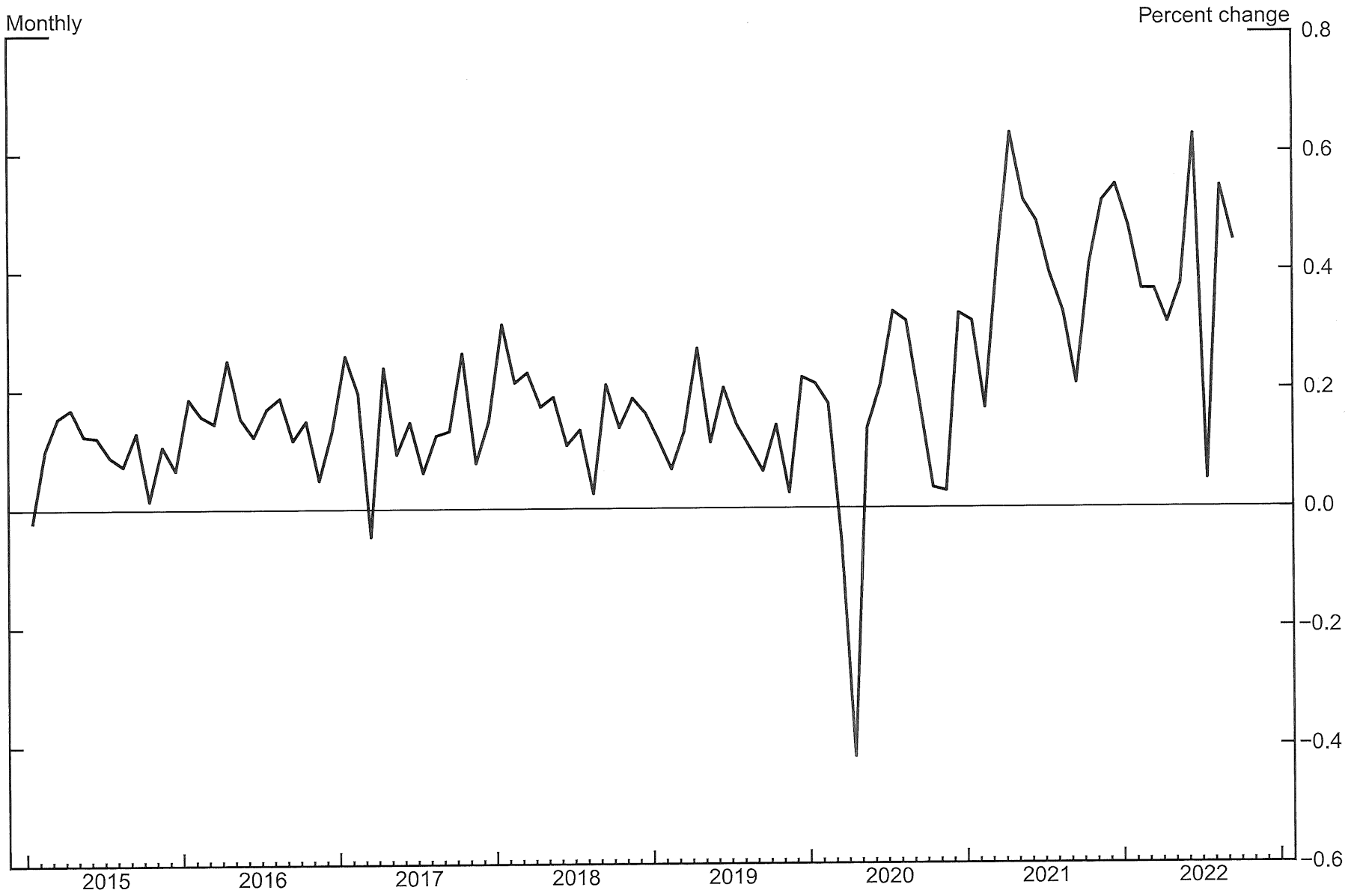


Note: Data go through 2022:Q3.
Source: Bureau of Economic Analysis.

Figure 3. Real Personal Consumption Expenditures

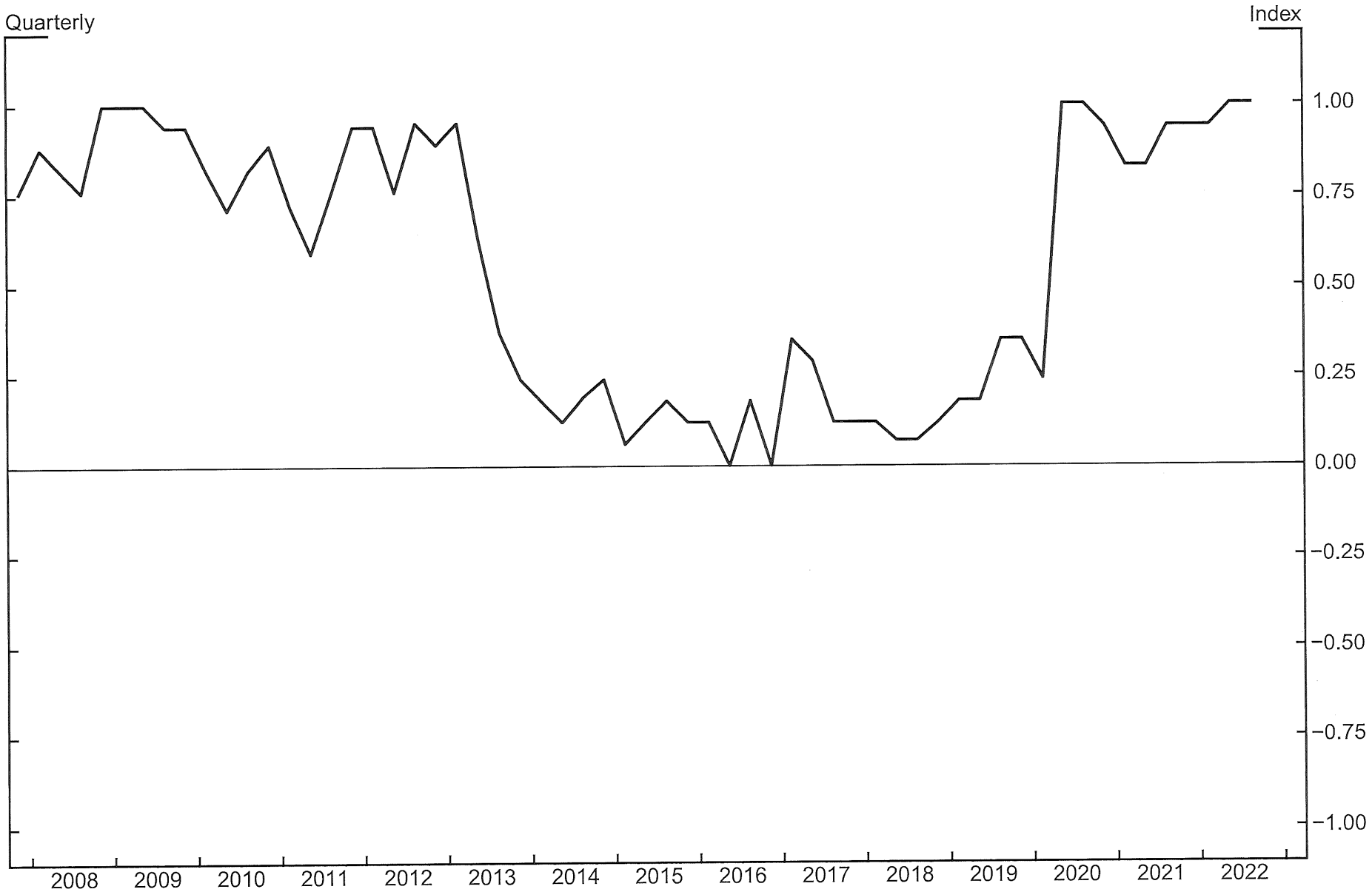
Note: Data go through September 2022.
Source: Bureau of Economic Analysis.

Figure 4. PCE Monthly Inflation Less Food and Energy



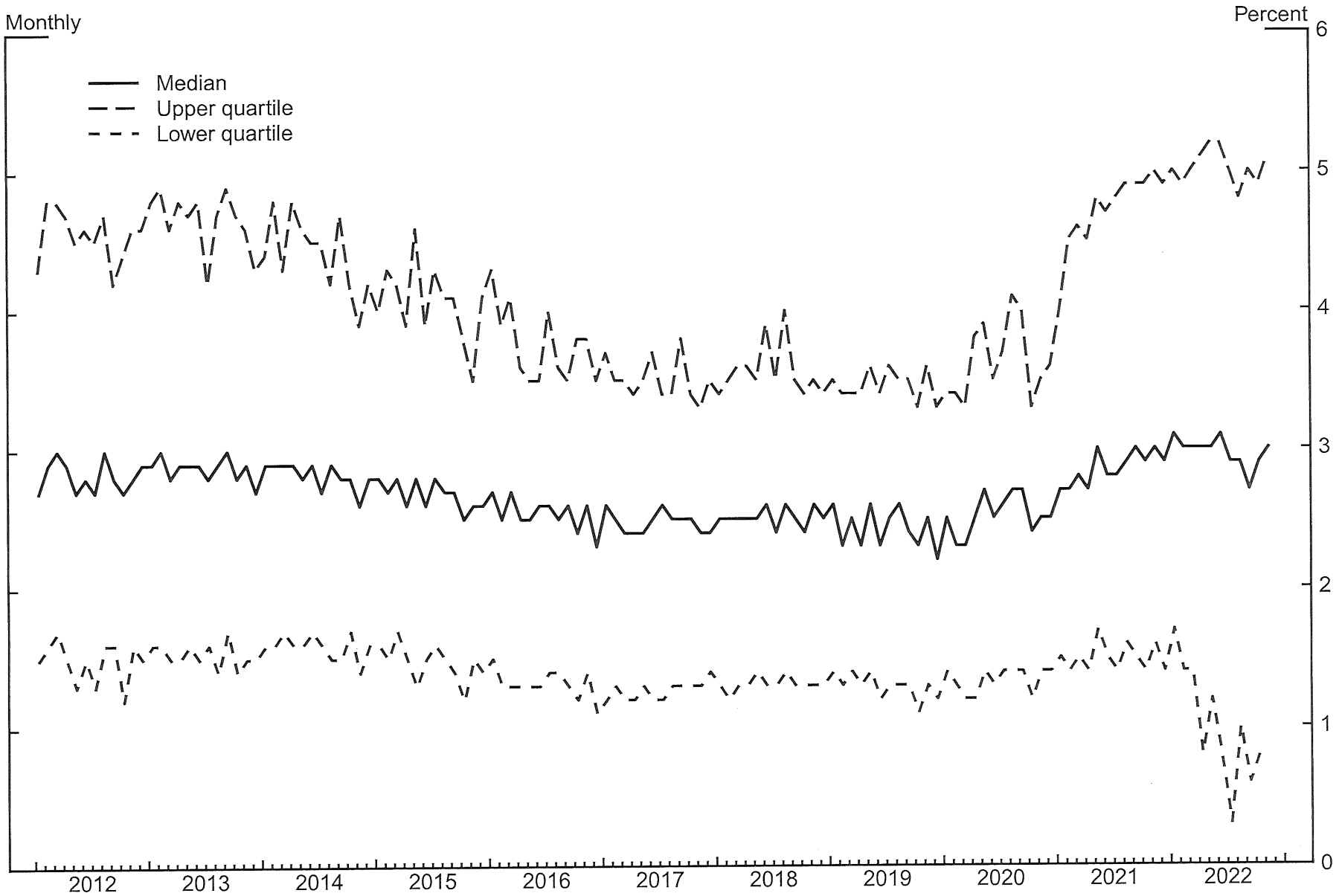
Note: Data go through September 2022. PCE is personal consumption expenditures.
Source: Bureau of Economic Analysis.

Figure 3. Diffusion Index of FOMC Participants' Uncertainty Assessments for GDP Growth



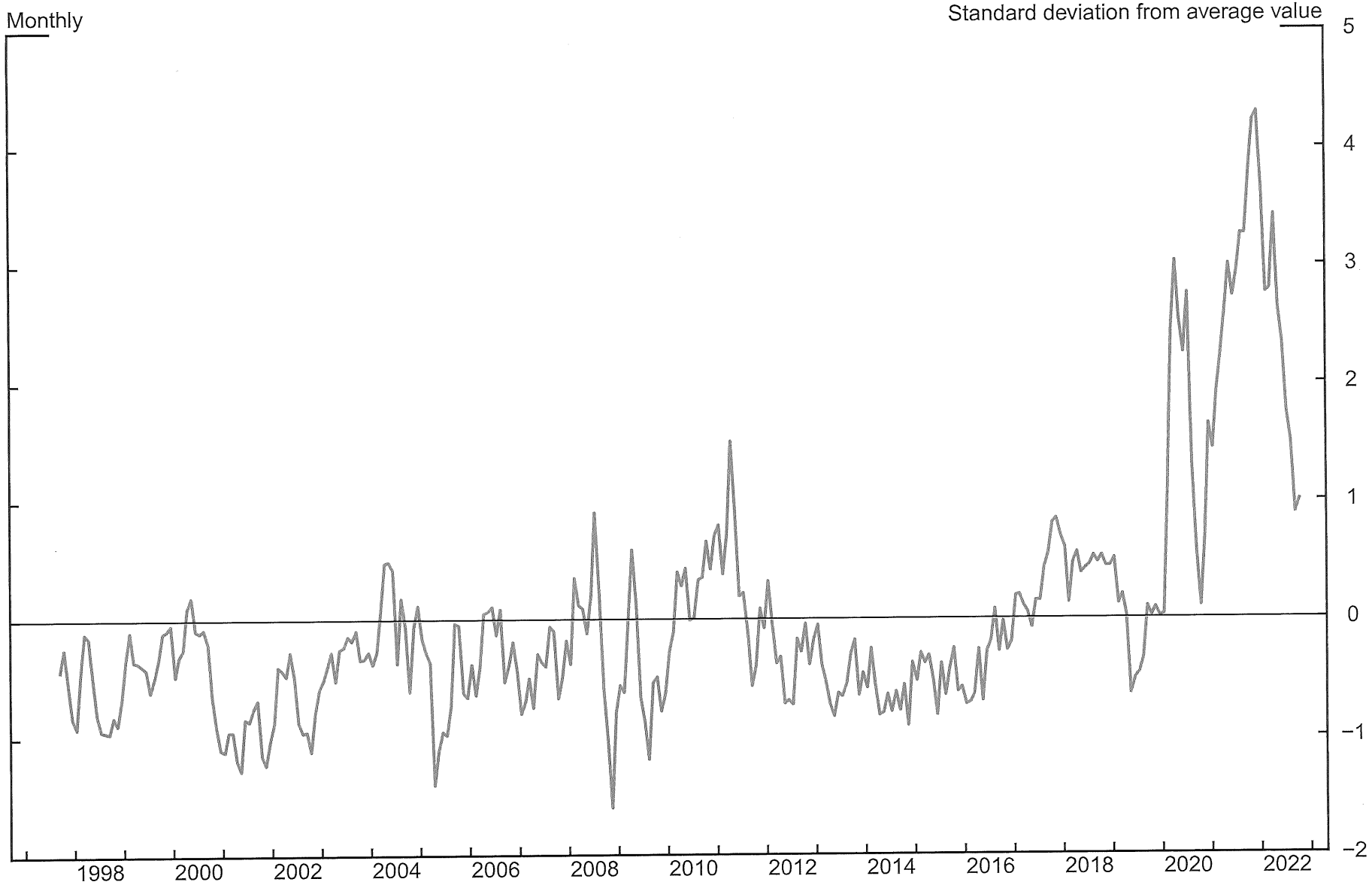
Note: Data go through 2022:Q3. FOMC is Federal Open Market Committee; GDP is gross domestic product.
Source: Federal Reserve Board.

Figure 3. Expected Price Change, Next 5 to 10 Years



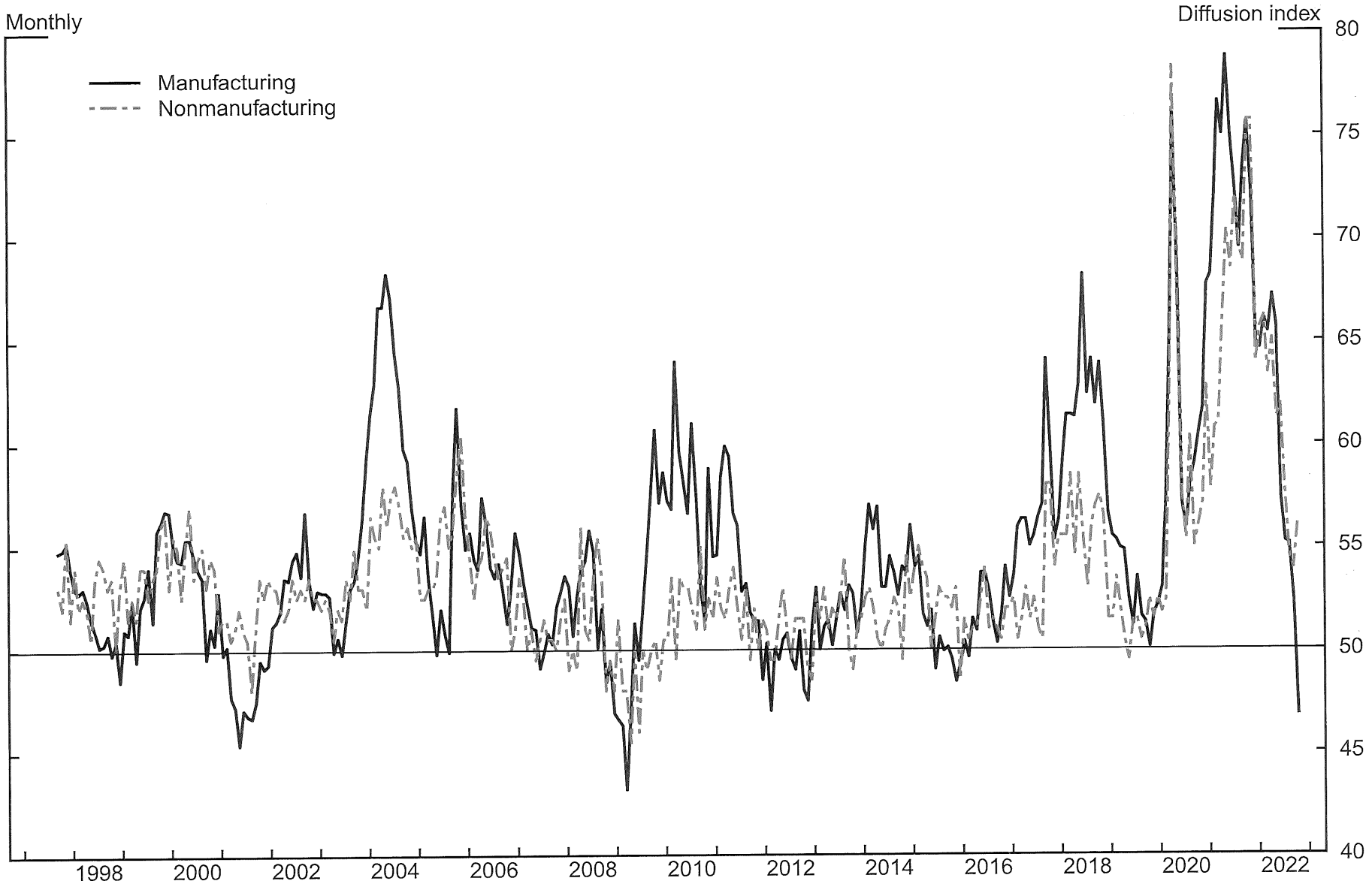
Note: Data go through November 2022.
Source: University of Michigan Surveys of Consumers.

Figure 7. Global Supply Chain Pressure Index



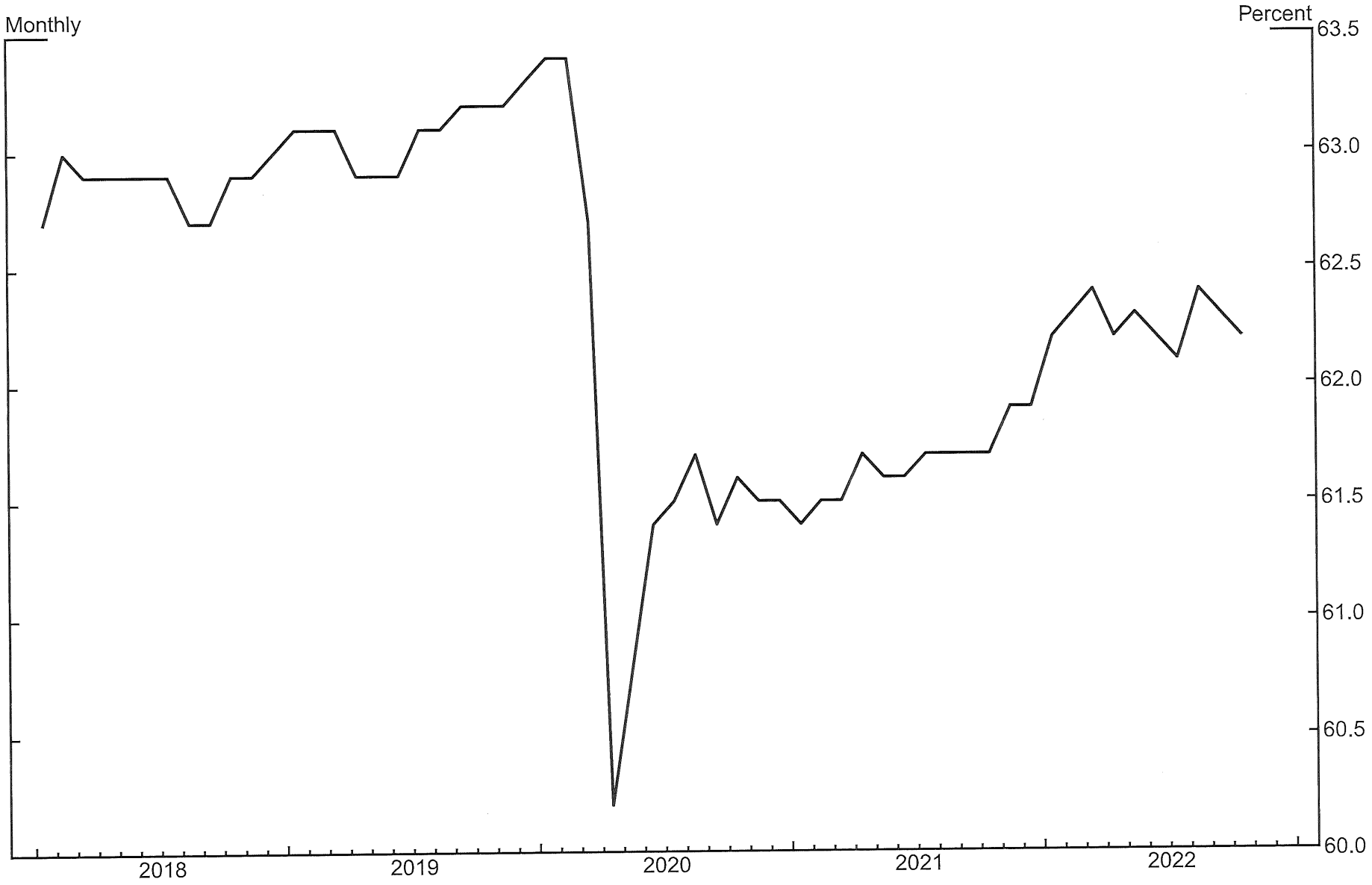
Note: Data go through October 2022.
Source: Federal Reserve Bank of New York.

