Inflation, Inflation Expectations, and Monetary Policymaking Strategy

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Introduction

I thank Eric Rosengren and MIT's Golub Center for inviting me to speak today. I have known Eric pretty much over my entire career as an economist. I feel very lucky that I had the opportunity to learn from him during our years at the Federal Reserve, not only about economics, financial stability, and monetary policy, but about how to lead a Reserve Bank. Today, it is probably not surprising that I plan to speak about inflation and the appropriate strategy for monetary policy when there is uncertainty about the path of both inflation and inflation expectations. Of course, the views I present will be my own and not necessarily those of the Federal Reserve System or of my colleagues on the Federal Open Market Committee (FOMC).

Inflation

The key challenge facing our economy is unacceptably high inflation. Inflation has been running well above 2 percent for well over a year now; it is very high not only in the U.S. but in other advanced economies around the globe. This high inflation stems from many factors, but fundamentally, it reflects an imbalance between strong demand and constrained supply, which has led to significant upward pressures on prices. Inflation is a top concern of businesses and households: this is evident in surveys and in my conversations with regional contacts. High inflation is imposing a particularly onerous burden on those who do not have the wherewithal to pay more for essentials like food, gasoline, and shelter, and who are now having to make hard choices about how to spend their money.

Price stability is the foundation of a strong economy; it is necessary for ensuring that the U.S. can sustain healthy labor market conditions over the medium and longer run and that the economy can be productive and live up to its potential for everyone's benefit. Stable prices mean businesses and households don't have to spend time trying to protect the purchasing power of their money; they can make long-term plans and commitments without having to deal with the uncertainty about the value of their money. Price stability and monetary policy are intimately linked, but because of the uncertainties surrounding inflation dynamics, setting monetary policy to achieve price stability is not trivial. It requires being able to

measure inflation so that we understand where inflation is relative to our goal. It requires being able to forecast inflation because monetary policy affects the economy with a lag that varies over time and with economic circumstances. It requires understanding the determinants of the monetary policy transmission mechanism. It also requires having the ability to make decisions under uncertainty.

The Federal Reserve has not always been successful at achieving price stability, and there have been misses on both sides. During the Great Depression in the 1930s, the U.S. experienced deflation. In the aftermath of the oil price shocks in the 1970s, inflation surged and remained high until then-Fed Chairman Paul Volcker began to tighten monetary policy to bring inflation down, at the cost of a deep recession in the early 1980s. The Fed has learned from these historical episodes. One lesson is the importance of a central bank remaining focused on its price stability goal.

The FOMC is committed to using its tools to bring inflation back down to our longer-run goal of 2 percent. Last week we took another decisive action to remove monetary policy accommodation by raising the target range of the federal funds rate by 75 basis points, and we are continuing the process of reducing assets on the Fed's balance sheet, which also reduces accommodation. Reductions in monetary policy accommodation and tighter financial conditions will bring demand into better balance with constrained supply in both product and labor markets, resulting in an economic transition to growth in real output that is well below trend, slower employment growth, and a higher unemployment rate.

[Figure 1: U.S. CPI and PCE inflation and global inflation]

Inflation continues to run at rates last seen in the early 1980s in the U.S. This is true whether one looks at CPI or PCE inflation. The strong increase in inflation that started in the spring of last year is very different from what the U.S. experienced during the long pre-pandemic expansion. Until late in that expansion, the concern was that inflation was running below our 2 percent longer-run goal, and this was true in other advanced economies as well. Several common factors contributed to low inflation in this period. First, in the aftermath of the financial crisis, global demand was weak. Prices of energy and other

commodities were declining, and in the U.S., a rise in the value of the dollar put downward pressure on the prices of imports into the U.S. Indeed, over the 2009-2011 period, one puzzle for policymakers was actually not why inflation was low, but rather, why it wasn't lower.[1] A major reason was that longer-term inflation expectations were relatively stable at levels consistent with 2 percent inflation, a topic that I'll return to later.

But low and stable inflation preceded the Great Recession. Since the mid-1980s, inflation had been relatively stable in spite of several wars, dramatic ups and downs in oil prices, and mild and severe recessions. The fact that inflation had become less correlated with changes in resource utilization in the labor market and in product markets – that is, there had been a flattening of the Phillips curve – suggested a change in inflation dynamics.[2] This hypothesis may still hold, but it is an open question as to whether inflation dynamics have once again changed or whether the factors that held down inflation prior to the pandemic will exert their force again over time.