Figure 3. ISM Supplier Deliveries Index



Note: Data go through October 2022. The ISM Supplier Deliveries Index is an inverse diffusion index, a reading above 50 percent indicates slower deliveries.
Source: Institute for Supply Management.

Figure 3. Labor Force Participation Rate



Note: Data go through October 2022.
Source: Bureau of Labor Statistics.

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Review and Outlook

Remarks by

Jerome H. Powell

Chair

Board of Governors of the Federal Reserve System

at

"Reassessing the Effectiveness and Transmission of Monetary Policy,"
an economic symposium sponsored by the Federal Reserve Bank of Kansas City

Jackson Hole, Wyoming

August 23, 2024

Four and a half years after COVID-19's arrival, the worst of the pandemic-related economic distortions are fading. Inflation has declined significantly. The labor market is no longer overheated, and conditions are now less tight than those that prevailed before the pandemic. Supply constraints have normalized. And the balance of the risks to our two mandates has changed. Our objective has been to restore price stability while maintaining a strong labor market, avoiding the sharp increases in unemployment that characterized earlier disinflationary episodes when inflation expectations were less well anchored. While the task is not complete, we have made a good deal of progress toward that outcome.

Today, I will begin by addressing the current economic situation and the path ahead for monetary policy. I will then turn to a discussion of economic events since the pandemic arrived, exploring why inflation rose to levels not seen in a generation, and why it has fallen so much while unemployment has remained low.

Near-Term Outlook for Policy

Let's begin with the current situation and the near-term outlook for policy.

For much of the past three years, inflation ran well above our 2 percent goal, and labor market conditions were extremely tight. The Federal Open Market Committee's (FOMC) primary focus has been on bringing down inflation, and appropriately so. Prior to this episode, most Americans alive today had not experienced the pain of high inflation for a sustained period. Inflation brought substantial hardship, especially for those least

able to meet the higher costs of essentials like food, housing, and transportation. High inflation triggered stress and a sense of unfairness that linger today.[1]

Our restrictive monetary policy helped restore balance between aggregate supply and demand, easing inflationary pressures and ensuring that inflation expectations remained well anchored. Inflation is now much closer to our objective, with prices having risen 2.5 percent over the past 12 months (figure 1).[2] After a pause earlier this year, progress toward our 2 percent objective has resumed. My confidence has grown that inflation is on a sustainable path back to 2 percent.

Turning to employment, in the years just prior to the pandemic, we saw the significant benefits to society that can come from a long period of strong labor market conditions: low unemployment, high participation, historically low racial employment gaps, and, with inflation low and stable, healthy real wage gains that were increasingly concentrated among those with lower incomes.[3]

Today, the labor market has cooled considerably from its formerly overheated state. The unemployment rate began to rise over a year ago and is now at 4.3 percent—still low by historical standards, but almost a full percentage point above its level in early 2023 (figure 2). Most of that increase has come over the past six months. So far, rising

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[1] Shiller (1997) and Stantcheva (2024) study why people dislike inflation. Pfafjar and Winkler (2024) study households' attitudes toward inflation and unemployment. Binetti, Nuzzi, and Stantcheva (2024) investigate households' attitudes toward, and understanding of, inflation. Kaplan and Schulhofer-Wohl (2017) and Jaravel (2021) document heterogeneity in the inflation rate experienced by households across the income distribution.

[2] The data for the personal consumption expenditures (PCE) price index is available for June 2024. Over the 12 months to June 2024, the PCE price index increased 2.5 percent. Data for the consumer price index and producer price index are available through July 2024 and can be used to estimate the level of the PCE price index through July. While such an estimate is subject to uncertainty, it suggests that inflation remained near 2.5 percent through July.

[3] Research documenting such benefits include Aaronson and others (2019), who discuss the experience in the 2010s and review related historical evidence.

unemployment has not been the result of elevated layoffs, as is typically the case in an economic downturn. Rather, the increase mainly reflects a substantial increase in the supply of workers and a slowdown from the previously frantic pace of hiring. Even so, the cooling in labor market conditions is unmistakable. Job gains remain solid but have slowed this year.[4] Job vacancies have fallen, and the ratio of vacancies to unemployment has returned to its pre-pandemic range. The hiring and quits rates are now below the levels that prevailed in 2018 and 2019. Nominal wage gains have moderated. All told, labor market conditions are now less tight than just before the pandemic in 2019—a year when inflation ran below 2 percent. It seems unlikely that the labor market will be a source of elevated inflationary pressures anytime soon. We do not seek or welcome further cooling in labor market conditions.

Overall, the economy continues to grow at a solid pace. But the inflation and labor market data show an evolving situation. The upside risks to inflation have diminished. And the downside risks to employment have increased. As we highlighted in our last FOMC statement, we are attentive to the risks to both sides of our dual mandate.

The time has come for policy to adjust. The direction of travel is clear, and the timing and pace of rate cuts will depend on incoming data, the evolving outlook, and the balance of risks.

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[4] Payroll employment grew by an average of 170,000 per month over the three months ending in July. On August 21, the Bureau of Labor Statistics released the preliminary estimate of the upcoming annual benchmark revision to the establishment survey data, which will be issued in February 2025. The preliminary estimate indicates a downward adjustment to March 2024 total nonfarm employment of 818,000.

We will do everything we can to support a strong labor market as we make further progress toward price stability. With an appropriate dialing back of policy restraint, there is good reason to think that the economy will get back to 2 percent inflation while maintaining a strong labor market. The current level of our policy rate gives us ample room to respond to any risks we may face, including the risk of unwelcome further weakening in labor market conditions.

The Rise and Fall of Inflation

Let's now turn to the questions of why inflation rose, and why it has fallen so significantly even as unemployment has remained low. There is a growing body of research on these questions, and this is a good time for this discussion.[5] It is, of course, too soon to make definitive assessments. This period will be analyzed and debated long after we are gone.

The arrival of the COVID-19 pandemic led quickly to shutdowns in economies around the world. It was a time of radical uncertainty and severe downside risks. As so often happens in times of crisis, Americans adapted and innovated. Governments responded with extraordinary force, especially in the U.S. Congress unanimously passed the CARES Act. At the Fed, we used our powers to an unprecedented extent to stabilize the financial system and help stave off an economic depression.

After a historically deep but brief recession, in mid-2020 the economy began to grow again. As the risks of a severe, extended downturn receded, and as the economy

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[5] Early examples include Ball, Leigh, and Mishra (2022) and di Giovanni and others (2022). More recent work includes Benigno and Eggertsson (2023, 2024), Blanchard and Bernanke (2023, 2024), Crump and others (2024), Bai and others (2024), and Dao and others (forthcoming).

reopened, we faced the risk of replaying the painfully slow recovery that followed the Global Financial Crisis.

Congress delivered substantial additional fiscal support in late 2020 and again in early 2021. Spending recovered strongly in the first half of 2021. The ongoing pandemic shaped the pattern of the recovery. Lingering concerns over COVID weighed on spending on in-person services. But pent-up demand, stimulative policies, pandemic changes in work and leisure practices, and the additional savings associated with constrained services spending all contributed to a historic surge in consumer spending on goods.

The pandemic also wreaked havoc on supply conditions. Eight million people left the workforce at its onset, and the size of the labor force was still 4 million below its pre-pandemic level in early 2021. The labor force would not return to its pre-pandemic trend until mid-2023 (figure 3).[6] Supply chains were snarled by a combination of lost workers, disrupted international trade linkages, and tectonic shifts in the composition and level of demand (figure 4). Clearly, this was nothing like the slow recovery after the Global Financial Crisis.

Enter inflation. After running below target through 2020, inflation spiked in March and April 2021. The initial burst of inflation was concentrated rather than broad based, with extremely large price increases for goods in short supply, such as motor

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[6] The Federal Reserve Board staff's estimate of the labor force makes two adjustments to the Bureau of Labor Statistics' published estimates: (i) reweighing Current Population Survey respondents such that the labor force estimates in all years reflect the Census Bureau's latest vintage of population estimates; and (ii) accounting for net immigration that is likely not fully reflected in the Census Bureau's latest population estimates, as detailed in the CBO's 2024 Demographic Outlook (see https://www.cbo.gov/publication/59899). The pre-pandemic trend described here is calculated by appending the CBO's January 2020 projected labor force growth from the start of the pandemic through 2024:Q2 onto the level of the labor force just before the start of the pandemic. (See Congressional Budget Office (2020), The Budget and Economic Outlook: 2020 to 2030; https://www.cbo.gov/publication/56073.)

vehicles. My colleagues and I judged at the outset that these pandemic-related factors would not be persistent and, thus, that the sudden rise in inflation was likely to pass through fairly quickly without the need for a monetary policy response—in short, that the inflation would be transitory. Standard thinking has long been that, as long as inflation expectations remain well anchored, it can be appropriate for central banks to look through a temporary rise in inflation.[7]

The good ship Transitory was a crowded one, with most mainstream analysts and advanced-economy central bankers on board.[8] The common expectation was that supply conditions would improve reasonably quickly, that the rapid recovery in demand would run its course, and that demand would rotate back from goods to services, bringing inflation down.

For a time, the data were consistent with the transitory hypothesis. Monthly readings for core inflation declined every month from April to September 2021, although progress came slower than expected (figure 5). The case began to weaken around midyear, as was reflected in our communications. Beginning in October, the data turned hard against the transitory hypothesis.[9] Inflation rose and broadened out from goods into

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[7] For example, former Chair Ben Bernanke and Olivier Blanchard summarize the standard approach in their work on inflation the following way: "Standard central banking doctrine holds that, so long as inflation expectations are reasonably well anchored, there is a case for 'looking through' temporary supply shocks rather than responding to the short-run increase in inflation" (Blanchard and Bernanke, 2024, p. 2). Clarida (forthcoming) notes how central banks around the world faced a sharp rise in the relative price of goods and chose, at least initially, to accommodate the price pressures with an expected transitory increase in inflation.

[8] In the September 2021 Summary of Economic Projections (SEP), the median projection for headline inflation in 2022 was 2.2 percent. In the August 2021 Survey of Professional Forecasters (the closest survey to the September SEP), the median projection for headline inflation in 2022 was also 2.2 percent. Projections from the Blue Chip survey were similar around this time.

[9] Beginning with the data for October, readings for monthly core PCE jumped to 0.4 percent or higher and inflationary pressures broadened out across goods and services categories. And monthly job gains, already strong, were consistently revised higher over the second half of 2021. Measures of wage inflation also accelerated.

services. It became clear that the high inflation was not transitory, and that it would require a strong policy response if inflation expectations were to remain well anchored. We recognized that and pivoted beginning in November. Financial conditions began to tighten. After phasing out our asset purchases, we lifted off in March 2022.

By early 2022, headline inflation exceeded 6 percent, with core inflation above 5 percent. New supply shocks appeared. Russia's invasion of Ukraine led to a sharp increase in energy and commodity prices. The improvements in supply conditions and rotation in demand from goods to services were taking much longer than expected, in part due to further COVID waves in the U.S.[10] And COVID continued to disrupt production globally, including through new and extended lockdowns in China.[11]

High rates of inflation were a global phenomenon, reflecting common experiences: rapid increases in the demand for goods, strained supply chains, tight labor markets, and sharp hikes in commodity prices.[12] The global nature of inflation was unlike any period since the 1970s. Back then, high inflation became entrenched—an outcome we were utterly committed to avoiding.

By mid-2022, the labor market was extremely tight, with employment increasing by over 6½ million from the middle of 2021. This increase in labor demand was met, in part, by workers rejoining the labor force as health concerns began to fade. But labor supply remained constrained, and, in the summer of 2022, labor force participation

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[10] For example, labor supply continued to be materially affected by COVID even after vaccines became broadly available in the U.S. By late 2021, anticipated increases in labor force participation had not yet materialized, likely owing, in part, to the rise of the Delta and Omicron COVID variants.

[11] For example, in March 2022, lockdowns were imposed in the Jilin province, the largest center for auto production. Authorities also ramped up or extended restrictions in manufacturing hubs in the southeast and in Shanghai, where lockdowns had initially been scheduled to end in April 2022.

[12] The global nature of this inflationary episode is emphasized in Cascaldi-Garcia and others (2024) and Clarida (forthcoming), among others.

remained well below pre-pandemic levels. There were nearly twice as many job openings as unemployed persons from March 2022 through the end of the year, signaling a severe labor shortage (figure 6).[13] Inflation peaked at 7.1 percent in June 2022.

At this podium two years ago, I discussed the possibility that addressing inflation could bring some pain in the form of higher unemployment and slower growth. Some argued that getting inflation under control would require a recession and a lengthy period of high unemployment.[14] I expressed our unconditional commitment to fully restoring price stability and to keeping at it until the job is done.

The FOMC did not flinch from carrying out our responsibilities, and our actions forcefully demonstrated our commitment to restoring price stability. We raised our policy rate by 425 basis points in 2022 and another 100 basis points in 2023. We have held our policy rate at its current restrictive level since July 2023 (figure 7).

The summer of 2022 proved to be the peak of inflation. The 4-1/2 percentage point decline in inflation from its peak two years ago has occurred in a context of low unemployment—a welcome and historically unusual result.

How did inflation fall without a sharp rise in unemployment above its estimated natural rate?

Pandemic-related distortions to supply and demand, as well as severe shocks to energy and commodity markets, were important drivers of high inflation, and their

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[13] It has been argued that the natural rate of unemployment had risen, and that the unemployment rate was less informative about tightness in labor market than other measures such as those involving vacancies. For example, see Crump and others (2024). More generally, research has emphasized that the unemployment rate and the ratio of vacancies to unemployment often provide similar signals, but the signals differed in the pandemic period, and the ratio of vacancies to unemployment is a better overall indicator. For example, see Ball, Leigh, and Mishra (2022) and Benigno and Eggertsson (2023, 2024).

[14] For example, Ball, Leigh, and Mishra (2022) and Cecchetti and others (2023) present analyses emphasizing that disinflation would require economic slack.

reversal has been a key part of the story of its decline. The unwinding of these factors took much longer than expected but ultimately played a large role in the subsequent disinflation. Our restrictive monetary policy contributed to a moderation in aggregate demand, which combined with improvements in aggregate supply to reduce inflationary pressures while allowing growth to continue at a healthy pace. As labor demand also moderated, the historically high level of vacancies relative to unemployment has normalized primarily through a decline in vacancies, without sizable and disruptive layoffs, bringing the labor market to a state where it is no longer a source of inflationary pressures.

A word on the critical importance of inflation expectations. Standard economic models have long reflected the view that inflation will return to its objective when product and labor markets are balanced—without the need for economic slack—so long as inflation expectations are anchored at our objective. That's what the models said, but the stability of longer-run inflation expectations since the 2000s had not been tested by a persistent burst of high inflation. It was far from assured that the inflation anchor would hold. Concerns over de-anchoring contributed to the view that disinflation would require slack in the economy and specifically in the labor market. An important takeaway from recent experience is that anchored inflation expectations, reinforced by vigorous central bank actions, can facilitate disinflation without the need for slack.

This narrative attributes much of the increase in inflation to an extraordinary collision between overheated and temporarily distorted demand and constrained supply. While researchers differ in their approaches and, to some extent, in their conclusions, a consensus seems to be emerging, which I see as attributing most of the rise in inflation to

this collision.[15] All told, the healing from pandemic distortions, our efforts to moderate aggregate demand, and the anchoring of expectations have worked together to put inflation on what increasingly appears to be a sustainable path to our 2 percent objective.

Disinflation while preserving labor market strength is only possible with anchored inflation expectations, which reflect the public's confidence that the central bank will bring about 2 percent inflation over time. That confidence has been built over decades and reinforced by our actions.

That is my assessment of events. Your mileage may vary.

Conclusion

Let me wrap up by emphasizing that the pandemic economy has proved to be unlike any other, and that there remains much to be learned from this extraordinary period. Our Statement on Longer-Run Goals and Monetary Policy Strategy emphasizes our commitment to reviewing our principles and making appropriate adjustments through a thorough public review every five years. As we begin this process later this year, we will be open to criticism and new ideas, while preserving the strengths of our framework. The limits of our knowledge—so clearly evident during the pandemic—demand humility and a questioning spirit focused on learning lessons from the past and applying them flexibly to our current challenges.

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[15] Blanchard and Bernanke (2023) use a traditional (flexible) Phillips curve approach to reach this conclusion for the U.S. Blanchard and Bernanke (2024) and Dao and others (forthcoming) examine a broader set of countries using similar approaches. Di Giovanni and others (2022) and Bai and others (2024) use different techniques and emphasize supply constraints and shocks in the increase in inflation over 2021 and 2022.

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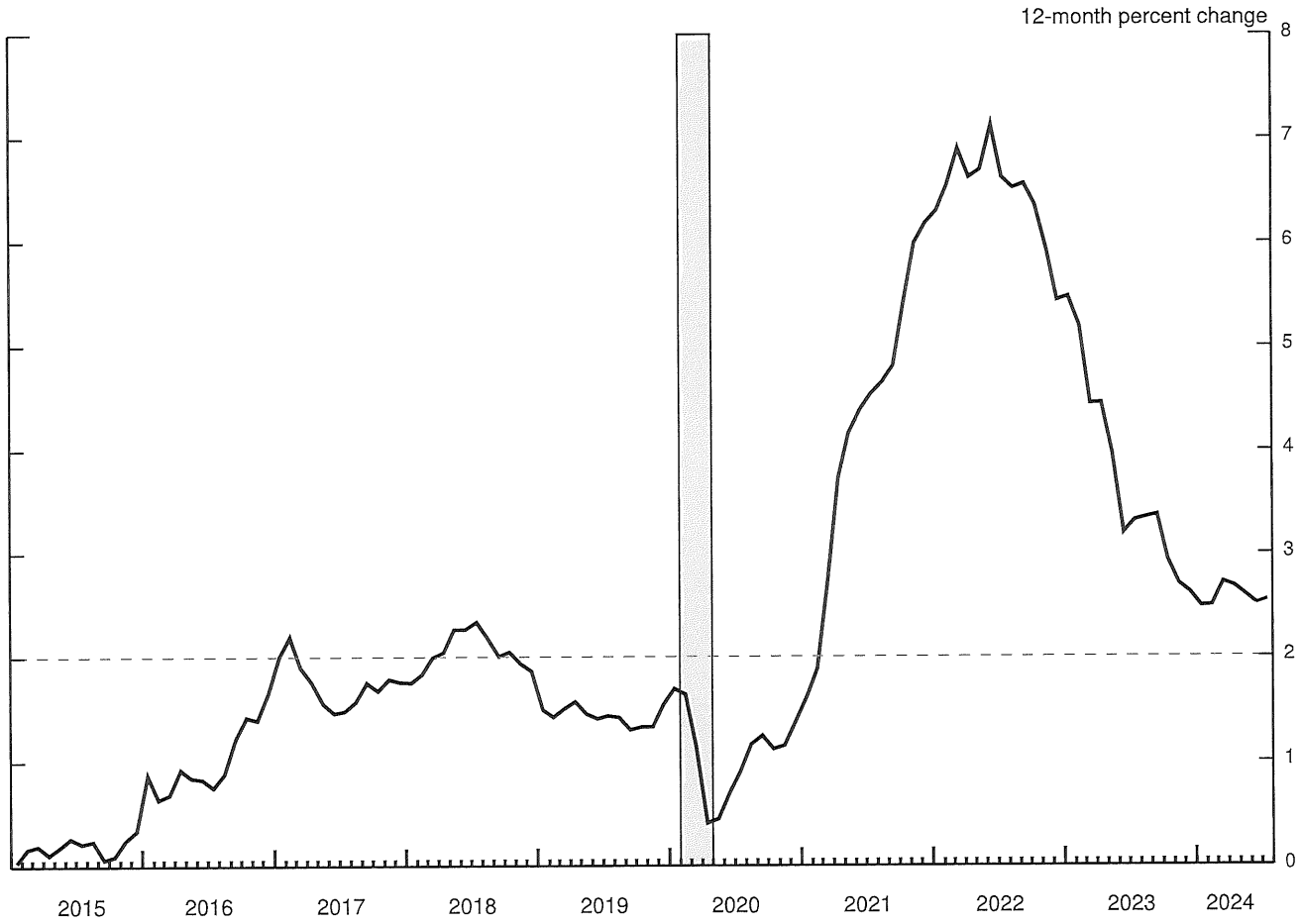
Figure 1

Personal Consumption Expenditures Price Index

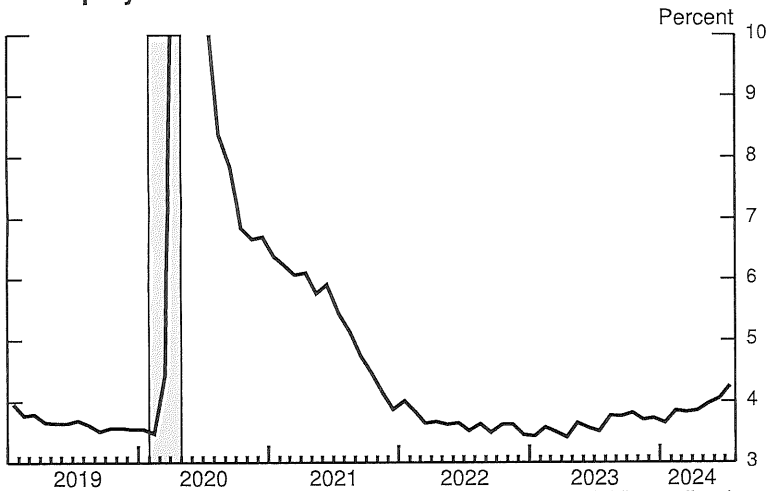


Note: The data are monthly and extend through July 2024. The data for July 2024 are estimates based on consumer price index and producer price index data. The outlined shaded bar indicates a period of business recession as defined by the National Bureau of Economic Research: February 2020-April 2020. PCE is personal consumption expenditures. The dashed line is at the 2 percent longer-run inflation target.

Source: Bureau of Economic Analysis, PCE, via Haver Analytics.

Figure 2

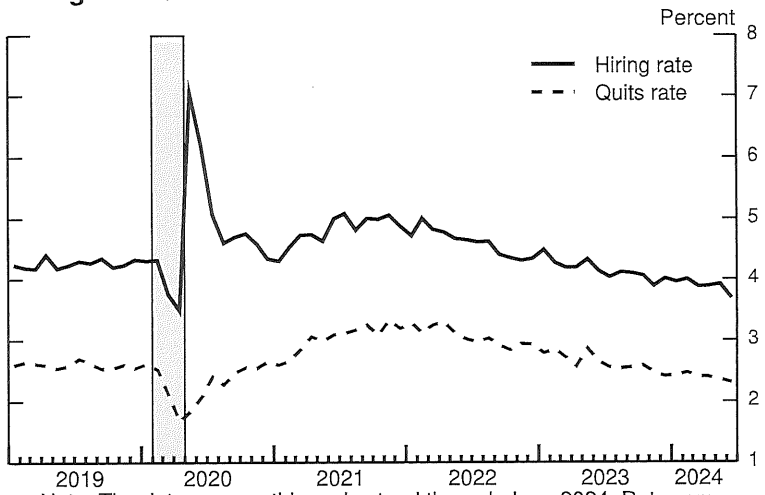
Unemployment Rate



Note: The data are monthly and extend through July 2024. The outlined shaded bar indicates a period of business recession as defined by the National Bureau of Economic Research: February 2020-April 2020. The unemployment rate peaked at 14.8 percent in April 2020. Unemployment rates for April-July 2020 are omitted for readability.

Source: Bureau of Labor Statistics via Haver Analytics.

Hiring and Quits Rates

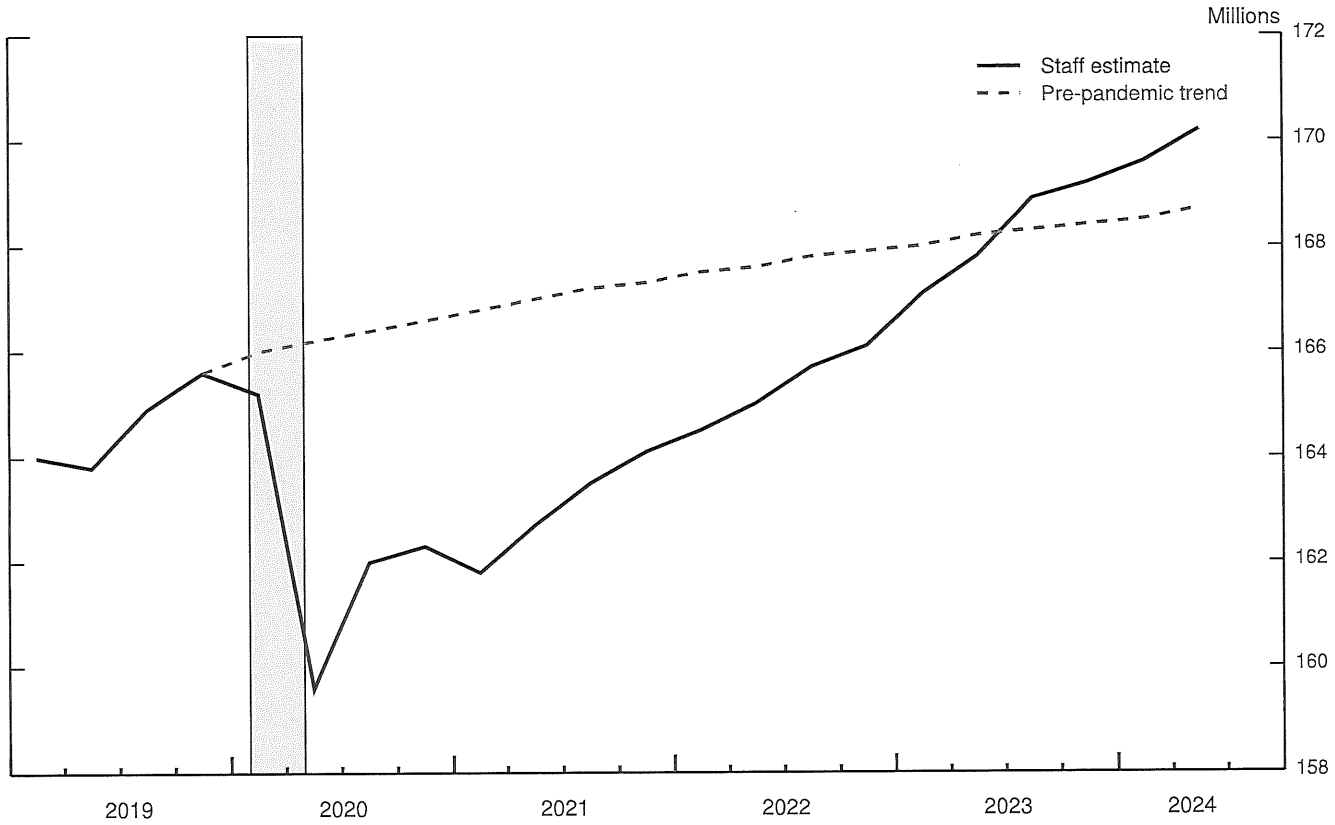


Note: The data are monthly and extend through June 2024. Rates are measured as percent of private employment. The outlined shaded bar indicates a period of business recession as defined by the National Bureau of Economic Research: February 2020-April 2020.

Source: Bureau of Labor Statistics via Haver Analytics.

Figure 3

Civilian Labor Force

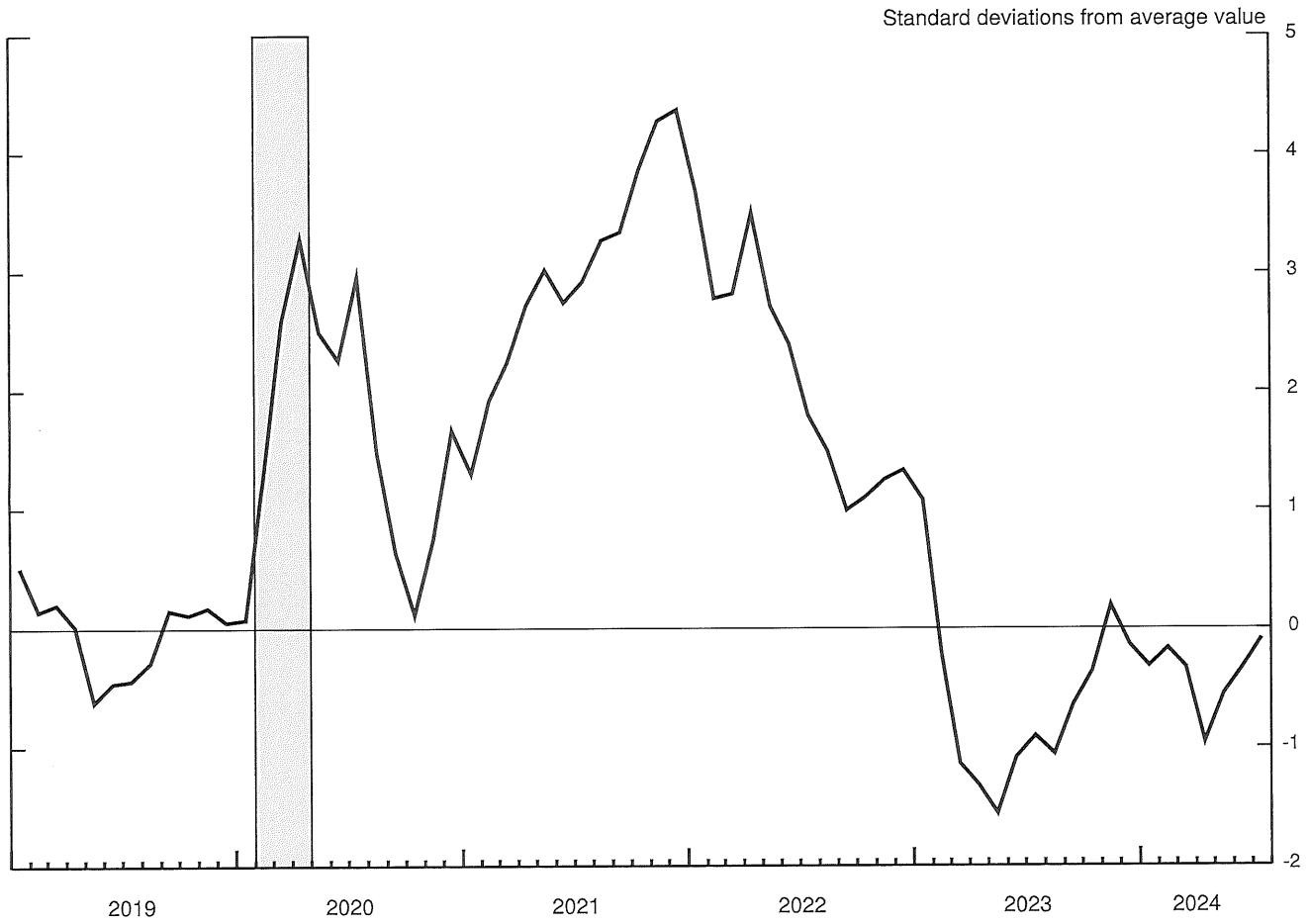


Note: Quarterly and seasonally adjusted data extending through 2024:Q2. The black line is a Federal Reserve Board staff estimate of the labor force, making two adjustments to the Bureau of Labor Statistics' published estimates: (i) reweighing Current Population Survey respondents such that the labor force estimates in all years reflect the Census Bureau's latest population estimates; and (ii) accounting for net immigration that is likely not fully reflected in the Census Bureau's latest population estimates, as detailed in the Congressional Budget Office's (CBO) *The Demographic Outlook: 2024 to 2054,* https://www.cbo.gov/publication/59899. The pre-pandemic trend is calculated by appending the CBO's January 2020 projected labor force growth from the start of the pandemic through 2024:Q2 onto the level of the labor force just before the start of the pandemic. The outlined shaded bar indicates a period of business recession as defined by the National Bureau of Economic Research: February 2020-April 2020.

Source: Bureau of Labor Statistics via Haver Analytics; CBO; Federal Reserve Board staff calculations.

Figure 4

Global Supply Chain Pressure Index

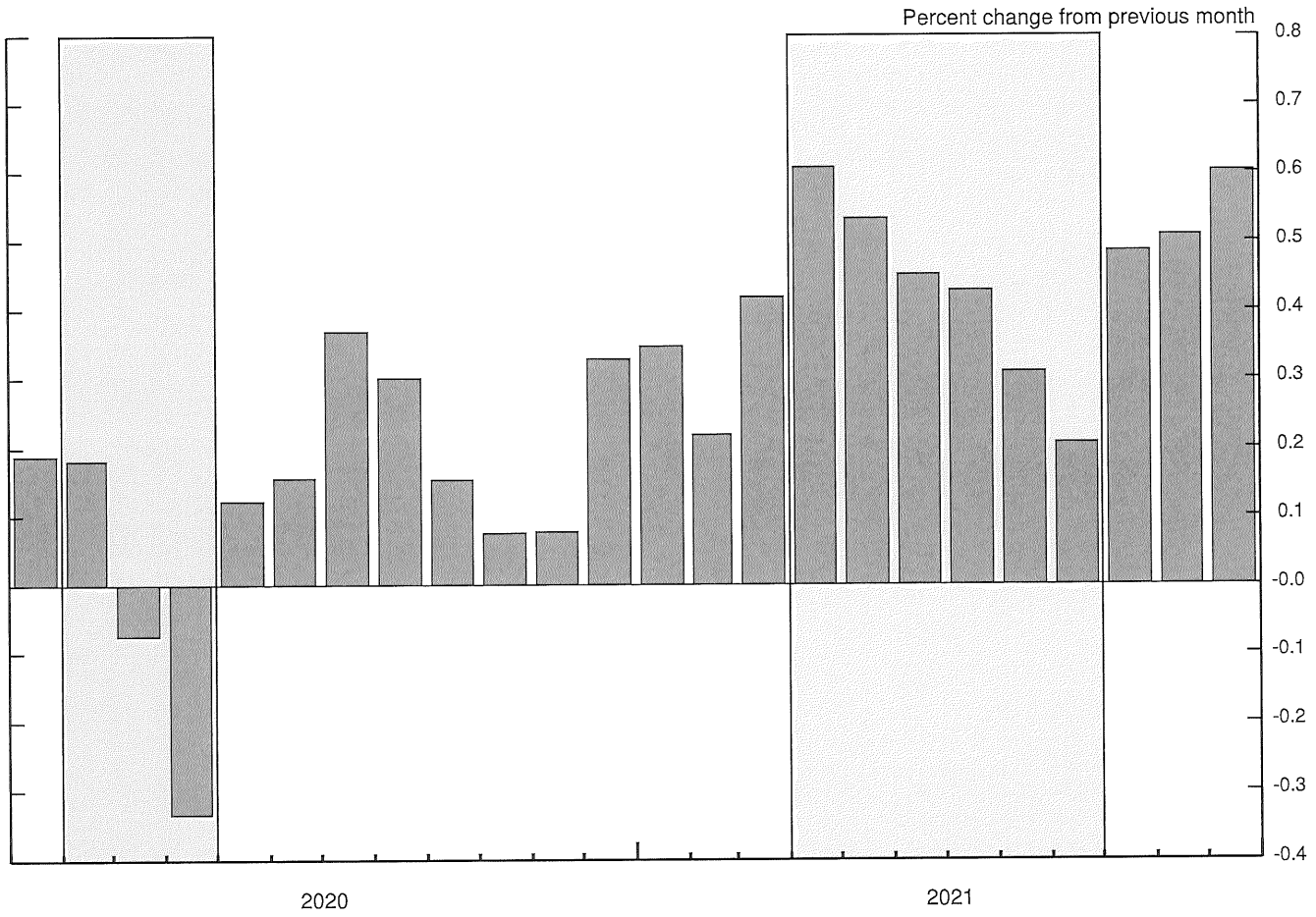


Note: The data are monthly and extend through July 2024. The index is presented as the number of standard deviations from its average value. The outlined shaded bar indicates a period of business recession as defined by the National Bureau of Economic Research: February 2020-April 2020.

Source: Federal Reserve Bank of New York.

Figure 5

Core PCE Prices



Note: The data are monthly and extend through December 2021. PCE is personal consumption expenditures. The gray outlined shaded bar indicates a period of business recession as defined by the National Bureau of Economic Research: February 2020-April 2020. The light-green outlined shaded region highlights the period from April 2021 to September 2021.

Source: Bureau of Economic Analysis, PCE, via Haver Analytics.

Figure 6

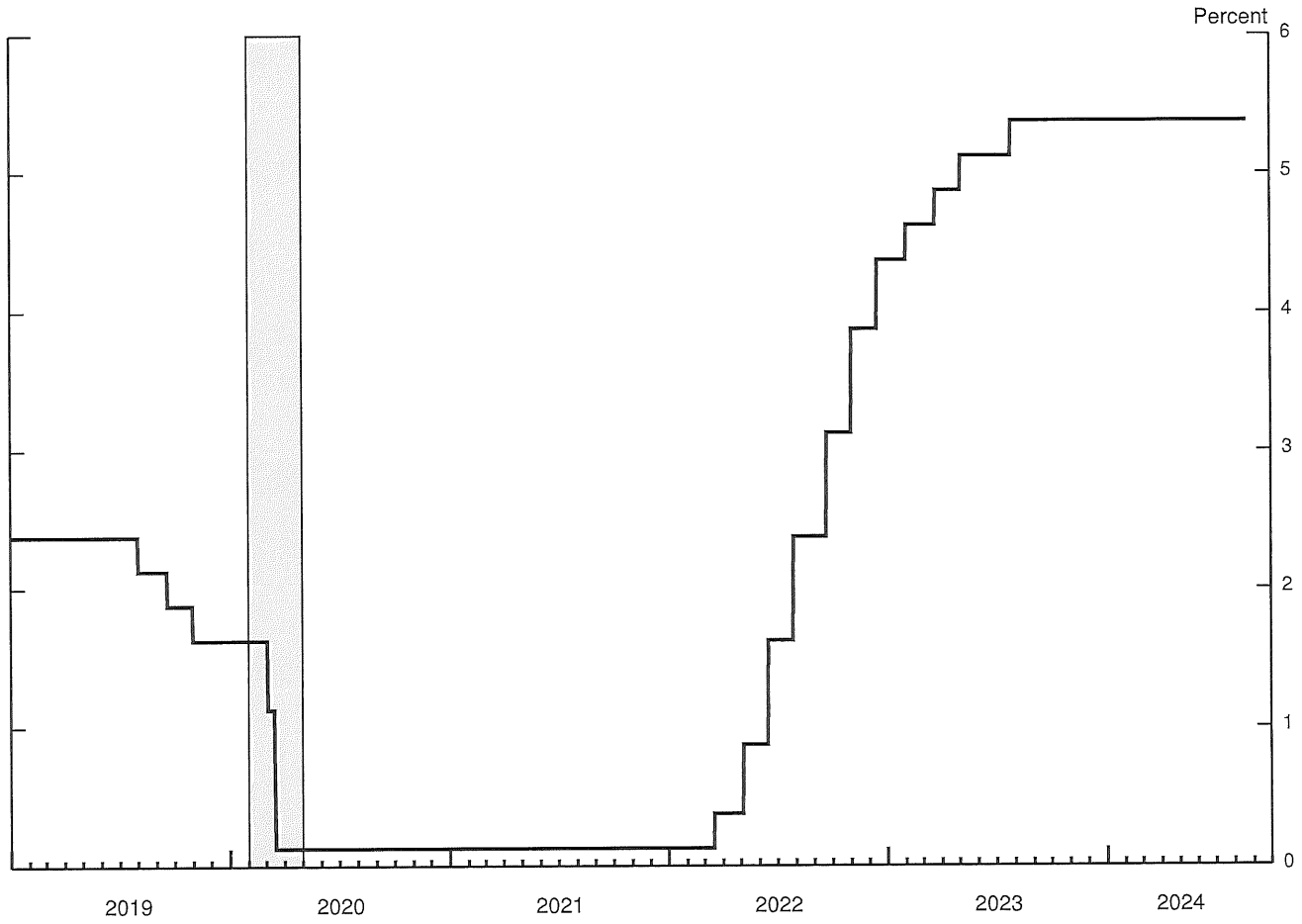
Job Openings to Unemployment

Note: The data are monthly and extend through July 2024. The ratio is calculated as the JOLTS (Job Openings and Labor Turnover Survey) job openings at the end of the previous month divided by current-month unemployed. The outlined shaded bar indicates a period of business recession as defined by the National Bureau of Economic Research: February 2020-April 2020.

Source: Bureau of Labor Statistics via Haver Analytics.

Figure 7

Midpoint of the Target Range for the Federal Funds Rate



Note: The data are daily and extend through August 22, 2024. The outlined shaded bar indicates a period of business recession as defined by the National Bureau of Economic Research: February 2020-April 2020.

Source: Federal Reserve Board.

FRBSF ECONOMIC LETTER

2012-34 | November 13, 2012

The Federal Reserve's Unconventional Policies

BY JOHN C. WILLIAMS

After the federal funds rate target was lowered to near zero in 2008, the Federal Reserve has used two types of unconventional monetary policies to stimulate the U.S. economy: forward policy guidance and large-scale asset purchases. These tools have been effective in pushing down longer-term Treasury yields and boosting other asset prices, thereby lifting spending and the economy. The following is adapted from a presentation by the president and CEO of the Federal Reserve Bank of San Francisco at the University of California, Irvine, on November 5, 2012.

The subject of my talk is the unconventional monetary policies pursued by the Federal Reserve over the past four years. In my time today, I'll cover three big questions. First, why has the Fed turned to unconventional monetary policies? Second, what effects are these policies having on the economy? And, third, what potential risks do they pose?

The limits of conventional monetary policy

Let me start with the first question, why unconventional monetary policy? Back in late 2008, our country was facing the worst financial crisis and recession since the Great Depression. Real gross domestic product, the broadest measure of how much we produce as a nation, plummeted at an annual rate of 8.9% in the fourth quarter of 2008. The economy was in free fall and the unemployment rate was soaring. In response, in December 2008, the Fed's monetary policy body, the Federal Open Market Committee, or FOMC, cut the target federal funds rate—our conventional instrument of monetary policy—essentially to zero.

The federal funds rate is the short-term interest rate that is normally the FOMC's primary lever used to influence the economy and inflation. When we want to stimulate the economy, we lower the target fed funds rate. This causes other interest rates—like rates on car loans and mortgages—to decline. And it boosts the value of the stock market as investors equalize risk-adjusted returns across their portfolios. In response to lower borrowing costs and the resulting improvement in financial conditions, households and businesses are more willing to spend, creating greater demand for goods and services. This increase in demand in turn causes businesses to increase production and hire more workers. When we want to slow the economy so it doesn't overheat and create inflationary pressures, we raise the fed funds rate and everything works in the opposite direction. That's conventional monetary policy in a nutshell.

Given the economy's dire straits during the recession, standard rules of thumb for monetary policy suggested that the funds rate should be cut to well below zero (see Rudebusch 2009 and Chung et al. 2012). But that was impossible. Why can't interest rates be pushed well below zero? Well, one simple reason is that currency—the cash in your wallet—pays no interest. Think about it. If bank accounts paid

negative interest—that is, if people were charged to keep their money in a bank—then depositors could take money out of their accounts and keep it as hard cash. That would save them the interest expense. Economists refer to this floor on interest rates as the zero lower bound.

Meanwhile, the economic outlook was grim. So, given the inability to cut interest rates well below zero, we began to explore alternative ways to ease credit conditions and thereby stimulate the economy. We also had an eye on inflation, which was heading lower, thereby creating a situation in which deflation might be a threat. I will focus specifically on two types of unconventional monetary policies that the Fed and other central banks put in place around that time. The first is what we at the Fed call forward policy guidance. The second is what we call large-scale asset purchases, but which are popularly known as quantitative easing, or QE.

Forward policy guidance

The first type of unconventional monetary policy that I will discuss is forward policy guidance. Let me start with some background. After each monetary policy meeting, the FOMC releases a statement describing the state of the economy and the reasons for our policy decision about our target for the federal funds rate (see Williams 2012b for a description of monetary policy statement evolution over the past two decades). In addition, the statement often contains language discussing economic risks and where the FOMC thinks monetary policy may be headed (see Rudebusch and Williams 2008). It's interesting to note that the statement language typically has bigger effects on financial conditions than the federal funds rate decision itself (see Gürkaynak, Sack, and Swanson 2005). That's not that surprising. After all, the current level of the federal funds rate only tells what the overnight interest rate is right now. But the FOMC's statement language hints at where those short-term rates are likely to be in the future. That's much more relevant information for households, businesses, and investors. They are typically borrowing for expenditures such as cars, homes, or business capital spending, which are generally financed over a longer term.

Although the FOMC has used versions of forward guidance at various times in the past, the use of the policy statement to provide more explicit information about future policy took a quantum leap forward in the summer of 2011. With the fed funds rate stuck near zero, forward guidance provided a tool to influence longer-term interest rates and financial market conditions. Forward guidance achieves its effects by influencing market expectations for the future path of interest rates. Let me give a concrete example. Around the middle of 2011, private-sector economists expected that the FOMC would start raising the fed funds rate in about nine months to a year, according to surveys of professional forecasters and financial market indicators (see Swanson and Williams 2012).

The introduction of forward guidance in the August 2011 FOMC statement succeeded in shifting market expectations regarding the future path of the federal funds rate. Specifically, the FOMC stated that it "anticipates that economic conditions...are likely to warrant exceptionally low levels for the federal funds rate at least through mid-2013." That statement communicated that the FOMC would probably keep the fed funds rate near zero for at least two more years, longer than many private-sector economists had been thinking. As a result of this shift in expectations, yields on Treasury securities fell by between one- and two-tenths of a percentage point. This may not sound like a big change. But in terms of the effects of monetary policy, those were actually big drops. In fact, this was about as big a fall in interest rates as would normally come from cutting the federal funds rate by three-quarters or even a full percentage

point (see Gürkaynak, Sack, and Swanson 2005 and Chung et al. 2012). And, the ripple effect through financial markets lowered the cost of credit for all kinds of borrowers, not just the U.S. Treasury.