[Figure 2: PCE energy, PCE food, PCE core inflation and share of components with high inflation rates]

The overriding message from a variety of measures is that inflation is not only high but it is broad-based. When inflation began to rise in April 2021, it was concentrated in a limited number of categories that were directly related to the effects of the pandemic. But by later last year, those price pressures had broadened across categories.

Energy prices have been a major contributor to the rise in inflation. Over the last year, the PCE energy price index has increased over 30 percent. Recent readings have eased, but developments related to the ongoing war in Ukraine suggest that gas and energy prices could move higher again later this year or early next year. Food prices have also risen significantly and inflation in this component is at its highest

[1] See Constâncio (2015).

[2] See Del Negro et al. (2020).

level since the late 1970s. But even excluding these components, core PCE inflation is at its highest level since the 1980s.

[Figure 3: Real goods and services spending relative to trend]

The nature of the pandemic shock and the response to it affected aggregate demand and aggregate supply. The mandated shutdowns and the voluntary pullback in demand for high-contact services led to a shift in spending early in the pandemic from services to goods. When the economy reopened, demand surged. This strong demand was supported by fiscal transfers and accommodative monetary policy. Spending is beginning to shift from goods to services, but neither is back to its pre-pandemic trend.

The strong demand was met by constrained supply, which was affected by supply chain bottlenecks and the withdrawal of workers from the labor force. Many thought the supply constraints would work themselves out fairly quickly. But rolling pandemic lockdowns across the globe in response to new waves of the virus and the sluggish return of workers to the work force made it difficult for supply to keep up with demand. Our business contacts tell us that supply chain disruptions remain a challenge, although they have learned how to better navigate them over time; they tell us that they have seen less improvement in the imbalance between the demand and supply of labor.

[Figure 4: Core PCE goods, services, and housing inflation]

The continued imbalance between demand and supply has led to intense inflationary pressures. Inflation in both goods and services is high, with goods inflation still exceeding services inflation. This is very different from the pre-pandemic expansion, when core goods inflation was slightly negative on average and falling goods prices were pulling inflation down.

Consumers spend a larger share of their income on services than on goods, so services have a higher weight in the inflation indices. Services inflation also tends to be more persistent than goods inflation. Housing, as measured by rents or imputed rents for owner-occupied housing, is a large and cyclically

sensitive component of services inflation; shelter is about a third of the CPI price index. Early in the pandemic, high unemployment and moratoria on foreclosures and evictions initially put downward pressure on housing inflation. Subsequently, there has been strong demand for housing and a rapid rise in house prices and rents. Activity in the housing sector has been slowing rapidly in response to higher mortgage rates, but there is a long-run imbalance between demand and supply of housing. So despite the moderation in activity, housing prices and rents remain quite high. It typically takes some time for higher rents to flow through to the inflation measures, so growth in housing rent and shelter costs will likely keep inflation elevated for some time.

[Figure 5: Core, median, and trimmed-mean inflation measures]

The July reading of PCE and core PCE inflation showed a bit of moderation, which was welcome news. But the August CPI report underscored that inflation pressures remain intense. Indicators of the underlying inflation trend, including the trimmed-mean and median CPI and PCE measures, which exclude components with the most extreme movements each month, show that inflation pressures remain very elevated and broad-based even though there has been some moderation in economic activity. Measured year-over-year, the median and trimmed-mean inflation rates were either stable or actually increased in July; in August, the median and trimmed-mean CPI rose.[3]

Wage pressures are also contributing to high inflation. They are growing much faster than the pace consistent with price stability and there is little sign that wage pressures are abating.

[Figure 6. SEP PCE inflation projections]

The evolution of projections made by FOMC participants shows that inflation has moved up much more and remained high for longer than anticipated. Both the demand and the supply sides of the economy will

[3] The Federal Reserve Bank of Cleveland produces the median and trimmed-mean CPI inflation rate and the median PCE inflation rate. The Federal Reserve Bank of Dallas produces the trimmed-mean PCE inflation rate. The Federal Reserve Bank of Cleveland's Center for Inflation Research produces inflation measures and analyses of inflation and inflation expectations to inform policymakers, researchers, and the general public.

continue to be affected by a variety of forces, including the war in Ukraine and the energy situation in Europe, the global economic outlook, property market stresses and continued lockdowns in China, the sentiment of consumers and businesses and their reaction to elevated inflation readings, changes in supply chain disruptions, and labor force participation. Since high inflation reflects the imbalance between supply and demand, there will continue to be considerable uncertainty around the inflation forecast.