The use of forward policy guidance has now become a key monetary policy tool. Since August 2011, the FOMC has extended forward guidance twice. In January 2012, the FOMC said it would keep the fed funds rate exceptionally low "at least through late 2014." Just this September, it extended its guidance further, "at least through mid-2015." The FOMC also said it would maintain low rates "for a considerable time after the economic recovery strengthens." In other words, it indicated it intends to keep short-term rates low even as the economy improves to make sure this recovery takes hold. I should note that the Fed is not alone in using forward guidance. Other central banks provide forward policy guidance in a variety of ways.

Although forward policy guidance has proven to be a very useful policy tool, it's not a perfect substitute for the kind of monetary stimulus that comes from lower interest rates. One issue is that, for the forward guidance policy to work as desired, the public has to believe that the FOMC will really carry out the policy as it says it will. But, the Fed doesn't have the ability to tie its hands that way. This point was made by Finn Kydland and Edward Prescott in the late 1970s. Let me explain. For forward policy guidance to have its maximum effect, the Fed must commit to keeping the short-term policy rate lower than it otherwise would to compensate for the fact that the short-term interest rate cannot be lowered today. But when the time comes to carry out the commitment made in its forward guidance, it may no longer want to do so. For instance, it might be hard to resist raising rates earlier than promised to head off an increase in inflation (see Adam and Billi 2007). So, even when central bankers say they will keep rates unusually low for a set time, the public may worry that the central bank will raise rates earlier to fight budding inflation pressures (Evans 2010 is an exception; see Walsh 2009 for discussion).

Another challenge for forward guidance is that the public may have different expectations about the future of the economy and monetary policy than the central bank. Expectations are crucial for forward guidance to be effective. If the public doesn't understand the central bank's intended policy path, then forward guidance may not work so well (see Reifschneider and Roberts 2006 and Williams 2006). Therefore, clear communication of policy to the public is a key challenge. This isn't always easy. The public and the media tend to gloss over the nuances of policy and take away simple sound bites.

Large-scale asset purchases

Let me now turn to the second form of unconventional monetary policy, large-scale asset purchases. The goal of large-scale asset purchases, or LSAPs, is the same as for conventional policy actions and forward guidance: to drive down longer-term interest rates, and thereby boost economic growth. How do LSAPs work? First, let me tell you when they wouldn't work. In a hypothetical world of perfect financial markets, LSAPs would have essentially no effect on asset prices or the economy. In such a world, the price of an asset depends solely on its expected future returns, adjusted for risk. If the price of a specific asset deviated from this level, arbitrageurs would swoop in to take advantage of the discrepancy, knowing that the price would inevitably return to its proper level. Suppose the Fed were to step in and buy large amounts of an asset class, say, for example, Treasury securities. In that case, other investors would freely sell their holdings and rebalance their portfolios accordingly. But, asset prices would not change at all. And there would be no impact on the broader economy.

The reason LSAPs work is that financial markets are not perfect. Decades ago, James Tobin and Franco Modigliani pointed out that markets are to a certain degree segmented. Some investors, such as pension funds, have "preferred habitats" for their investments. For example, a pension fund might prefer longer-term securities to hedge its longer-term liabilities. Thus, the supply and demand of assets in these habitats can affect prices because that pension fund is not going to start buying short-term securities just because the prices of longer-term securities rise.

Now, if the Fed buys significant quantities of longer-term Treasury securities or mortgage-backed securities, then the supply of those securities available to the public falls. As supply falls, the prices of those securities rise and their yields decline. The effects extend to other longer-term securities. Mortgage rates and corporate bond yields fall as investors who sold securities to the Fed invest that money elsewhere. Hence, LSAPs drive down a broad range of longer-term borrowing rates. And lower rates get households and businesses to spend more than they otherwise would, boosting economic activity.

LSAPs can also affect interest rates by signaling that the central bank is determined to ease monetary conditions (see Bauer and Rudebusch 2012, Christensen and Rudebusch 2012, and Krishnamurthy and Vissing-Jorgensen 2011). Effectively, the central bank is putting its money where its mouth is. Thus, LSAPs reinforce forward guidance. For this reason, I view these two types of unconventional monetary policy as complementary.

The use of LSAPs goes back to a 1961 initiative with the catchy name of Operation Twist, an effort by the Fed and the Kennedy Administration to drive down longer-term interest rates. More recently, in late 2008 and 2009, the Fed purchased over $1.7 trillion of longer-term Treasury bonds and mortgage-backed securities, a program often referred to as QE1. In November 2010, the FOMC announced an additional $600 billion of longer-term bond purchases—QE2. And, two months ago, we got QE3 when the FOMC announced that the Fed would buy an additional $40 billion in mortgage-backed securities every month until the outlook for the job market improves substantially.

Other central banks have also carried out large-scale asset purchase programs. The Bank of Japan began a large-scale asset purchase program in 2001. In its most recent program, launched in 2010, it has bought roughly $1.1 trillion in Japanese government bonds and other assets. In March 2009, the Bank of England announced an LSAP program that was later raised to the equivalent of roughly $600 billion in purchases mostly of British government bonds. Both of these central banks have continued and expanded their asset purchase programs in the past year.

The effects of unconventional monetary policy on the economy

A great deal of research has analyzed the effects of forward policy guidance and large-scale asset purchases on financial conditions and the economy. As I mentioned before, forward policy guidance has proven to be effective at lowering expectations of future interest rates (see Swanson and Williams 2012 and Woodford 2012). Similarly, the evidence shows that LSAPs have been effective at improving financial conditions as well.

To be precise, the estimated impact of a $600 billion LSAP program, such as QE2, is to lower the 10-year Treasury yield by between 0.15 and 0.20 percentage point (see, for example, Williams 2011, Krishnamurthy and Vissing-Jorgensen 2011, Hamilton and Wu 2012, Swanson 2011, Gagnon et al. 2011,

and Chen, Curdia, and Ferrero 2012). It is around the same magnitude as the effects of forward policy guidance, and about how much the yield on 10-year Treasury securities typically responds to a cut in the fed funds rate of three-quarters to one percentage point (see Chung et al. 2012 and Gürkaynak, Sack, and Swanson 2005). So, by that metric, LSAPs have big effects on longer-term Treasury yields.

By pushing down longer-term Treasury yields, forward guidance and LSAPs have rippled through to other interest rates and boosted other asset prices, lifting spending and the economy. For example, mortgage rates have fallen below 3½%, apparently the lowest level since at least the 1930s. Thanks in part to those rock-bottom rates, we're at long last seeing signs of life in the housing market. Likewise, cheap auto financing rates have spurred car sales. And historically low corporate bond rates encourage businesses to start new projects and hire more workers.

In addition, low interest rates help to support asset prices, such as the value of people's homes and their retirement funds. All else equal, households are more likely to consume if their wealth is growing rather than falling. Stronger asset prices support consumption because they make people feel wealthier and more confident. And that in turn helps boost the economy.

Finally, although it's not our main intention, these unconventional policies have also had an effect on the dollar versus foreign currencies. When interest rates in the United States fall relative to rates in other countries, the dollar tends to decline as money flows to foreign markets with higher returns. One estimate is that a $600 billion program like QE2 causes the dollar to fall by roughly 3 or 4% (see Neely 2011). That helps stimulate the U.S. economy by making American goods more competitive at home and abroad.

I've argued that forward guidance and LSAPs invigorate the economy by lowering interest rates and improving financial conditions more generally. But just how big are these effects? That's not easy to answer. Financial markets react instantly to FOMC announcements, so it's relatively easy to gauge the financial impact of any policy move. By contrast, monetary policy actions affect economic growth, employment, and inflation gradually over time. Thus, the broad economic effects of monetary policy are not immediately obvious. Moreover, data on unemployment and gross domestic product are only collected monthly or quarterly. Many factors besides monetary policy affect these variables. In any particular data release, it's devilishly hard to separate the contribution of monetary policy from other factors.

To control for these other factors, a researcher must use a macroeconomic model. In some of my own research with staff at the Federal Reserve Board, we used the Board's large-scale macroeconomic model, which has hundreds of economic relationships built in, for this purpose (see Chung et al. 2012). We estimated that the Fed's $600 billion QE2 program lowered the unemployment rate by about 0.3 percentage point compared with what it would have been without the program. We also estimated that the program raised GDP by a little over half a percentage point and inflation by 0.2 percentage point. When we considered the combined effects of QE1 and QE2, we found that these programs had a peak effect of reducing the unemployment rate by 1½ percentage points. In addition, we found that these programs probably prevented the U.S. economy from falling into deflation.

Other researchers using different macroeconomic models have found roughly similar effects, although there is a lot of uncertainty surrounding these estimates (see Chen, Curdia, and Ferrero 2012, Kiley 2012,

Fuhrer and Olivei 2011, Baumeister and Benati 2010, and Curdia and Ferrero 2011). Part of the uncertainty stems from the fact that changes in longer-term interest rates due to LSAPs may be atypical. That is, they may affect the economy differently than do changes in longer-term interest rates in normal times. That would make the past relationship between longer-term interest rates and the economy less informative for estimating the effects of unconventional monetary policy.

Risks and uncertainty

Although the evidence shows that the Fed's unconventional policy actions have been effective at lowering interest rates and stimulating economic growth, it's also clear that there remains a great deal of uncertainty about the effects of these policies. After decades of using the fed funds rate as the main tool of monetary policy, Fed policymakers have plenty of confidence in this instrument. We know it works and we're pretty good at estimating how much it works. By contrast, with unconventional monetary policies, we're in waters that have not been extensively charted. We don't know all the consequences. There is uncertainty about the magnitude of the effects on the economy, as I've already discussed. In addition, there is a concern that these policies carry with them risks of unintended negative consequences. Let me go over a few of those concerns.

One concern is that the Fed's very low rate policies may be building up inflationary pressures that we can't yet see (see Williams 2012a). Of course, this risk is not peculiar to unconventional policies. It exists whenever monetary policy is very expansionary. Although this is a risk, it's important to note in the current context that inflation has been very low during this period of unconventional policies, and it remains so. Moreover, the public's inflation expectations remain well anchored. So, we are not seeing signs of rising inflation on the horizon. Japan's experience with unconventional policies is informative as well. Japan has had undesirably low inflation since the 1990s despite the Bank of Japan's very large quantitative easing programs.

Nonetheless, whenever a stimulatory monetary policy is in place, there is always a risk of inflation rising too high. Let me emphasize that the Fed has the tools to combat such a threat if it were to materialize. We can raise interest rates, slowing economic growth. And we can reverse the asset purchase programs, selling assets back into the market if needed.

A second concern is that these policies may be contributing to excessive risk-taking in financial markets as investors seek higher yields in the low-rate environment. I take this concern seriously. We monitor indicators of financial market conditions very closely, looking for signs of imbalances or excesses. In addition, in our role as bank supervisors, we carefully watch for signs of inappropriate risk-taking. We are always on the lookout for indications that the low-rate environment is creating dangers for the banking system. That said, as of today, most indications still point to an environment of heightened risk aversion rather than reckless risk-taking in our financial system. Memories of 2008 are simply too close for most financial market participants to go out on a limb. If that situation were to change significantly, we could modify our unconventional policies to mitigate undesired effects on risk-taking.

I've highlighted the uncertain effects of unconventional policies and some concerns about undesired consequences of these policies. But, the presence of uncertainty does not mean that we shouldn't be using these tools. That is the point that William Brainard analyzed 45 years ago in his classic paper on optimal policy under uncertainty. The answer Brainard (1967) found was that a policy tool with

uncertain effects should not be discarded. However, it should be employed more cautiously than policy tools that have more certain effects. This insight applies to the current situation. The Fed has been deliberate in using its unconventional policies over the past few years. We've carefully weighed the benefits of these policies on improving economic growth against potential risks and uncertainties.

Conclusion

Let me offer some final thoughts. Unconventional monetary policies such as forward guidance and large-scale asset purchases give central banks effective instruments when the traditional policy interest rate is near zero. The Fed and other central banks have been actively using these policies. In the United States, these policies have had meaningful effects on longer-term interest rates and other financial conditions. The precise impact on unemployment, GDP, and inflation is harder to determine. But the available evidence suggests they have been effective in stimulating growth without creating an undesirable rise in inflation. Conducting monetary policy always involves striking the right balance between the benefits and risks of a policy action. As the FOMC statement makes clear: "In determining the size, pace, and composition of its asset purchases, the Committee will, as always, take appropriate account of the likely efficacy and costs of such purchases."

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Economic Outlook and Monetary Policy Implementation

Remarks by

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Vice Chair

Board of Governors of the Federal Reserve System

at the

American Institute for Economic Research, Shadow Open Market Committee, and Florida Atlantic University Conference

Boca Raton, Florida

January 16, 2026

Thank you, President Hasner, for the kind introduction. It is an honor to speak at Florida Atlantic University, and I am glad to have the chance to talk with those here from the American Institute for Economic Research and the Shadow Open Market Committee.

I especially appreciate the opportunity to discuss my economic outlook at the start of the new year. It is a task made considerably easier with the gradual return of federal government data, which was disrupted by last year's lapse in funding. The lack of data reinforced two long-held beliefs for me. One, how grateful I am for the dedicated service of the statistical agencies to keep policymakers, businesses, and the public informed about the state of the economy. And, two, how important it is to have access to an array of data beyond what those agencies provide. That includes data produced by the Federal Reserve System, state governments, and a wide variety of private-sector sources. All of those data sources inform my view of the economy and help me make monetary policy decisions.

Today, I will start by sharing my outlook for the economy at the start of 2026. Next, I will discuss the implications of that outlook for the path of monetary policy. And, finally, I will discuss some recent developments in monetary policy implementation, which I know is of interest to many of you in this room. As a reminder, these views are my own and are not necessarily those of my colleagues.

Economic Outlook

I am starting 2026 with a cautiously optimistic point of view. Conditions in the labor market appear to be stabilizing, and I see the economy as well positioned to continue to grow while inflation returns to a pathway toward our 2 percent objective. The most recent data indicate that economic activity has remained strong. In the third

quarter of 2025, gross domestic product rose at an annual rate of 4.3 percent. As you can see in figure 1, that was a sharp acceleration from the first half of last year, mostly reflecting strong consumer spending and an upward swing in net exports, which can be volatile. Business investment grew at a solid rate in the third quarter, while residential investment continued to be soft. Fourth-quarter growth is likely to be restrained due to the effects of the government shutdown. Still, excluding those effects, I see the economy expanding at a solid pace of about 2 percent in the near term.

Looking at the labor market, job growth moderated last year, and the unemployment rate edged higher. In November and December, employers added about 50,000 jobs to payrolls each month, as you can see in figure 2. This came after payrolls declined in October, largely due to an unusually large number of separations from the federal government. However, even setting aside October, the broader trend last year showed slower job creation than in 2024. At least part of the slowdown in the job market reflects a decline in the growth of the labor force due to lower immigration and labor force participation. However, labor demand has softened as well. Meanwhile, the unemployment rate, shown in figure 3, ended the year at 4.4 percent, up modestly from 4.1 percent at the end of the previous year.

That said, the labor market is not deteriorating rapidly, as layoffs remain low; however, hiring remains low as well. Figure 4 shows that there were 0.9 available jobs in November for every unemployed American seeking work. While that level is normally consistent with a solid labor market, the ratio is considerably lower than a few years ago, when labor market conditions were much tighter early in the pandemic recovery. In this less dynamic and somewhat softer labor market, the downside risks to employment

appear to have risen. My baseline, however, is for the unemployment rate to hold steady throughout this year.

Considering the other part of our dual mandate, inflation remains somewhat elevated from our 2 percent goal. As you know, the Federal Open Market Committee (FOMC) targets the rate of increase in the personal consumption expenditures (PCE) price index; however, due to the government shutdown, the most recent available PCE price data are for September 2025. For this reason, I find it informative to review consumer price index (CPI) data to get a timelier sense of the direction of inflation, even if it does not directly translate to our inflation target. Over the longer term, both CPI and PCE measures tell a similar story. Data released earlier this week showed that the CPI rose 2.7 percent over the 12 months ending in December, the same rate as November. Core CPI, which excludes food and energy prices, rose 2.6 percent, also matching November's reading. You can see in figure 5 that both headline and core measures of inflation have eased significantly from their highs in mid-2022. However, that progress slowed over the past year or so, and inflation remains at a level that is above readings consistent with our inflation target.

Looking at the subcomponents of core CPI, shown in figure 6, we can see why there has been a slowdown in the pace of disinflation. Over the past year, we have seen further notable declines in services inflation—rent of shelter as well as other non-energy services—but these have been offset by an increase in core goods price inflation. Looking at the three buckets separately, shelter inflation, shown by the black dot-dashed line, has continued to decline, and core services inflation excluding shelter, the red dashed line, has also been on a downward trend, albeit on a somewhat bumpier path.

Those readings are consistent with overall inflation moving back toward our target. What is inconsistent with a return to 2 percent inflation is the rise in core good prices. Following very high readings during the pandemic, goods inflation fell sharply, reaching its pre-pandemic range in 2023, and fluctuated roughly in that range until 2025. Last year, core goods price inflation picked up markedly, to 1.4 percent over the 12 months ending in December 2025, at least in part reflecting increased tariffs filtering through to certain goods prices.

While some upside risks remain, moving forward I expect to see inflation return to a sustainable path back to our 2 percent target. It is a reasonable base case that the effects of tariffs on inflation will not be long-lasting—effectively, a one-time shift in the price level. My view that inflation will resume a path toward our goal is consistent with near-term measures of inflation expectations declining from their peaks last year, as reflected in both market- and survey-based measures. And most measures of longer-term expectations remain consistent with our 2 percent inflation goal.

Monetary Policy

Although I am cautiously optimistic about the path ahead, as a monetary policymaker, I do confront a challenging situation. With the downside risks to employment having risen last year, I viewed the balance of risks as having shifted. As a result, I supported the FOMC's decisions to reduce the policy interest rate last year. I viewed that as the right step to balance the upside risk of persistent above-target inflation and the downside risk of a deteriorating labor market. This policy stance puts the economy in a good position moving forward.

As shown in figure 7, since the middle of 2024, the Committee has reduced the policy rate by 1.75 percentage points. In my view, those moves have brought the federal funds rate into a range consistent with the neutral rate — a rate that neither stimulates nor restricts economic activity. I look forward to our upcoming policy meeting, which will be held in less than two weeks. While I do not want to prejudge the decision that will take place there, in my view, the current policy stance leaves us well positioned to determine the extent and timing of additional adjustments to our policy rate based on the incoming data, the evolving outlook, and the balance of risks.

Monetary Policy Implementation

Now, let me turn to monetary policy implementation. I'll begin with a bit of history to provide a backdrop for recent developments.

In January 2019, following many years of successful implementation along with extensive deliberations, the FOMC formally adopted its ample-reserves implementation framework.[1] Some key advantages of this framework include successful control of the policy rate in a variety of conditions and effective transmission to other money market rates and broader financial conditions. The FOMC defined this framework as one where "control over the level of the federal funds rate and other short-term interest rates is exercised primarily through the setting of the Federal Reserve's administered rates, and in which active management of the supply of reserves is not required."[2] Therefore, the

[1] For more details, see the minutes of the November 2018, December 2018, and January 2019 FOMC meetings, which are available on the Board's website at https://www.federalreserve.gov/monetarypolicy/fomc_historical_year.htm.

[2] See Board of Governors of the Federal Reserve System (2019), "Statement Regarding Monetary Policy Implementation and Balance Sheet Normalization," press release, January 30, https://www.federalreserve.gov/newsevents/pressreleases/monetary20190130c.htm.

supply of reserves needs to be sufficiently large to meet the demand for reserves on most days.

Against this backdrop, I'll now discuss recent developments in monetary policy implementation. As of December 2025, the FOMC concluded the process of reducing the size of the Fed's balance sheet that began in mid-2022 by halting the reduction of the Fed's asset holdings. During this process, we successfully reduced our securities holdings by about $2.2 trillion. This asset runoff affected not only our assets, but also our liabilities such as the reserves in the banking system and the level of overnight reverse repurchase agreement (repo) operation balances.

At the beginning of balance sheet runoff in 2022, reserves were at an abundant level of around $3.5 trillion. As the balance sheet shrank over the next few years, the federal funds rate remained about 7 basis points below the interest on reserve balances (IORB) rate for most of this period. The decline in the level of reserves from an abundant level toward an ample level exerted upward pressure on money market rates in recent months. As the level of reserves declined, repo rates started to increase and became more volatile. We began to see intensified rate pressures, especially on tax payment days and Treasury securities settlement days, when large flows into the Treasury General Account (TGA), another liability of the Fed, led to corresponding declines in the amount of reserves in the banking system. The federal funds rate started to move up steadily in its target range, and it now stands at 1 basis point below the IORB rate. These and other indicators of tightening money market conditions were what we expected to see as reserves declined toward the range of ample reserves.

It is important to note that while ending the asset runoff slows down the decline in reserves, it does not completely halt this process. Even when the Fed's assets remain constant, trend growth in non-reserve liabilities, particularly currency in circulation, will continue to absorb reserves over time. There is also significant cyclical variation in the supply of reserve balances, reflecting seasonal changes in the TGA and other factors. Furthermore, the demand for reserves is not static but rather dynamic, influenced by various factors including economic growth and changes in the financial system. Consequently, to maintain an ample reserves level—a key operational objective of our current monetary policy implementation framework—the FOMC must expand its balance sheet commensurately with the public's demand for its liabilities. This necessitates a nuanced and forward-looking approach to balance sheet management that considers both cyclical and structural factors affecting the demand for and supply of reserves.

With the level of bank reserves judged to have declined to an ample level, the FOMC initiated reserve management purchases in December 2025. This was the crucial next step in balance sheet management to maintain ample reserves and ensure effective interest rate control, as consistent with the plan we adopted in May 2022.[3]

It is important to note that reserve management purchases are not quantitative easing (QE). Each process has a distinct purpose, with different goals and economic implications. QE represents a monetary policy tool deployed when the federal funds rate is constrained by the effective lower bound. The primary objective of QE is to provide economic stimulus by exerting downward pressure on long-term interest rates. This has

[3] See Board of Governors of the Federal Reserve System (2022), "Plans for Reducing the Size of the Federal Reserve's Balance Sheet," press release, May 4, https://www.federalreserve.gov/newsevents/pressreleases/monetary20220504b.htm.

been achieved typically through large-scale purchases of longer-term Treasury securities and agency mortgage-backed securities. These purchases are intended to influence the yield curve and broader financial conditions by removing duration risk held by the public for a given setting of short-term interest rate policy.

In contrast, reserve management purchases involve the acquisition of Treasury bills and other short-term Treasury securities in a manner that further normalizes the average maturity of the Federal Reserve's asset holdings. They help implement the short-term interest rate policy decided on by the Committee but do not alter broader financial conditions. These routine purchases are conducted to maintain ample reserves and ensure effective control over short-term interest rates. The pace and size of these purchases are calibrated to meet demand for reserve balances and to adjust reserve supply as other items on the liabilities side of our balance sheet grow over time. These purchases do not have any implications for the stance of monetary policy.

As detailed in the statement released by the Federal Reserve Bank of New York at the conclusion of our December 2025 FOMC meeting, reserve management purchases will be front-loaded for the first few months to alleviate potential near-term pressures in money markets.[4] Thereafter, we expect the pace of reserve management purchases to decline, though the actual size will depend on seasonal fluctuations in non-reserve liabilities and market conditions. In the end, the size of our balance sheet will be determined by the public's demand for our liabilities in our ample-reserves regime.

[4] See Federal Reserve Bank of New York (2025), "Statement Regarding Reserve Management Purchases Operations," statement, December 10, https://www.newyorkfed.org/markets/opolicy/operating_policy_251210a.

Before concluding, let me also emphasize that in our ample-reserves regime, standing repo operations are a critical tool that helps provide a ceiling on money market rates. By doing so, these operations ensure that the federal funds rate remains within its target range, even on days of elevated pressures in money markets. Consistent with this view, the FOMC eliminated the aggregate limit on standing repo operations in December 2025.[5] These operations are intended to support monetary policy implementation and smooth market functioning, and they should be used by our counterparties when deemed economically sensible. This is indeed what we saw over the 2025 year-end period. There was notable upward pressure on repo rates amid substantial net Treasury settlements, as widely expected. Usage increased at the Fed's standing repo operations on year-end as market repo rates increased substantially. Despite the elevated levels of repo rates, trading conditions remained orderly in money markets. I am pleased to see increased usage of our standing repo operations when it becomes economically sensible to do so.

Conclusion

To conclude, I will reiterate that I am cautiously optimistic about the path of the economy while acknowledging that we face risks to both sides of our dual mandate. Consequently, I will continue to watch incoming data carefully so that we can set policy to achieve our mandated goals: maximum employment and stable prices. A critical aspect of achieving these goals is ensuring that the Fed can efficiently and smoothly

[5] See Federal Reserve Bank of New York (2025), "Statement Regarding Standing Overnight Repo Operations," statement, December 10, https://www.newyorkfed.org/markets/opolicy/operating_policy_251210.

implement monetary policy decisions. We have taken the necessary steps to ensure that capability and will continue to do so.

Once again, it has been an honor to be here. Thank you for the opportunity to speak with you, and I look forward to our discussion.

American Institute for Economic Research, Shadow Open Market Committee, and Florida Atlantic University Conference

Boca Raton, Florida

January 16, 2026

Economic Outlook and Monetary Policy Implementation

Philip N. Jefferson

Vice Chair, Federal Reserve Board

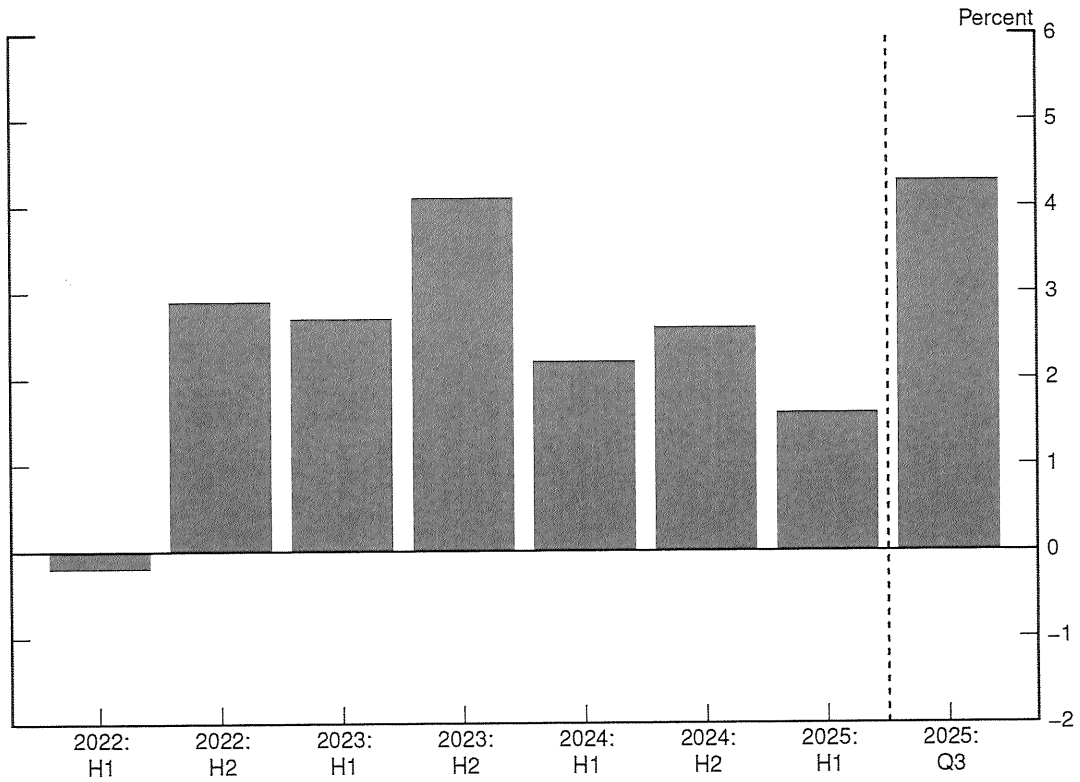
Board of Governors of the
Federal Reserve System

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

Road Map of Talk

- Views on Economic Outlook
- Implications for Monetary Policy
- Developments in Federal Reserve's Monetary Policy Implementation
- Conclusion

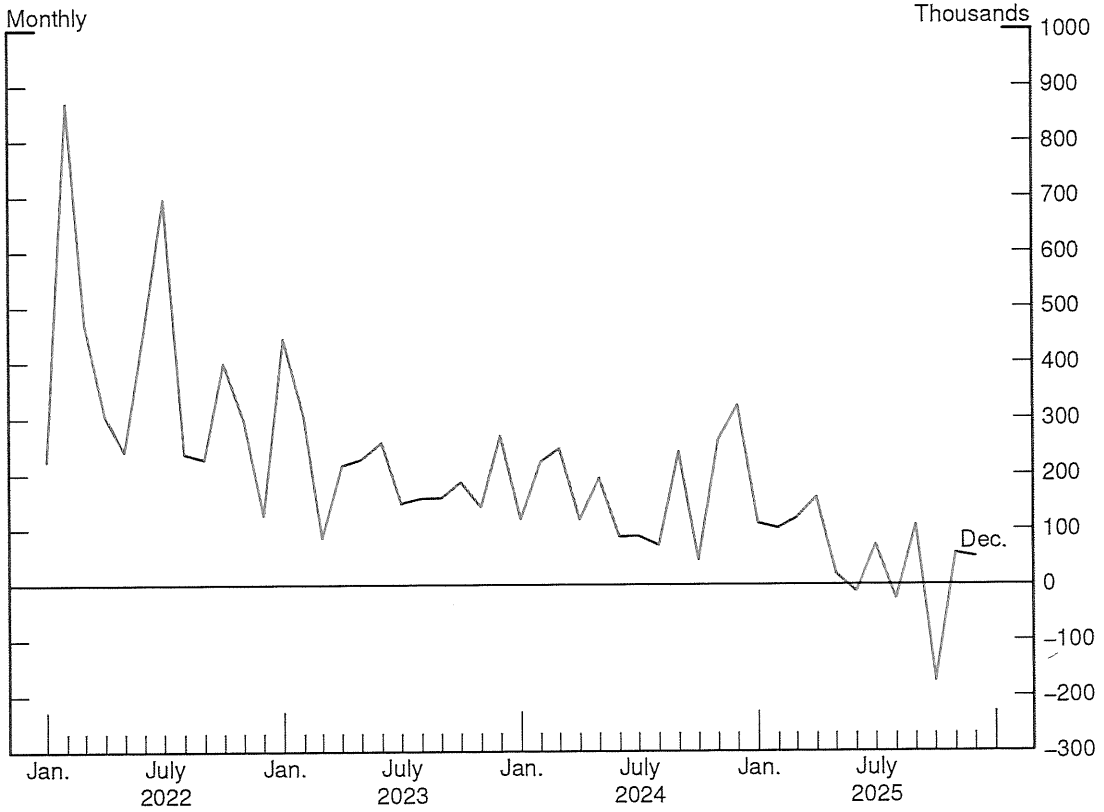
Figure 1: Real Gross Domestic Product



Note: Percent change from preceding period. The vertical dashed line separates half-yearly GDP data from quarterly GDP data. Half-year GDP values represent Q4:Q2 and Q2:Q4 comparisons, and quarterly values represent percent change from one quarter ago. Seasonally adjusted.

Source: U.S. Bureau of Economic Analysis, Real Gross Domestic Product, retrieved from FRED, Federal Reserve Bank of St. Louis.

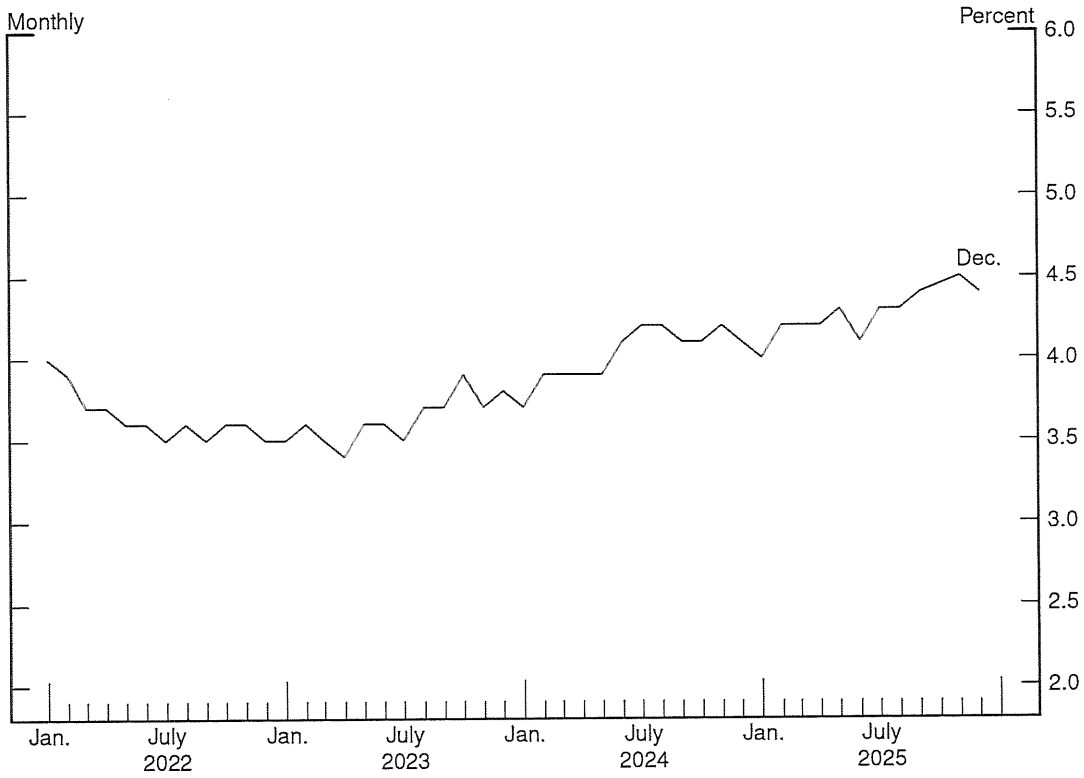
Figure 2: Monthly Nonfarm Payroll Gains



Note: Seasonally adjusted.

Source: U.S. Bureau of Labor Statistics, All Employees, Total Nonfarm, retrieved from FRED, Federal Reserve Bank of St. Louis.

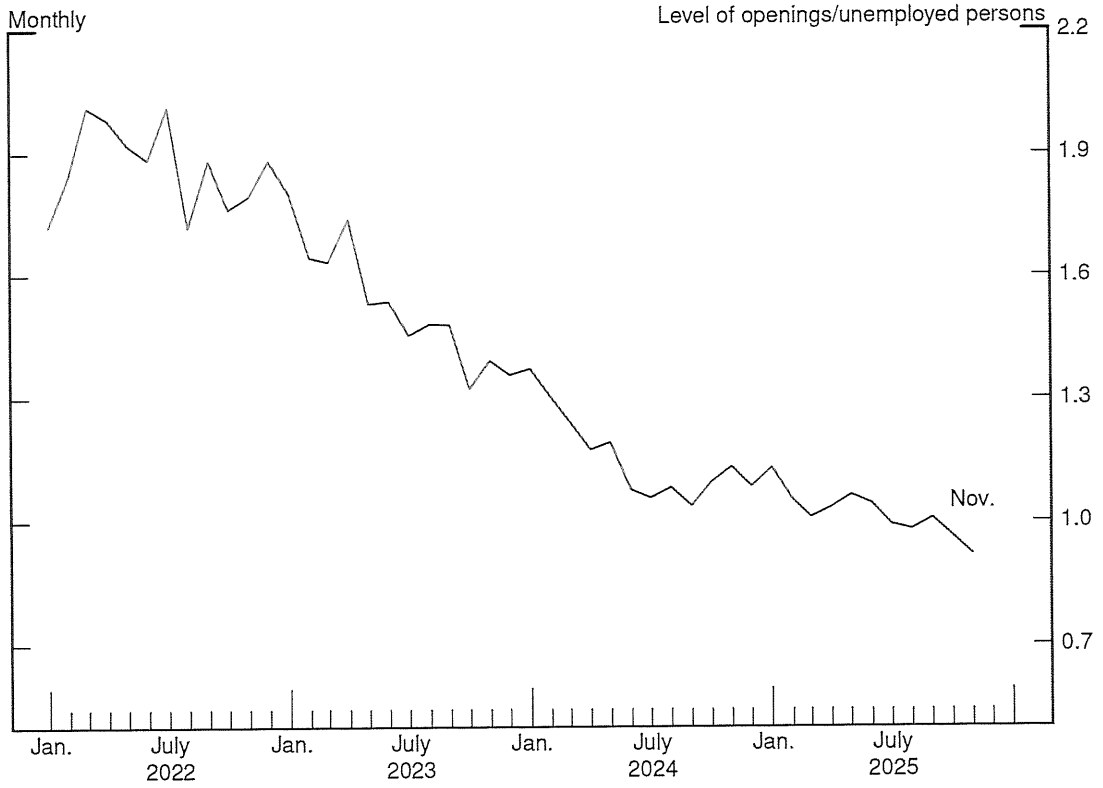
Figure 3: Unemployment Rate



Note: There is no data for October 2025.

Source: U.S. Bureau of Labor Statistics, Unemployment Rate, retrieved from FRED, Federal Reserve Bank of St. Louis.

Figure 4: Nonfarm Job Openings/Unemployment Level



Note: There is no data for October 2025. Seasonally adjusted.

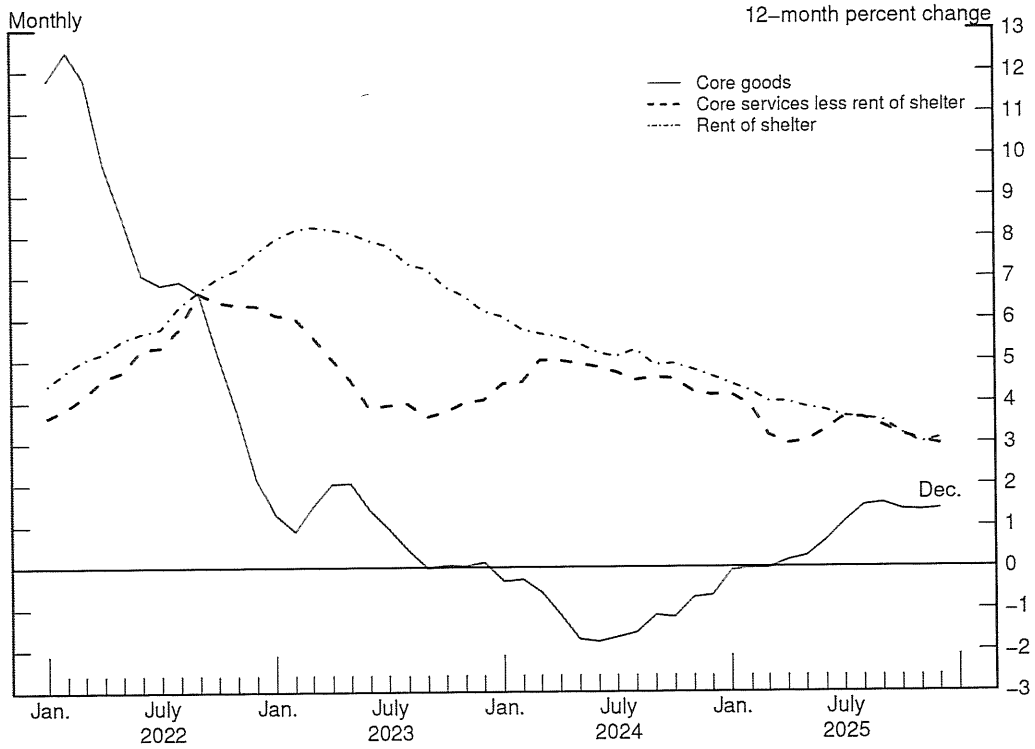
Source: U.S. Bureau of Labor Statistics, Job Openings: Total Nonfarm and Unemployment Level, retrieved from FRED, Federal Reserve Bank of St. Louis.

Figure 5: 12-Month CPI and Core CPI Inflation

Note: Consumer price index (CPI) inflation is the change in the consumer price index, and core CPI inflation is the change in consumer price index excluding food and energy. CPI and core CPI are 12-month inflation percentages calculated using seasonally adjusted annual rates. October values are interpolations by Haver Analytics.

Source: U.S. Bureau of Labor Statistics, Consumer Price Index; Haver Analytics, https://www.haver.com/our-data.

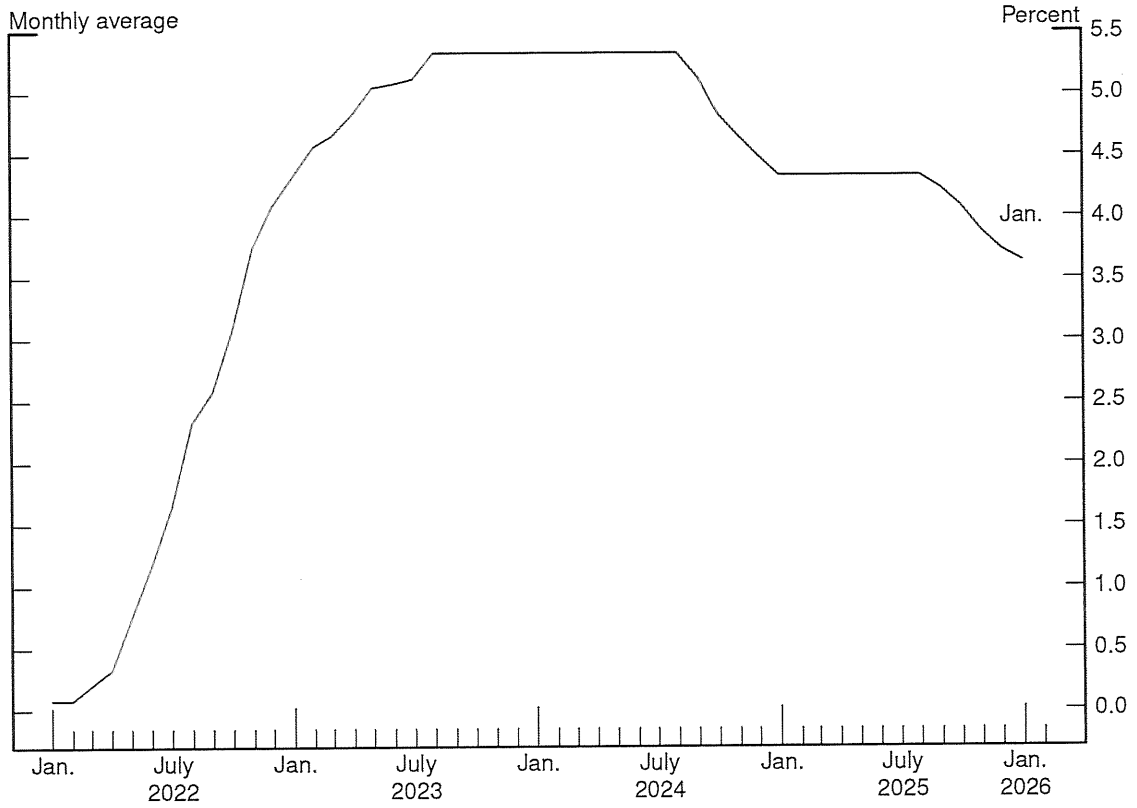
Figure 6: Components of Core CPI Inflation



Note: Core goods inflation is the change in the Consumer price index (CPI) for commodities excluding food and energy. Core services inflation less rent of shelter is the change in the CPI for services excluding energy and rent of shelter. October values are staff interpolations for core services less rent of shelter and Haver interpolations for core goods and rent of shelter.

Source: U.S. Bureau of Labor Statistics, Consumer Price Index; Haver Analytics, https://www.haver.com/our-data; Staff estimates.

Figure 7: Federal Funds Rate



Source: Federal Reserve Bank of New York.

Recent Developments in Monetary Policy Implementation

May 2022: Fed adopts plans for reducing the size of its balance sheet

June 2022: Fed starts balance sheet runoff process

October 2025: Fed announces it will conclude reduction of its aggregate securities holdings on Dec. 1

December 2025: Fed initiates reserve management purchases to maintain ample reserves

FRBSF Economic Letter

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2026-01 | January 5, 2026

What Can History Tell Us About Tariff Shocks?

Regis Barnichon and Aayush Singh

The change in the average U.S. tariff rate in 2025 was the largest in the modern era. One way to assess the effects of such a large shock on unemployment and inflation is by looking at data from pre-World War II periods with tariff rate changes of a similar magnitude. Analysis shows that previous tariff hikes raised unemployment and reduced both economic activity and inflation. Uncertainty may be a factor behind these effects: A large tariff increase raises uncertainty, which can depress overall demand and lead to lower inflation.

The 15% increase in the average U.S. tariff rate in 2025 was the largest in the modern era. Assessing the likely impacts of such a large and sudden change, or tariff shock, on unemployment and inflation is crucial for monetary policy discussions. In general, if a tariff shock raises inflation, tighter monetary policy could help tame the inflation increase, if other factors remain constant. By contrast, if a tariff shock has little effect on inflation but leads to an increase in unemployment, loosening monetary policy could be helpful.

However, there is little consensus on the overall economic effects of tariff shocks—mainly because there have not been such large changes in tariff rates for decades. Since World War II, global tariffs have steadily fallen under the General Agreement on Tariffs and Trade (GATT), dropping from 10% in 1945 to under 3% by January 2025. The last time average tariffs were above 15% was during the interwar period between World Wars I and II.

In this *Economic Letter*, we take a historical perspective and study the effects of tariff rate changes in past eras, specifically when changes were similar in speed and magnitude to those in 2025. In particular, we look back at the so-called first wave of globalization—the period of increased global economic integration in trade and finance between 1870 and 1913—as well as the interwar period. These two eras saw large fluctuations in tariff rates.

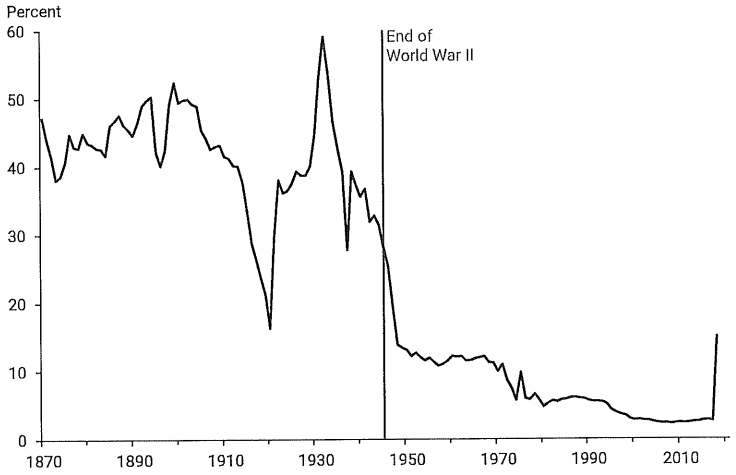
Analysis shows that shifting policy priorities—rather than reactions to contemporaneous economic conditions—were the main drivers of tariff adjustments from past eras. We find that these tariff hikes raised unemployment, which slowed economic activity, while simultaneously *lowering* inflation.

Background from historical data

While numerous theoretical studies have analyzed the economic effects of changes in tariffs (see, for example, Rodríguez-Clare, Ulate, and Vasquez 2025), there has been little empirical work on the topic, and recent studies have been limited to post-1960 variation (see, for example, Schmitt-Grohé and Uribe 2025).

Since World War II, global tariffs have steadily fallen under GATT agreements, dropping from 10% in 1945 to under 3% by January 2025. Figure 1 illustrates the average tariff rate in the United States since 1865, showing that the last time average tariffs were above 15% was before World War II. Major tariff changes have been absent in recent history until 2025.

Figure 1
Average U.S. tariff rate for all imports



However, during the first wave of globalization—the period of increased global economic integration in trade and finance between 1870 and 1913—and the interwar period, tariff rates displayed large fluctuations that were similar in size and speed to the 2025 average tariff rate increase. Indeed, while the general trend has been downward over the past 150 years, earlier periods show that tariffs occasionally rose or fell as much as 20 percentage points in a year.

Estimating the effects of unexpected tariff changes on the economy

The large and abrupt tariff changes in the historical data can provide some insights into how tariffs affect inflation and economic activity. However, it could be misleading to assume that the data depict a relationship between the two. If tariff rates could change in response to economic conditions, subsequent economic activity may simply reflect the normal evolution of the economy rather than the effects of tariffs. For example, if policymakers thought that higher tariffs helped raise employment in the short run by making imports more expensive and thereby boosting spending on domestic goods, they might raise tariffs whenever the unemployment rate started increasing to protect domestic workers. In that case, the data might appear to mistakenly suggest a correlation between higher tariffs and higher unemployment.

To learn about the causal effects of tariff changes, one must isolate the changes in tariffs that are independent of the state of the economy, such as those associated with policy shifts following elections. For example, in the 1888 presidential election, Benjamin Harrison defeated incumbent Grover Cleveland by a narrow margin, when the economy was neither in a recession nor overheating. The Harrison victory led to the Tariff Act of 1890—also known as the McKinley tariff—which raised average tariffs to almost 50%. That change was driven by the new administration's policy stance that tariffs were needed to protect domestic industries from cheaper foreign competition. Since the tariff change was motivated by long-run considerations, we can study its effect by observing how inflation and economic activity fared in the years afterward. We acknowledge that other developments could have also influenced the economy. However, by averaging over many such tariff changes, we can isolate the effects of tariffs on the economy in that period.

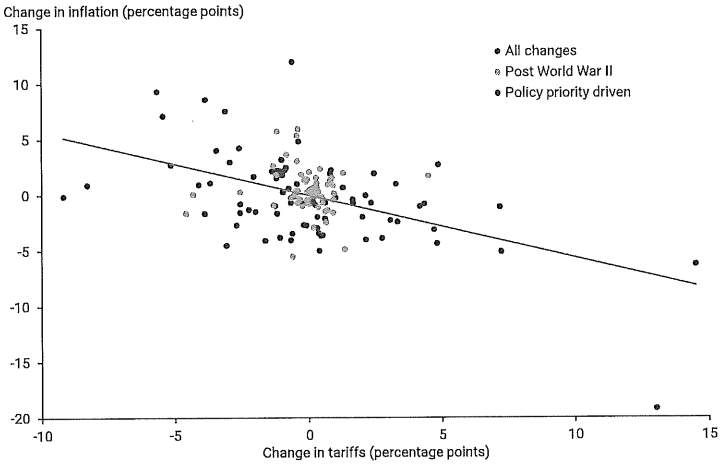
In Barnichon and Singh (2025), we carefully reviewed the major historical tariff changes in the United States since 1870. We found no systematic relationship between the state of the economic cycle and the direction of tariff changes. This reflects that, throughout the 19th century and up until 1935, elected officials from

different parties held opposite views on the desirability of tariffs. One side favored higher tariffs to protect their constituents in industrialized regions. The other favored lower tariffs because their constituents were focused less on industry and more on imported goods. Since changes in the economic cycle are not associated with either side winning elections, there was no general relationship between the direction of tariff changes and the state of the economy. Thus, relying on this "narrative identification" approach, we can study the causal effects of tariff shocks using simple regressions of economic activity or inflation on tariff changes.

Estimating tariff effects

The dots in Figure 2 show each case of a change in the average tariff rate, either positive or negative, on the horizontal axis and the changes in inflation in the year of that tariff change on the vertical axis. The data suggest a strong negative correlation between changes in tariffs and inflation: A 1 percentage point increase in tariffs is associated with a 0.6 percentage point decline in inflation. Focusing only on large tariff changes that can be directly tied to shifting policy priorities gives very similar results, as indicated by the red dots in the figure.

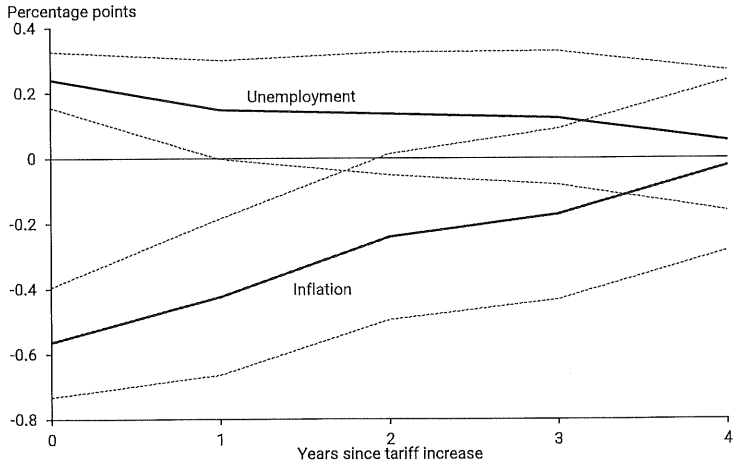
Figure 2
Tariff changes and inflation changes, 1886-2017



Note: Green dots denote tariff changes enacted after World War II. Red dots denote tariff changes deemed "policy priority driven" using authors' narrative identification approach. Blue dots represent all other tariff changes. Line is fitted to all dots.

Next, to estimate the dynamic effects of tariff changes, we use a statistical model called a vector autoregression, which allows us to capture the effects of shocks over time after making mild assumptions about the underlying economic structure (see Barnichon and Singh 2025 for details). Figure 3 shows the responses of inflation and unemployment over time following a 1 percentage point increase in the tariff rate.

Figure 3
Tariff increase effect on inflation, unemployment: 1869-1941



Note: Dashed lines denote the 95% confidence intervals around averages.
Source: Historical Statistics of the United States (1976) and authors' calculations.

The figure suggests that a temporary tariff increase leads to a rise in unemployment (blue line) and a decline in inflation (red line) that both last up to two years after the initial shock before becoming statistically insignificant. In other words, and perhaps surprisingly, our estimates show that an increase in tariffs decreases inflation.

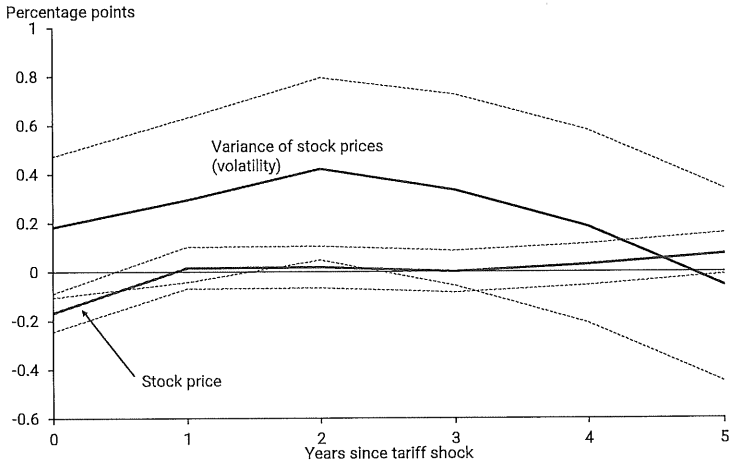
How can higher tariffs lower inflation?

One prominent theory about tariff shocks is that they tend to drive up domestic production costs through more expensive imported inputs while raising the prices of final goods that are made abroad (see, for example, Werning, Lorenzoni, and Guerrieri 2025). Under this framework, higher tariffs would be expected to lead to lower economic activity and higher inflation in the short run.

Our estimates suggest the opposite, however, with shocks from higher tariffs leading to both higher unemployment and *lower* inflation. A possible explanation relies on the effects of uncertainty: A tariff shock tends to coincide with an uncertain economic environment, which by itself depresses economic activity by lowering consumers' and investors' confidence and puts downward pressure on inflation (see, for example, Leduc and Liu 2016). Another possible explanation is that an adverse tariff shock leads to a drop in asset prices, which then depresses overall demand and leads to higher unemployment and lower inflation.

To study the plausibility of these two mechanisms, we use our statistical model to estimate the effects of tariff shocks on a common stock price index and on stock market volatility as a proxy for uncertainty. Figure 4 shows that both uncertainty (blue line) and a drop in stock prices (red line) are plausible explanations for the economic effect of tariffs. The immediate effect of higher tariffs on stock prices is negative, but the effect quickly fades within the first year. Stock market volatility increases notably after the tariff shock, although the estimates are statistically precise only in the first and second year after a tariff increase.

Figure 4
Tariff increase effect on stock prices, volatility: 1869-1941



Note: Dashed lines denote the 95% confidence intervals around averages. Variance of stock prices denotes the estimated monthly volatility in stock prices, and Stock price denotes the yearly change in a common stock price index.
Source: Historical Statistics of the United States (1976) and authors' calculations.

Conclusion

In this *Letter*, we show that large and abrupt tariff increases before World War II were associated with lower inflation and higher unemployment, potentially spurred by higher uncertainty and lower wealth. Because many aspects of the economy were different a hundred or more years ago, those historical experiences may not fully apply to current conditions. For instance, the share of imported inputs in production is higher today than in the past, which means a tariff shock may be more likely to raise inflation (Bergin and Corsetti 2023). Nevertheless, our analysis of historical data highlights a possibility that the large tariff increase of 2025 could put upward pressure on unemployment while putting downward pressure on inflation.

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Reflections on Stablecoins and Payments Innovations

Remarks by

Christopher J. Waller

Member

Board of Governors of the Federal Reserve System

at

"Planning for Surprises, Learning from Crises"
2021 Financial Stability Conference, cohosted by
the Federal Reserve Bank of Cleveland and the Office of Financial Research

Cleveland, Ohio
(via webcast)

November 17, 2021

The U.S. payment system is experiencing a technology-driven revolution. Shifting consumer preferences and the introduction of new products and services from a wide variety of new entities have led to advancements in payments technology. This dynamic landscape has also sparked an active policy debate—about the risks these new developments pose, how regulators should address them, and whether the government should offer an alternative of its own.

Earlier this year, I spoke about the last of these questions: whether the Fed should offer a general-purpose central bank digital currency (CBDC) to the American public.[1] My skepticism about the need for a CBDC, which I still hold, comes in part from the real and rapid innovation taking place in payments. My argument—simple as it sounds—is that payments innovation, and the competition it brings, is good for consumers. The market and the public are telling us there is room for improvement in the U.S. payment system. We should take that message to heart and provide a safe and sound way for those improvements to occur.

My remarks today focus on "stablecoins," the highest-profile example of a new and fast-growing payments technology.[2] Stablecoins are a type of digital asset designed to maintain a stable value relative to a national currency or other reference assets. Stablecoins have piggybacked off the recent increase in crypto-asset activity, and their market capitalization has increased almost fivefold in just the past year.[3] Stablecoins can

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[1] See Christopher J. Waller (2021), "CBDC: A Solution in Search of a Problem?" speech delivered at the American Enterprise Institute, Washington (via webcast), August 5, https://www.federalreserve.gov/newsevents/speech/waller20210805a.htm.

[2] These views are my own and do not represent any position of the Board of Governors or other Federal Reserve policymakers.

[3] See President's Working Group on Financial Markets, Federal Deposit Insurance Corporation, and Office of the Comptroller of the Currency (2021), *Report on Stablecoins* (Washington: PWG, FDIC, and OCC, November) https://home.treasury.gov/system/files/136/StableCoinReport_Nov1_508.pdf.

be thought of in two forms. Some serve as a "safe, liquid" asset in the decentralized finance, or DeFi, world of crypto-trading. Examples include Tether and USD Coin. Alternatively, there are stablecoins that are intended to serve as an instrument for retail payments between consumers and firms. Although these types of stablecoins have not taken off yet, some firms are working to assess the viability of such stablecoins as a retail payment instrument. This growth in usage of stablecoins and their potential to serve as a retail payment instrument has prompted regulatory attention, including a new report from the President's Working Group on Financial Markets (PWG). This report urges the Congress to limit the issuance of "payment stablecoins" to banks and other insured depository institutions.

Fostering responsible payments innovation means setting clear and appropriate rules of the road for everyone to follow. We know how to handle that task, and we should tackle it head-on. The PWG report lays out one path to responsible innovation, and I applaud that effort. However, I also believe there may be others that better promote innovation and competition while still protecting consumers and addressing risks to financial stability. This is the right time to debate such approaches, and it is important to get them right. If we do not, these technologies may move to other jurisdictions—posing risks to U.S. markets that we will be much less able to manage.

Stablecoins: What's Old, and What's New

Stablecoin arrangements involve a range of legal and operational structures across a range of distributed ledger networks. They are a genuinely new product, based on genuinely new technology. But despite the jargon surrounding stablecoins, we can also

understand them as a new version of something older and more familiar: the bank deposit.[4]

As I have said before, both the government and the private sector play indispensable roles in the U.S. monetary system. The Federal Reserve offers both physical "central bank money" to the general public in the form of physical currency and digital "central bank money" to depository institutions in the form of digital accounts. Commercial banks, in turn, give households and businesses access to "commercial bank money," crediting checking and savings accounts when a customer deposits cash or takes out a loan. This privately created money serves as a bridge between the central bank and the public.

Commercial bank money is a form of private debt. The bank issuing that debt promises to honor it at a fixed, one-to-one exchange rate with central bank money. The bank itself is responsible for keeping that promise. However, the bank is supported in that task by a tried-and-true system of public support. That includes regulation and supervision, which ensure banks are safe and sound, not taking imprudent risks in their day-to-day business; the availability of discount window credit, which ensures well-capitalized banks can meet their emergency liquidity needs; and deposit insurance, which protects consumer deposits if the bank fails. Put together, those programs leave very little residual risk that a depositor in good standing will ever have to leave the teller empty handed. They make a bank's redemption promise credible, and they make commercial bank money a near-perfect substitute for cash. As a result, households and businesses overwhelmingly use commercial bank money for everyday transactions.[5]

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[4] This analogy applies to the economics of stablecoins; I make no comment on their legal status.
[5] See Waller, "CBDC," in note 1.

This arrangement has many advantages. Small retail customers do not have to spend their time vetting the safety and soundness of their banks—regulators and supervisors do that for them. Consumers have a safe place to keep their savings and a nearly risk-free way to make payments, which are settled in ultrasafe central bank liabilities. Banks can focus their effort on investments, products, and services from a place of safety and soundness. Communities and customers benefit from those efforts in the form of more efficient capital allocation and higher-quality, lower-cost financial products.

These advantages, however, are not cost free. Regulation ensures that commercial banks issue "sound money" by making sure those banks are safe and stable, and that they bear the risks of their own investment decisions. But regulation also imposes costs, from the expense and time required to seek a banking charter to the costs of compliance with an array of regulations. While regulations are necessary, they also limit free entry into at least some of the markets in which banks operate. As a result, regulatory oversight can insulate banks from some forms of direct competition. The Congress has long recognized the importance of private-sector competition and customer choice, particularly in payments, and the Congress and the Federal Reserve take regular steps to preserve a competitive payments marketplace.[6]

The objective of stablecoins is to mimic the safe-asset features of commercial bank money. They typically offer a fixed exchange rate of one-to-one to a single asset or a basket of assets. Payment stablecoins tend to choose a sovereign currency as their

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[6] See Federal Reserve System (2021), "Fostering Payment and Settlement System Safety and Efficiency," in *The Fed Explained: What the Central Bank Does*, 11th ed. (Washington: FRS), pp. 84–111, https://www.federalreserve.gov/aboutthefed/files/the-fed-explained.pdf.

anchor, typically the U.S. dollar. Stablecoin issuers suggest that one can redeem a stablecoin from the issuer for one U.S. dollar, although redemption rights are not always well defined. Nor is the entity responsible for conducting redemption always clearly specified.

To enhance the credibility of redemption at par, some stablecoin issuers go further, promising to limit the investments they make with the money backing each stablecoin by keeping it in cash or other highly liquid assets. In this respect, stablecoins can resemble a "narrow bank," a well-known payment-only banking structure that monetary economists have studied for more than half a century.[7] Constructed this way, stablecoins also resemble currency boards, which peg a foreign currency to the dollar and hold dollar reserves to back up redemption promises.

Although stablecoins try to mimic commercial bank money, they differ dramatically in terms of the payment networks they use. Dollar-denominated commercial bank money is a settlement instrument in a wide range of asset markets, and customers can transfer it using a wide range of payment platforms. However, commercial bank money is not "native" to public blockchains, the distributed networks that support trading and other activity involving crypto-assets. Stablecoins help fill that gap as a less volatile anchor for crypto-asset transactions and an "on-ramp" for digital asset trading.

Promises and Risks

This role—as a more stable private asset in digital markets that otherwise lack such assets—has meaningful benefits by itself, helping make those markets deeper and more liquid. A well-designed, well-regulated stablecoin could also have other benefits,

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[7] See, for example, Milton Friedman (1960), *A Program for Monetary Stability* (New York: Fordham University Press).

which go well beyond digital asset markets. It might allow for different activity on distributed ledger technology, or DLT, platforms, like a wider range of automated (or "smart") contracts. It might serve as an "atomic" settlement asset and thus help bring some of the speed and potential efficiencies of digital asset markets into more traditional ones. With the right network design, stablecoins might help deliver faster, more efficient retail payments as well, especially in the cross-border context, where transparency can still be low and costs can still be high. Stablecoins could be a source of healthy competition for existing payments platforms and help the broader payments system reach a wider range of consumers. And, importantly, while stablecoins and other payment innovations could create new risks, we should not foreclose the possibility that they may help address old ones—for example, by providing greater visibility into the resources and obligations that ultimately support any system of privately issued money.

These benefits are substantial, and even where they are still uncertain, it is important to recognize them. But to capture those benefits, stablecoins must bridge the biggest gap between them and commercial bank money: robust, consistent supervision and regulation and appropriate public backstops. Strong oversight, combined with deposit insurance and other public support that comes with it, is what makes bank deposits an acceptable and accepted form of money. Today stablecoins lack that oversight, and its absence does create risks. The PWG described several such risks in its report, but I will highlight just three.

The first is the risk of a destabilizing run. The United States has a rich history of privately created money, stretching back to promissory notes that merchants and lawyers

issued on the early frontier.[8] Some of these instruments worked well for long periods; others came from unregulated or unscrupulous issuers, who promised safety and stability at a more attractive rate of return. When these instruments went bad, the consequences could extend well beyond the depositors, investors, or even institutions who put their principal at risk. It is important not to overstate these risks; if the investors that participate in stablecoin arrangements know their money is at risk, then a run on one issuer is less likely to become a run on all of them. But without transparency into those risks, or with retail users that are less able to monitor them, the possibility of widespread losses is more of a concern. As I mentioned, for commercial bank money, regulation, supervision, deposit insurance, and the discount window make this dynamic more remote by giving a bank's creditors less reason to run.

The second risk is the risk of a payment system failure. Stablecoins share many of the functions of a traditional payment system. If stablecoins' role in payments activity grows—which, again, could be a good development—their exposure to clearing, settlement, and other payment system risks would grow, too. Stablecoins also present some unique versions of these risks because responsibility for different payment functions is scattered across the network. The United States does not have a national payments regulator, but it does have strong standards for addressing payment system risk, especially where those payment systems are systemically important. Regulators should draw on those standards with care and take a fresh look at what should or should not apply in the stablecoin context.

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[8] See Justin Simard (2016), "The Birth of a Legal Economy: Lawyers and the Development of American Commerce," *Buffalo Law Review,* vol. 64, no. 5, pp. 1059–1134.

The third risk is the risk of scale. Stablecoins, like any payment mechanism, can exhibit strong network effects; the more people use a payment instrument, the more useful it is, and the greater the value it delivers to each participant. For this same reason, network effects can be (and usually are) highly beneficial. As a result, rapid and broad scaling of a payment instrument is socially desirable. In fact, in a perfect world, there would be one payment system and one payment instrument that everyone uses. The problem with this is that, in our imperfect world, this would confer monopoly power over the payment system. Any entity that has control over a large and widely used payment system has substantial market power and thus the ability to extract rents in exchange for access—which, again, hurts competition and decreases the network benefits to consumers. Thus, there is a tradeoff between the efficiency of having one large network and the cost of monopoly control of that network. I believe that we are a long way from a monopoly in stablecoin issuance; I see a lot of interest in offering this type of payments competition and ensuring that there are relatively few barriers to entry. In my view, having stablecoins scale rapidly is not a concern as long as there is sufficient competition within the stablecoin industry and from the existing banking system. In this world, some form of interoperability is critical to ensure that competition allows consumers to easily move across stablecoin networks, just as they can move between different commercial bank monies or sovereign currencies.

Looking Beyond the Banking Model

Jurisdictions around the world are grappling with these same risks, trying to foster the potential benefits of stablecoin arrangements while minimizing their costs. The PWG report described one approach to that cost-benefit equation: restricting the issuance of

"payment stablecoins" to insured depository institutions and imposing strict limits on the behavior of wallet providers and other nonbank intermediaries. Given the economic similarities between payment stablecoins and bank deposits, I have no objection to the idea of banks issuing both instruments. The United States has a tried-and-true system for overseeing and supporting the creation of commercial bank money, and there is no reason to suggest it could not be adapted to work in this context.

However, I disagree with the notion that stablecoin issuance can or should *only* be conducted by banks, simply because of the nature of the liability. I understand the attraction of forcing a new product into an old, familiar structure. But that approach and mindset would eliminate a key benefit of a stablecoin arrangement—that it serves as a viable competitor to banking organizations in their role as payment providers. The Federal Reserve and the Congress have long recognized the value in a vibrant, diverse payment system, which benefits from private-sector innovation. That innovation can come from outside the banking sector, and we should not be surprised when it crops up in a commercial context, particularly in Silicon Valley. When it does, we should give those innovations the chance to compete with other systems and providers—including banks—on a clear and level playing field.

To do so, the regulatory and supervisory framework for payment stablecoins should address the specific risks that these arrangements pose—directly, fully, and narrowly. This means establishing safeguards around all of the key functions and activities of a stablecoin arrangement, including measures to ensure the stablecoin "reserve" is maintained as advertised. But it does not necessarily mean imposing the full banking rulebook, which is geared in part toward lending activities, not payments. If an

entity were to issue stablecoin-linked liabilities as its sole activity; if it backed those liabilities only with very safe assets; if it engaged in no maturity transformation and offered its customers no credit; and if it were subject to a full program of ongoing supervisory oversight, covering the full stablecoin arrangement, that might provide enough assurance for these arrangements to work.

There should also be safeguards for other participants in a stablecoin arrangement, like wallet providers and other intermediaries. Again, however, not all of the restrictions that apply to bank relationships might be necessary. For example, there is no need to apply restrictions on commercial companies from owning or controlling intermediaries in these arrangements. The separation of banking and commerce is grounded in concerns about captive lending—the idea that banks might lend to their owners on too favorable terms, giving the owners an unfair subsidy and putting the bank on shaky ground. These traditional concerns do not apply to wallet providers and other intermediaries who abstain from lending activities. There are new questions to consider, such as around the use of customers' financial transaction data, but where anticompetitive behavior happens, existing law (and particularly antitrust law) should still apply.

Policymakers will continue to work through these questions in the coming months, but in the process, we should not let the novelty of stablecoins muddy the waters. The United States has a long history of developing, refining, and integrating new payment technologies in ways that maintain the integrity of its financial institutions and its payment system. Stablecoins may be new, but their economics are far from it. We know how to make this kind of privately issued money safe and sound, and, in designing

a program of regulation and supervision to do so, we have plenty of examples to draw on. In the interest of competition and of the consumers it benefits, we should get to work.

For release on delivery
5:05 p.m. EST (2:05 p.m. local time)
February 12, 2025

Reflections on a Maturing Stablecoin Market

Remarks by

Christopher J. Waller

Member

Board of Governors of the Federal Reserve System

at

A Very Stable Conference

San Francisco, California

February 12, 2025

Thank you for inviting me to speak today about stablecoins, an important innovation for the crypto ecosystem with the potential to improve retail and cross-border payments.[1] A little over three years ago, I outlined my views on the benefits and risks of stablecoins.[2] I can think of no better place than this conference to discuss the maturing stablecoin market and examine potential challenges that could impede stablecoins from reaching their full potential.

For the purposes of this speech, I define stablecoins as a type of digital asset designed to maintain a stable value relative to a national currency and backed at least one-to-one with safe and liquid assets. Specifically, a pool of assets is held in reserve so that stablecoins can be redeemed for traditional currency in a timely fashion.

Stablecoins—as with any means of payment—must demonstrate 1) a clear *use case* and 2) a clear *commercial case* to be economically viable. These terms are often conflated, but they are different, and both are necessary. Having a use case is how you attract consumers and businesses, while a business model is necessary for issuers of stablecoins to continue operating. As private sector innovators look to expand on the use cases of stablecoins and seek to achieve scale, what might emerge as challenges or roadblocks? This is a question I will explore today, including from a public sector perspective. Of course, as a policymaker, I am not here to endorse any of these use cases or business models, and what follows is not advice or recommendations. Rather, I am discussing them to underscore the varied ecosystem that policymakers must understand.

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[1] Thank you to Marc Rodriguez, Alex Sproveri, Sonja Danburg, and David Mills of the Federal Reserve Board for their assistance in preparing this text. The views expressed here are my own and not necessarily those of my colleagues on the Federal Reserve Board.

[2] See Christopher J. Waller, "Reflections on Stablecoins and Payments Innovations" (speech at "Planning for Surprises, Learning from Crises" 2021 Financial Stability Conference, Cleveland, OH, November 17, 2021), https://www.federalreserve.gov/newsevents/speech/waller20211117a.htm.

I will begin by explaining some of the use cases of stablecoins, including those that are well established and those that are still emerging. The primary use of stablecoins is as a safe crypto store of value. In the early days of crypto trading, buying and selling crypto meant trading one crypto-asset for another crypto-asset. As we have seen, crypto prices can fluctuate substantially, which means crypto-assets that are not anchored as stablecoins suffer from price risk. All financial markets crave the existence of a safe, low-risk asset which allows traders to move out of risky positions into safe ones where the safe asset price is known and stable. The beauty of financial innovation is that if a market demands such an asset, someone will figure out how to supply it. Thus, stablecoins were born.

A stablecoin's value is tied to a national fiat currency, with the U.S. dollar being the fiat currency of choice for most stablecoins. In this sense, stablecoins are synthetic dollars. In our everyday life, the dollar serves as a medium of exchange and a unit of account. By their tie to the dollar, stablecoins are the medium of exchange and unit of account in the crypto ecosystem.

But how does one trade a "real" dollar for a "synthetic" dollar, like a stablecoin? Exchanges already allowed agents to move in and out of the crypto ecosystem but doing so took time and money. Stablecoins provided a marketplace solution to this problem—a means to represent dollars on exchanges so that transactions could be carried out more quickly and efficiently. Currently, stablecoins are involved in over 80 percent of trading volume on major centralized crypto exchanges.[3]

[3] See "Share of Trade Volume by Pair Denomination," *The Block*, last modified February 10, 2025, https://www.theblock.co/data/crypto-markets/spot/share-of-trade-volume-by-pair-denomination.

A second stablecoin use case is providing a means to access and hold U.S. dollars. Today, around 99 percent of stablecoin market capitalization is denominated in U.S. dollars, and the vast majority of digital asset trades are priced in U.S. dollars.[4] This is no surprise given the primacy of the U.S. dollar in global finance and trade, and I believe that stablecoins have the potential to maintain and extend the role of the dollar internationally.[5] U.S. dollar stablecoins could be particularly appealing to those in high inflation countries or to those without easy or affordable access to dollar cash or banking services.

A third use case is cross-border payments. For example, we are hearing increased industry focus on the "stablecoin sandwich" model of cross-border payments, in which fiat currency in one country is converted first into a U.S. dollar stablecoin, then that stablecoin is transferred to another individual, and then finally the stablecoin is converted back into the local fiat currency at its destination. This has the potential to reduce the complexity of a series of correspondent banking networks, improving transparency, cost, and timeliness. As this use case develops, it is critical that market participants implement all anti-money laundering and relevant consumer safeguards.

The last use case I will describe is in retail payments. At present, stablecoin use for retail payments is very limited. However, I am seeing a lot of new, private sector entrants looking to find ways to support the use of stablecoins for retail payments. For example, firms that provide point-of-sale technology are acquiring innovative fintechs or developing their own capabilities to accept stablecoins for retail purchases. This provides

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[4] See "DefiLlama-Defi Dashboard," https://defillama.com/.

[5] See Christopher J. Waller, "The Dollar's International Role" (speech at "Climate, Currency, and Central Banking," Nassau, BS, February 15, 2024), https://www.federalreserve.gov/newsevents/speech/waller20240215a.htm.

consumers with yet another option. Firms are also looking to incorporate stablecoins—and crypto more broadly—into peer-to-peer payment apps.

It remains to be seen whether stablecoins will scale for retail payment use cases. Such an evolution would require both a substantial number of consumers to shift their preferences toward using stablecoins and a significant number of businesses to make necessary investments to receive payments via stablecoins. We know that consumer retail payments behavior is sticky, and when behavior does change, it generally happens over a long period. If retail payments use cases do increase, it would probably take years to have a significant impact. That said, if stablecoins reduce transaction fees or allow merchants to attract customers, then merchants could have an incentive to accept them. Ultimately, the market will sort out whether consumers and businesses have the incentives to use stablecoins in this way.

In addition to stablecoins having clear cut use cases, issuers must have a viable business model. To cite one famous example, Red Lobster's endless shrimp deal was popular with customers, but it did not turn out to be a sustainable model for the restaurant chain. Let me describe what I think are the incentives for stablecoin issuers, but I am here today to learn more.

To date, most stablecoin issuers appear to generate revenue primarily by earning higher returns on their reserve assets than they incur in expenses. They issue a zero-interest liability and use the proceeds to acquire interest earning assets, thereby profiting from the spread. As with bank deposits, the interest rate environment will have a significant effect on the profitability of firms issuing stablecoins. Higher interest rates generally mean higher rates of return on reserve assets, which generates revenue for the

issuer. However, higher interest rates also have the potential to make non-interest bearing assets less attractive for consumers to hold. That said, users who hold stablecoins as an accessible, safe store of U.S. dollar denominated value may not be particularly sensitive to the interest rate environment, a phenomenon we already see today with some holders of physical U.S. dollars.

An additional way stablecoin issuers can generate revenue is through fees. This could include charging minting and burning fees, which occur when a customer acquires a new stablecoin for a real dollar or wants to redeem it for real dollars. This is very much like the foreign exchange market in fiat currencies that most of us are familiar with. Alternatively, as occurs with most payments firms, the issuer could earn money from transaction fees.

Finally, stablecoin issuers may use stablecoins as part of a broader strategy to attract customers to whom they may sell other products and services. In that case, stablecoins could be seen as a "loss leader" to entice customers to use other products or services offered by the stablecoin issuer that are much more profitable.

With the exception of the last example, the viability of the other business models will depend on the ability of stablecoins to scale as a means of payment and on how consumers and businesses respond. For example, if the stablecoin issuer decides to pass through interest earnings on its assets, that will make the stablecoin more attractive, but it will reduce the profits from issuing a stablecoin. The smaller the interest rate spread, the more important scale becomes. For the fee-based models, free entry into this space will drive down fees as it does in any other market, which will reduce the revenue from issuing a stablecoin.

Within this market, scale is important for achieving certain use cases as well as satisfying certain business models. For example, stablecoins are unlikely to become a viable option for retail payments if consumers question whether stablecoins will be widely accepted as a means of payment, while stablecoin issuers cannot generate significant revenue from interest on backing assets or fees without scale. I call this the "Field of Dreams" problem—if you build it, will they come?

With all of that in mind, let's now dive into some of the potential challenges or roadblocks that will need to be overcome for stablecoins to achieve their full potential.

The first theme I will explore is one that I have discussed in the past—the safety and soundness of stablecoins and the need for a clear regulatory regime for stablecoins in the United States.[6] Stablecoins are forms of private money and, like any form of private money, are subject to run risk, and we have seen "depegs" of some stablecoins in recent years. Additionally, all payment systems face risk of failure, and stablecoins are subject to clearing, settlement, and other payment system risks as well. At the same time, it is important to note that the risks faced by stablecoin issuers are not the same risks faced by banks. The stablecoin market would benefit from a U.S. regulatory and supervisory framework that addresses stablecoin risks directly, fully, and narrowly. This framework should allow both non-banks and banks to issue regulated stablecoins and should consider the effects of regulation on the payments landscape, including competing payment instruments.

I want to reiterate that I think it is important that U.S. legislation makes provision for the supervision and regulation of stablecoin issuers that is proportionate to the risks

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[6] See Chrisopher J. Waller, "Reflections on Stablecoins and Payments Innovations."

they pose, without stifling their innovative potential while the marketplace is still developing. I believe in the power of the private sector to develop solutions that benefit businesses and consumers, with the job of the public sector to create a fair set of rules for market participants to operate within, including guardrails that ensure safety for consumers and the financial system as a whole. Having a level of certainty is important for businesses looking to invest in new products and services as well as for consumer confidence and assurance.

Fragmentation is the next theme I'll explore, first from a technical perspective. Currently, several popular blockchain networks are designed as distinct from one another. Firms looking to scale across blockchains are seeking technical solutions to achieve cross-chain interoperability. Will this ultimately prove efficient, especially in a world with multiple stablecoin providers operating within potentially different combinations of blockchain networks? Or will there be multiple, competing ecosystems, for example where one stablecoin dominates on certain blockchains, and another stablecoin dominates on others? Alternatively, a stablecoin market featuring a high degree of interoperability could support a variety of stablecoin issuers and blockchain networks, providing consumers a choice in stablecoins and technologies. It is not yet clear how these dynamics will ultimately impact business models and use cases for stablecoins, but it is an issue that bears watching as firms work to scale and mature their businesses.

Fragmentation around the use and acceptance of stablecoins will also act as an impediment to scaling and will impact how stablecoin use cases develop. As I noted, stablecoins will prove useful as a means of payment insofar as holders of a specific stablecoin expect that others will accept them. The more people will accept a stablecoin,

the more convenient a stablecoin will be. For the retail payment use case, how easy will it be for me as a consumer to pay with stablecoins at the point of sale, either in-person or online? From the merchant perspective, what incentives will firms have to accept stablecoins? Similarly, for cross-border payments, how widely will different firms (and their banking partners) transact in stablecoins? And, more broadly, could stablecoins have the potential to recreate and potentially exacerbate the current challenges associated with correspondent banking, further fragmenting the marketplace? Or could stablecoins mature in such a way to change the market structure of cross-border payments?

Fragmentation in regulation also has the potential to hold stablecoins back from reaching their full potential. As I already discussed, the stablecoin market does not have a clear regulatory framework in the United States. While there have been efforts to develop some international standards, the emergence of different global stablecoin regulatory regimes creates the potential for conflicting regulation domestically and internationally.[7] This regulatory fragmentation could make it difficult for U.S. dollar stablecoin issuers to operate at a global scale. And as I have noted, scale is vital for any means of payment to achieve its full potential.

For example, under Europe's Markets in Crypto-Assets Regulation, stablecoin issuers can earn interest on their reserve assets as a business model, whereas other regulatory models being discussed would require reserves for stablecoins deemed systemically important to be held as non-interest-bearing central bank deposits, limiting

[7] See Committee on Payments and Market Infrastructures and Board of the International Organization of Securities Commissions, Application of the Principles for Financial Market Infrastructures to stablecoin arrangements (Basel: Bank for International Settlements, July 2022), https://www.bis.org/cpmi/publ/d206.pdf.

stablecoin issuers into a specific business model. Domestically, state regulators have been key players in the development of the stablecoin market, and several states are in the process of developing state laws or finalizing new regulations related to stablecoin issuance. There is a risk that state regulations may conflict, which could prevent the use of the same stablecoin across all states and reduce stablecoin scalability. As with the United States' dual banking system, a complementary framework with state and federal regulators working together can allow innovation to flourish while achieving some of the benefits of scale that come with a harmonized set of market rules.

Different regulatory regimes are also creating separate reserve asset and redemption requirements for stablecoin issuers—a further potential regulatory regime fragmentation. In Europe, non-systemic stablecoin issuers are required to hold a minimum of 30 percent of their backing assets in bank deposits, and regulators have further proposed concentration limits per bank.[8] This differs from the requirements of some U.S. state-regulated issuers.[9] To operate at a global scale, stablecoin issuers would therefore have to issue the same stablecoin under multiple regimes with separate reserve

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[8] See Regulation (EU) 2023/1114 of the European Parliament and of the Council of 31 May 2023 on markets in crypto-assets, and amending Regulations (EU) No 1093/2010 and (EU) No 1095/2010 and Directives 2013/36/EU and (EU) 2019/1937. See European Banking Authority, Draft Regulatory Technical Standards to specify the highly liquid financial instruments with minimal market risk, credit risk and concentration risk under Article 38(5) of Regulation (EU) 2023/1114 (Paris: European Banking Authority, June 2024), https://www.eba.europa.eu/sites/default/files/2024-06/d92b94f8-8260-43b6-abae-d21e022414ed/Final%20report_draft%20RTS%20to%20specify%20the%20HLFI%20in%20the%20reserve%20of%20assets%20Article%2038%205.pdf and European Banking Authority, Draft Regulatory Technical Standards to further specify the liquidity requirements of the reserve of assets under Article 36(4) of Regulation (EU) 2023/1114 (Paris: European Banking Authority, June 2024), https://www.eba.europa.eu/sites/default/files/2024-06/580db2f3-8370-4927-baa3-0f995722b417/Final%20report_draft%20RTS%20further%20specifying%20the%20liquidity%20requirements%20Article%2036%204.pdf.

[9] For example, see "Virtual Currency Guidance," New York State Department of Financial Services, last modified June 8, 2022, https://www.dfs.ny.gov/industry_guidance/industry_letters/il20220608_issuance_stablecoins.

asset and redemption requirements. Will this be efficient and ultimately prove workable if the number of regulatory regimes domestically and internationally continue to grow? Will we expect a stablecoin issuer to rebalance its reserves when a stablecoin is transferred between users in different countries or U.S. states? Creating consistency at the federal level could allow federal authorities to negotiate with foreign counterparts to ensure global regulations serve the interests of U.S. consumers and businesses and allow the U.S. to be a regulation setter for an asset class primarily denominated in our national unit of account.

In conclusion, my hope is that the stablecoin market will grow or diminish on the merits of their benefits to consumers and the broader economy. For the private sector, that means continuing to develop innovative solutions that fit a market need while building sustainable business models. And for the public sector, it means setting clear and targeted legal and regulatory frameworks and coordinating those frameworks across states and national boundaries to enable private sector innovation at a global scale.

Thank you.

For release on delivery
9:00 a.m. EDT
October 16, 2025

Exploring the Possibilities and Risks of New Payment Technologies

Remarks by

Michael S. Barr

Member

Board of Governors of the Federal Reserve System

at

2025 D.C. Fintech Week

Washington, D.C.

October 16, 2025

Thank you for the opportunity to speak to you today.

Payments innovation is accelerating.[1] Stablecoins, artificial intelligence (AI), real-time payments, and richer payment metadata offer significant improvements to the cost, speed, and functionality of payments. Better payments functionality can help financial institutions and businesses manage liquidity more efficiently at lower cost. It can also mean that people receive their paychecks more promptly and manage their payments more effectively. Payments innovation is especially important for lower-income individuals who are often underserved by the financial system and lack financial slack.

For the bulk of my remarks today, I will focus on the benefits and risks of stablecoins. Congress has recently passed legislation that provides some clarity to issuers of stablecoins about how they can fit into the regulatory and supervisory framework. While there is a lot of work to do on the part of the government to fill in the specifics during the rule-writing process, increased certainty could lead to more rapid development of stablecoins and related products and services for businesses and households.

Potential Benefits of Stablecoins

I will start with some of the potential benefits of stablecoins. The primary benefit comes from the ledger itself, which can operate globally and encode functionality and conditionality directly into assets and transactions. This functionality unlocks a range of new financial use cases that were previously impractical when transactions required updating a series of ledgers spread across individual financial institutions.

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

The global nature of stablecoins is fundamental to their usefulness in parts of the payment system that have high friction, such as cross-border payments. Some of these frictions are necessary and important, such as those associated with complying with relevant laws and regulations on money laundering and terrorist financing. But removing or mitigating other frictions may reduce costs and facilitate more efficient transactions.

While today stablecoins are mostly used to facilitate crypto-trading activities, and secondarily as a dollar-denominated store of value in some foreign jurisdictions, I want to provide some examples where stablecoins may be useful for additional functions in cross-border payments.

Remittances

Stablecoins can be used to reduce the costs of remittances, since it tends to be more expensive to send remittances to jurisdictions with less-developed domestic payment systems.[2] As of a few years ago, stablecoins had only a limited ability to reduce costs because there were meaningful fees associated with on-ramping into stablecoins and off-ramping out to local currencies. However, stablecoin acceptance networks have arisen in some corridors that help reduce these fees and offer the potential to reduce the cost and increase the speed of remittances for those least able to bear these costs.

Trade finance

Stablecoins have the potential to also improve the speed of managing the paperwork and processes inherent in global trade and trade finance, perhaps with the use of smart contracts. In these applications, a digitally native form of payment could

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[2] See Viktors Stebunovs (2025), "Clean Money, High Costs?" International Finance Discussion Papers 1422 (Washington: Board of Governors of the Federal Reserve System, September), https://doi.org/10.17016/IFDP.2025.1422.

potentially be used to streamline the tracking and validation process that occurs between financial institutions, shipping companies, and customs warehouses and the companies that engage in trade. Small businesses might see lower costs and greater access.

Multinational firms' cash management

And for larger firms that have entities across the globe, stablecoins may help with treasury management. Stablecoins offer the promise of near-real-time global payments, helping multinational firms manage their cash efficiently between their related entities while still making payments through local internal entities in different countries, reducing costs and improving liquidity.

Risks to Achieving the Benefits of New Payment Technologies

I have mentioned just a few of the potential ways in which stablecoins can provide benefits to households and business. Continued investment in technology can also support compliance with important legal restrictions that prevent the use of the financial system for nefarious purposes. This investment will be a key area necessary for supporting stablecoins in achieving their potential benefits. Let me start with money laundering and terrorist financing.

The potential for technology to support anti-money-laundering compliance

One unique feature of stablecoins is their role as bearer instruments, similar to old-fashioned traveler's checks, but mostly operating on global permissionless networks that can include plenty of users with bad intentions. That creates particular challenges for preventing money laundering and terrorist finance, since bad actors can purchase stablecoins in secondary markets that may not have customer identification requirements. The U.S. puts a heavy premium on ensuring that all financial institutions comply with

rules that seek to prevent criminals and terrorists from using our financial system. Financial companies, particularly banks, that take shortcuts on anti-money-laundering compliance sooner or later come to regret these shortcuts.

Compliance with Bank Secrecy Act and anti-money-laundering requirements can be very data intensive and costly, requiring significant staffing to identify and then address or resolve flagged issues. Permissioned networks with only trusted nodes doing the know your customer work can reduce the risks. Moreover, new technologies, used with care, can potentially reduce frictions on legitimate payments and speed up the identification of problem payments. AI may be well suited to flag payments that are outliers relative to typical patterns, potentially reducing the volume of false positives and unnecessary filings.[3] There may also be ways to improve the explainability of payments if they travel through the payment cycle with more data elements, such as those in the ISO 20022 standards recently implemented on Fedwire. There are also technologies that can aid with stablecoin compliance, such as trusted identity tokens in wallets that satisfy Customer Identification Program requirements and smart contracts that freeze stablecoins in problematic wallets. This suite of tools can also be used for preventing other types of crime, such as fraud.

[3] See Jeffrey S. Allen and Max S.S. Hatfield (2025), "Can LLMs Improve Sanctions Screening in the Financial System? Evidence from a Fuzzy Matching Assessment," Finance and Economics Discussion Series 2025-092 (Washington: Board of Governors of the Federal Reserve System, September), https://doi.org/10.17016/FEDS.2025.092; U.S. Department of the Treasury (2024), "Treasury Announces Enhanced Fraud Detection Processes, Including Machine Learning AI, Prevented and Recovered Over $4 Billion in Fiscal Year 2024," press release, October 17, https://home.treasury.gov/news/press-releases/jy2650.

A Rocky History of Private Money Creation

A second key area is financial stability. Let me take a step back and explain why I am focused on the financial stability risk of stablecoins. Caution is warranted because of the long and painful history of private money created with insufficient safeguards.

The fragility of private money is inherent in the way that it is created. Financial institutions issue liquid liabilities to the public that are redeemable on demand and at par, but issuers risk being ultimately unable to liquidate their assets promptly at par when facing run dynamics and market stress. Maturity and liquidity transformation can have social benefits by meeting the needs of the public for money-like assets and supporting the supply of credit to the real economy. However, for this social benefit to be durable, maturity transformation necessarily requires safeguards that address run risk.[4]

Looking at the long history of runs from private money is a helpful reminder of how these runs can happen and what's at stake when they do. For example, in the 1800s, during the so-called Free Banking Era, the United States had competing forms of private money in the form of bank notes. The value of these notes was tied to the creditworthiness, location, and credibility of the issuing bank, although some of the notes were backed by bonds issued by the state governments as well as other high-quality assets.[5] Despite these protections, the quality of the guarantees backing the bank notes

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[4] The need for joint capital and liquidity regulation to address excessive run risk at financial institutions is established in Anil Kashyap, Dimitrios P Tsomocos, and Alexandros P. Vardoulakis (2024), "Optimal Bank Regulation in the Presence of Credit and Run Risk," *Journal of Political Economy,* vol. 132 (March), pp. 772–823. How the public provision of safe assets can suppress the demand for private money-like assets and, thus, reduce financial fragility is examined in Mark Carlson, Burcu Duygan-Bump, Fabio Natalucci, Bill Nelson, Marcelo Ochoa, Jeremy Stein, and Skander Van den Heuvel (2016), "The Demand for Short-Term, Safe Assets and Financial Stability: Some Evidence and Implications for Central Bank Policies," *International Journal of Central Banking*, vol. 12 (December), pp. 307–33.

[5] See, for example, Gary Gorton (1996), "Reputation Formation in Early Bank Note Markets," *Journal of Political Economy,* vol. 104 (April), pp. 346–97.

was not beyond question, and they often traded below par. Concerns about the health of issuing banks, or of the states themselves in this era, resulted in regular bank runs and, in a number of instances, widespread financial panics. This stability of the system was improved over time, such as through legal changes that effectively required bank notes to be backed only by U.S. government securities. Nevertheless, regular episodes of runs continued to materialize until the Panic of 1907, which prominently featured a run on trust companies that offered deposit products backed by assets less liquid than the assets held by banks of the era. This episode led to the creation of the Federal Reserve System.

The historical examples point out that issuing liquid liabilities redeemable at par but backed by assets, even high-quality ones, about which creditors might have questions makes private money vulnerable to run risk. These same dynamics occurred even in much more modern times. The most notable example is when the Reserve Primary Fund broke the buck on September 16, 2008, one day after the bankruptcy of Lehman Brothers, as the assets backing the fund came into question.[6] Pressures on money market funds also occurred during the onset of the COVID-19 outbreak in March 2020, when institutional prime funds suffered outflows of about 30 percent of their assets under management within a period of two weeks.[7]

These experiences show the vulnerability of private money-like assets to runs, and how these runs can threaten not only the financial sector, but also the broader economy.

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[6] See, for example, Lawrence Schmidt, Allan Timmermann, and Russ Wermers (2016), "Runs on Money Market Mutual Funds," *American Economic Review,* vol. 106 (September), pp. 2625–57.

[7] See, for example, Lei Li, Yi Li, Marco Macchiavelli, and Xing Zhou (2021), "Liquidity Restrictions, Runs, and Central Bank Interventions: Evidence from Money Market Funds," *Review of Financial Studies,* vol. 34 (November), pp. 5402–37.

Issues in the Unregulated Stablecoin Market

The mostly unregulated stablecoin market has also experienced run dynamics in recent times. While people purchasing something called a "stablecoin" might reasonably assume that they can rely on redemption at par on demand, unregulated stablecoins are currently backed by a range of non–cash reserve assets that can make them vulnerable, especially under stressed conditions.[8] Three key features—redemption on demand, at par, and backed by noncash assets—render stablecoins susceptible to runs similar to fragile banks or money market funds.[9]

Because stablecoins are not backed by deposit insurance and stablecoin issuers do not have access to central bank liquidity, the quality and liquidity of their reserve assets is critical to their long-run viability. At the same time, stablecoin issuers traditionally retain profits from investing reserve assets and therefore have a high incentive to maximize the return on their reserve assets by extending the risk spectrum as far out as possible. Stretching the boundaries of permissible reserve assets can increase profits in good times but risks a crack in confidence during inevitable bouts of market stress. The incentive to reach for yield can grow especially in lower-interest-rate environments. Stablecoins will only be stable if they can be reliably and promptly redeemed at par in a range of conditions, including during stress in the market that can put pressure on the value of even otherwise liquid government debt, and during episodes of strain on the individual issuer or its related entities.

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[8] See Yuegi Yang, Muyao Shen, and Jason Leopold (2023), "Biggest Crypto Stablecoin Tether Was Once Backed by Chinese Securities," Bloomberg, June 16; [Scott Chipolina] (2023), "Crypto Group Circle Admits $3.3bn Exposure to Failed Silicon Valley Bank," *Financial Times,* March 11.

[9] See, for example, Gary B. Gorton, Elizabeth C. Klee, Chase P. Ross, Sharon Y. Ross, and Alexandros P. Vardoulakis (2025), "Leverage and Stablecoin Pegs," *Journal of Financial and Quantitative Analysis*.

Permissible Stablecoin Reserves under the New Legal Framework

To address these vulnerabilities in the largely unregulated stablecoin market, Congress passed the bipartisan GENIUS Act. The act's primary tool to mitigate the risk of runs is limiting permissible reserve assets to an itemized list of highly liquid assets.[10] This is a significant improvement in an area where reserve assets for stablecoins have been highly varied. Tight control over reserve assets, coupled with supervision, capital and liquidity requirements, and other measures, could enhance the stability of stablecoins and make them a more viable payment instruments over the long term.

But success in accomplishing these goals will depend on the details of regulatory implementation. The GENIUS Act provides a helpful statutory framework, but it will be up to both the federal banking agencies and the states to coordinate and develop a comprehensive set of rules that can fill in important gaps and ensure that there are robust guardrails to protect users of stablecoins and mitigate broader risks to the financial system. Regulators have a lot of work to do to implement the act, and I will outline several areas that will require close attention.

For example, some of the enumerated reserve assets backing stablecoins are not immune to stress. Permissible reserve assets include uninsured deposits, which were a key risk factor during the March 2023 banking stress.[11] While the GENIUS Act permits regulators to limit the concentration of reserve assets in uninsured deposits, it will matter how these rules are written.[12]

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[10] See 12 U.S.C.§ 5903(a)(1)(A).
[11] See 12 U.S.C. § 5903(a)(1)(A)(ii); Michael S. Barr (2023), "The Importance of Effective Liquidity Risk Management," speech delivered at the ECB Forum on Banking Supervision, Frankfurt, Germany, December 1, https://www.federalreserve.gov/newsevents/speech/barr20231201a.htm.
[12] See 12 U.S.C. § 5903(a)(1)(A)(ii), (a)(4)(A)(iii).

Additionally, in connection with overnight repo, the act permits any medium of exchange authorized or adopted by a foreign government to be held as a reserve asset—a category that could include potentially volatile assets.[13] For example, until quite recently, El Salvador treated Bitcoin as legal tender, and it still specifically permits Bitcoin to be used for transactions on a voluntary basis. As a result, an issuer could argue that Bitcoin repo could qualify as an eligible reserve asset for a stablecoin. In a case of stress experienced by the issuer or counterparty, or if Bitcoin were to drop sharply in value, a stablecoin issuer could be stuck holding the Bitcoin that had declined in value, potentially compromising the one-to-one backing of the stablecoin liabilities. To the extent possible, regulations should be put in place to eliminate or minimize such risks.[14]

In addition to the potential vulnerabilities of some permitted reserves, other aspects of the GENIUS Act might permit risks to develop unless carefully regulated. The act permits four federal agencies and agencies in each state and territory to serve as the primary regulator and supervisor of stablecoin issuers.[15] As a result, there might be a great deal of heterogeneity in the regulatory frameworks that apply to permitted issuers, despite controls in the act intended to provide that the frameworks are substantially similar. The resulting array of charter choice options, unless carefully managed, may provide incentives for regulatory arbitrage.

For example, the act permits federal and state regulators to authorize stablecoin issuers to engage in a broad range of "digital asset service provider" and "incidental"

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[13] See 12 U.S.C. § 5903(a)(1)(A)(iv) (permitting "money" received under repurchase agreements with an overnight maturity to be held as a reserve asset); 12 U.S.C. § 5901(18) (defining money to include "a medium of exchange currently authorized or adopted by a domestic or foreign government").
[14] See, for example, 12 U.S.C. § 5903(a)(4)(A)(iii).
[15] See 12 U.S.C. § 5901(25) (defining "primary Federal payment stablecoin regulator"); 12 U.S.C. § 5901(30) (defining "State payment stablecoin regulator").

activities other than stablecoin issuance, including potentially acting as a crypto-asset exchange or broker-dealer.[16] Issuers are likely to seek to stretch these activities limitations. In fact, issuers may argue that they are permitted under the act to perform the full range of activities conducted by FTX, provided they make the relevant representations and conduct appropriate accounting. Unless state and federal agencies carefully coordinate, this could result in some state or federal regulators permitting a range of activities that might expose stablecoin issuers to increased risk.

The potentially broad set of permissible activities could raise heightened concerns in cases where stablecoin issuers are subsidiaries or affiliates of banks.[17] In such cases, the risks of expanded activities could affect the banking organization and the banking system more broadly. These risks are especially elevated because the GENIUS Act carves stablecoin issuers that are part of banking organizations out of bank and bank holding company consolidated capital requirements—even if they conduct a broad range of activities that pose risks that are greater than and different from those associated with stablecoin issuance.[18] Stablecoin issuers are only subject to the capital requirements implemented under the act, which could end up being too narrow to cover the risks of

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[16] See 12 U.S.C. § 5903(a)(7)(B) (setting out a rule of construction permitting primary regulators to authorize stablecoin issuers to engage in digital asset service provider and "incidental" activities); 12 U.S.C. § 5901(7)(A) (listing "digital asset service provider" activities).

[17] Among other things, an expanded scope of activities could create issues in the insolvency context. While the GENIUS Act amends the Bankruptcy Code to segregate stablecoin reserve assets for the benefit of stablecoin holders, many issuers are likely to be subject to resolution by the federal or state regulators that charter such institutions. Particularly where issuers are engaged in a broad range of activities, it is not clear how stablecoin reserves will be segregated from the issuer's other assets under those insolvency frameworks. See 12 U.S.C. 5910(a)(1) (the only provision of the GENIUS Act's insolvency provisions that applies to insolvency frameworks other than the Bankruptcy Code). Federal and state regulators administering resolution regimes could provide more clarity through rulemaking.

[18] See 12 U.S.C. § 5903(a)(4)(B)(iii).

expanded activities.[19] Thus, appropriate capital requirements are another area where coordination among federal and state regulators is key—and it may be facilitated by the GENIUS Act's framework for assessing that state requirements are "substantially similar" to federal requirements.[20]

Relatedly, the act enables stablecoin issuers—including those that may conduct an expanded range of activities—to be chartered by regulators as uninsured national or state-chartered trust banks.[21] This authorization and related decisions by regulators may result in trust banks that engage in a broader range of non-fiduciary, non-custodial, principal activities. Let us not forget a lesson hard-learned in the Panic of 1907—a lighter-weight regulatory framework for trust-chartered entities conducting bank-like activities can create opportunities for regulatory arbitrage and vulnerabilities for the financial system. Overall, these and other gaps may have implications for the safety and soundness of stablecoin issuers.

Consumer Protection Issues

The act also has gaps relating to consumer protection. For example, it does not apply to all instruments that are commonly referred to as "stablecoins," and certain dollar-denominated, tokenized products can continue to be offered and sold without being subject to the regulatory framework under the act.[22] This risks creating confusion and could result in consumers relying on payment instruments that they believe are regulated,

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[19] See 12 U.S.C. § 5903(a)(4)(A)(i)(II) (providing, among other things, that capital requirements for stablecoin issuers shall "not exceed requirements that are sufficient to ensure the ongoing operations" of the issuer).

[20] See 12 U.S.C. § 5903(c).

[21] See 12 U.S.C. § 5901(11)(B), (31)(A).

[22] The act limits only the issuance, offer, and sale of "payment stablecoins." See 12 U.S.C. § 5901(22) (defining "payment stablecoin"); 12 U.S.C. § 5902(a)–(b) (prohibitions on issuing, offering, or selling "payment stablecoins"). The act does not affect the issuance, offer, or sale of instruments that fall outside the "payment stablecoin."

but for which there are no prudential protections of any kind. To mitigate this risk, federal and state regulators should work together to prevent misrepresentations, including through their authority to prohibit unfair and deceptive acts and practices.[23]

The act also lacks sufficient protections to prevent the mixing of bank-like activities and commerce, which could lead to an increase of economic concentration and create competitive distortions—potentially to the detriment of consumers.[24] And, finally, the act does not provide consumers with the fraud protections applicable to traditional payment instruments—including protection for unauthorized transfers.

Alternative adaptations of payment technologies: Tokenized deposits

I have talked extensively about how the potential benefits of stablecoins can only be achieved if stablecoins can be reliably redeemed at par under a wide range of conditions. Importantly, the technology that supports stablecoins can also be used for other products—for example, tokenized deposits.

The benefits of tokenized deposits include that they are part of a regulatory framework that has been tested over time. Banks face robust regulatory and supervisory regimes proportional to their size and complexity. This supervision and regulation is paired with deposit insurance, providing confidence that deposits held in sizes relevant for most retail purposes will be available on demand at par. The resolution regime is orderly, which provides additional confidence about the stability of the instruments in a wide range of circumstances and reduces contagion. Moreover, banks have ready access

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[23] See, for example, 12 U.S.C. § 5903(e)(3), which makes it "unlawful to market a product in the United States as a payment stablecoin unless the product is issued pursuant to the [act]."

[24] See 12 U.S.C. § 5903(a)(12) (preventing only *majority* ownership of stablecoin issuers by a *public*, nonfinancial company, and providing for possible exceptions to that requirement); 12 U.S.C. § 5903(a)(8) (preventing tying only with respect to paid products and services offered by a payment stablecoin issuer and its subsidiaries, and not with respect to products and services offered by a payment stablecoin issuer's affiliates, including their parent companies).

to the discount window, where they can readily monetize assets on their balance sheets at a pre-specified interest rate under a range of market conditions, including the most dire. I don't want to say this system is perfect—it definitely is not—but it is far more robust than what we have developed so far for stablecoins. Thus, it may make sense for both market participants and regulators to consider how tokenized deposits will fit into this ecosystem.

As I said at the outset, stablecoins have the potential to improve the efficiency of the payment system, particularly in cross-border applications. For stablecoins to reach their potential, additional work is needed to create guardrails that protect households and businesses, and the financial system as a whole. While the GENIUS Act made important progress in creating a framework for stablecoins, a great deal will depend on how federal and state regulators implement it. If the regulatory framework provides strong guardrails and consumer protections, both the innovation represented by stablecoins as payment instruments, and the resulting competition in the payments space, could help foster payments improvements that benefit households and businesses.

Thank you.

OCTOBER 1, 2025

A Historical Perspective on Stablecoins

Stephan Luck

Digital currencies have grown rapidly in recent years. In July 2025, Congress passed the "Guiding and Establishing National Innovation for U.S. Stablecoins Act" (GENIUS) Act, establishing the first comprehensive federal framework governing the issuance of stablecoins. In this post, we place stablecoins in a historical perspective by comparing them to national bank notes, a form of privately issued money that circulated in the United States from 1863 through 1935.

What Are Stablecoins?

Stablecoins are digital currencies designed to maintain a stable nominal value by being pegged to a benchmark such as the U.S. dollar. Stablecoins aim to combine decentralized payment systems' technological advantages—such as digital methods of recording transactions (i.e., digital ledgers/blockchains) and of representing traditional assets (e.g., tokenization)—with the convenience of traditional forms of money.

The GENIUS Act gives fiat-backed stablecoins a clear legal foundation in the United States. Under the Act, permitted payment stablecoin issuers (PPSIs), such as federally regulated banks, approved nonbanks, or qualifying state-chartered entities, are authorized to issue stablecoins. Stablecoins under the Act must be fully backed one-to-one by safe, liquid assets such as U.S. dollars, short-term Treasury securities, uninsured deposits at commercial banks, or cash equivalents. Issuers may not pay interest or yields on stablecoin balances, and holders enjoy priority claims in bankruptcy. To promote transparency, issuers must provide monthly public disclosures of their reserves.

National Bank Notes: A Historical Parallel

Stablecoins may feel novel but, conceptually, they echo an earlier era of U.S. financial history. From 1863 to 1935, "national bank notes" circulated widely as a form of private money that was backed by public debt. Authorized by the National Banking Acts of 1863 and 1864, these notes were issued by national banks, which were commercial banks chartered under federal law.

How did note issuance by national banks work? A bank could apply for a national bank charter by the Office of the Comptroller of the Currency if it fulfilled a set of requirements such as having a minimum amount of capital. Once the bank was granted a national bank

charter, it could use its capital to purchase government bonds. To print notes, the bank then had to deposit with the Treasury U.S. government bonds that were eligible for note issuance. National bank notes were redeemable in lawful money such as specie (coin) or greenbacks (paper money issued by the Treasury directly). Typically, a bank could issue notes valued at up to 90 percent of the par value of the government bonds it deposited. This structure ensured that the notes were overcollateralized, with government bonds available to protect note holders in case the issuing bank defaulted. Indeed, for the more than 2,000 national bank failures that took place from 1863 through 1935, no losses were ever incurred by holders of national bank notes.

The original motive of the National Banking Acts was twofold. First, the issuance of national bank notes was intended to create a uniform currency. Before the National Banking Era (1863-1913), during the so-called Free Banking Era (1837-1863), banks were typically legally required to back any note issuance with bonds of the state governments. Because states tended to default frequently, state bonds were a risky investment. Such risk often led to concerns about the value of the bank notes, and thus the same bank note often had a different market value in different parts of the country at the same point in time, reducing its usefulness as a form of money for transaction purposes. Providing a currency for circulation through the newly formed national banking system was an attempt to create a uniform currency in which bank notes had the same value in all parts of the country.

Second, directly connecting the issuance of national bank notes to federal government bonds was a means to increase demand for the bonds. The federal government saw a large rise in its expenses during the Civil War, and, to finance those expenses, it desired to issue government bonds. Thus, it was expedient to create a currency based on its own debt.

National banks, however, did more than just issue bank notes and invest in government bonds. They essentially operated two lines of business within the same entity. First, they operated a note-issuing business that allowed them to earn interest on government bonds while paying no interest to note holders. National banks therefore captured most of the "seigniorage" (government revenue received through creating money) during the National Banking Era. Second, national banks operated regular commercial banking businesses in which they financed loans and securities through deposits and equity, just like commercial banks do nowadays.

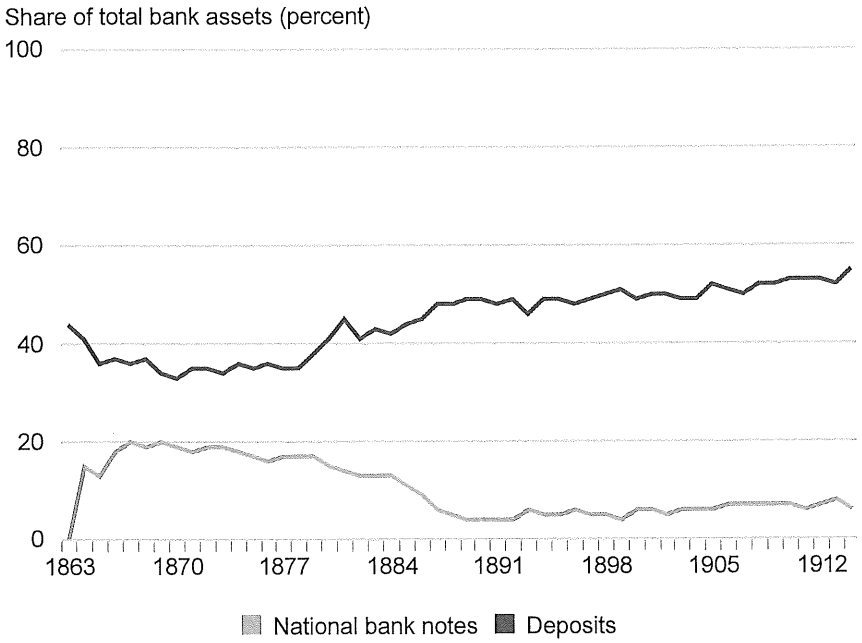
What Can History Teach Us About the Potential Success of Stablecoins?

These historical details show that national bank notes and stablecoins have many commonalities. Similar to national bank notes, stablecoins under the GENIUS Act are privately issued but can be partially or fully backed by government securities. Moreover, they are issued by many private entities that are granted a charter to earn seigniorage from holding government bonds. Like national banks, issuers of stablecoins can also engage in other lines of business. Finally, stablecoins, like national bank notes, promise to be redeemable at par and the one-to-one convertibility with government money is supposed to be maintained even when the issuer fails and defaults on other liabilities that are not stablecoins.

National bank notes were initially successful for two main reasons. First, given that they were traded at the same price as greenbacks and specie, they were a more useful form of money than other circulating notes. Second, bank notes faced little competition from other forms of money, such as bank deposits. Before the rise of deposit insurance, deposits were often risky investments and, historically, not a widely accepted form of payment.

However, as the interbank system in the U.S. developed, the use of deposits for payments became increasingly common. While national bank notes represented around 20 percent of total bank assets by the end of 1880, that share declined thereafter, as shown in the chart below. The decline in bank notes was mirrored by the increase in deposits. This pattern is in line with a decline in the demand for bank notes and the rise of bank deposits as an alternative source of money.

National Bank Notes and Deposits During the National Banking Era



Source: The data are from Correia et al., 2024.
Notes: This chart shows the total of national bank notes and deposits as a share of total national bank assets from 1863 through 1935.

Bank deposits had an advantage over national bank notes in that they were able to earn interest. And while deposits remained risky investments, they became increasingly attractive as payment systems improved. Eventually, most households and firms that desired to hold money for transaction purposes held deposits rather than national bank notes, and they either used checks or wired money from bank to bank to make payments, rather than carrying notes.

This dynamic between national bank notes and bank deposits is a cautionary tale for the potential rise of stablecoins. Currently, most retail deposits pay little interest. Moreover, banks charge considerable fees for large instant payments such as wire fees. However, as stablecoins become more commonly used, the traditional centralized payment system may move to become more attractive in response. To avoid losing valuable deposits, banks may start to offer better terms on deposits or offer both higher interest and better payment services, just as they did during the National Banking Era. Alternatively, bank deposits may become "tokenized" themselves.

Thus, at least for domestic payments, the footprint of stablecoins may be limited given that many potential retail depositors may stick with bank deposits. For international payments, because the scope for improvements in the efficiency of the international payment system is itself more limited, demand for stablecoins may be highest from international investors that either require seamless cross-border payments, otherwise have no access to reliable forms of money, or prefer decentralized payment systems for other reasons.

Wrapping Up

Stablecoins under the GENIUS Act share important features with national bank notes: both are forms of private money backed by federal government debt. The historical experience of national bank notes illustrates that stablecoins may have a large potential to increase the demand for U.S. government debt. However, at the same time, the demise of national bank notes and the rise of bank deposits also suggest that other forms of money may become more attractive as a consequence of the new competition. While this would arguably be a desirable effect of the GENIUS Act, it may also induce a natural upper limit for the growth of the market for stablecoins themselves.

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