Inflation Expectations

One of the big lessons from the 1970s is that it is much more difficult and costly to bring inflation down once it has become embedded in the economy, that is, once businesses and households expect inflation to remain elevated and that expectation influences their savings and investment decisions and price-setting and wage-setting behavior. High inflation imposes costs on households and businesses in both the short and the long run. It eats into savings and makes it hard to plan for the future. By making it more difficult to evaluate investment opportunities, high inflation can affect productivity growth, with long-term consequences for the standard of living. The Fed's monetary policy framework recognizes the importance of keeping inflation expectations well-anchored at levels consistent with 2 percent inflation.[4] And by "well-anchored" I mean longer-term inflation expectations that are insensitive to data.

Inflation expectations have been a central factor in models of inflationary dynamics since the 1960s and 1970s.[5] In many inflation models used by central banks, inflation is driven by three key factors: some measure of a resource utilization gap (for example, the output gap or unemployment rate gap), or marginal cost of production; lagged inflation, which captures the inertia in the inflation process; and expectations of inflation. Different models put different weights on these fundamental factors, but

[4] The FOMC's statement on longer-run goals and monetary policy strategy, revised in 2020 and reaffirmed since then, says that the Committee judges that longer-term inflation expectations that are well anchored at 2 percent contribute to achieving its monetary policy goals. See Federal Open Market Committee (2022a).

[5] See Phelps (1967), Friedman (1968), and Lucas (1972). Empirical work on the determinants of inflation finds that the output gap matters when it is large and that, in recent years, forward-looking measures of inflation expectations play a larger role in explaining inflation dynamics than do backward-looking measures.

household and business expectations matter, since they affect wage demands and offers, and therefore firms' price-setting behavior.[6] In addition to their role in inflation dynamics and helping to forecast inflation, inflation expectations also provide an indication of how credible the public finds the central bank's commitment to achieving its policy goals.

Theory indicates that well-anchored longer-term inflation expectations can help to mitigate the pull of resource gaps on inflation, and therefore, the cyclical movements in interest rates that policymakers induce to maintain price stability need not be as large as when inflation expectations are not well anchored. This is particularly useful when the zero lower bound constrains interest rates. Arguably, the U.S. might have suffered much lower inflation during the Great Recession had inflation expectations not been relatively stable, offsetting some of the influence the negative output gap had on inflation. Similarly, in the face of today's very high inflation readings, keeping inflation expectations well anchored should help to bring inflation back to goal without as large a change in the output gap. Of course, we have to acknowledge that while the theory is compelling, the real world does not always cooperate. For example, in Japan, inflation expectations have run well above actual inflation for a number of years.[7]

[Figure 7: Measures of short-term and medium- and longer-term inflation expectations]

One difficulty in moving from theory to practice is that inflation expectations are not directly observable. So we look at a number of measures, which differ by type of agent and time horizon. These include measures based on surveys of consumers, businesses, and professional forecasters; measures derived from financial markets; and composite indices that combine various measures.[8] A clear signal is not always forthcoming because the inflation expectations of different groups of agents can behave differently from

[6] For further discussion, see Fuhrer and Olivei (2009) and Clark and Davig (2009).

[7] See Trehan and Lynch (2013) and Hattori and Yetman (2017).

[8] The index of common inflation expectations is a research data series maintained by the Board of Governors' staff. See Ahn and Fulton (2021).

one another, even within groups there can be variation, and the literature has not firmly established whose expectations are most important for inflation dynamics.[9, 10]

Shorter-term expectations tend to move with gasoline prices and the prices of other salient items like food. Longer-term expectations and their level relative to short-term expectations give a better sense of whether expectations are becoming unanchored from the target, an indication of increased risk of inflation becoming embedded in the economy, and, relatedly, the level of the central bank's credibility in the eyes of the public. For example, longer-term expectations remaining stable in the face of a positive shock to inflation would indicate that the public believes that inflation will come down, although it need not indicate that the public believes monetary policy will be the main driver of the reduction.

The rise in inflation expectations since last year has been concentrated in short-term expectations, which rose with the rise in gasoline and food prices. More recently, these short-term expectations have moved down with gasoline prices. Still, they indicate that consumers expect high inflation to prevail over the next year.

Medium- and longer-term inflation expectations have moved up less than short-run expectations, and they are below current inflation readings, an indication that the public believes that inflation will move back down. The recent decline in the New York Fed's medium-term expectations measure and the University of Michigan's longer-term expectations measure was welcome news. But despite the moderation, these

[9] See Candia, Coibion, and Gorodnichenko (2021).

[10] As discussed in De Pooter, et al. (2016), survey measures of the inflation expectations of professional forecasters and financial industry participants were fairly stable over the course of the Great Recession and recovery, while those of households and businesses drifted down.

In addition, the Cleveland Fed's indirect consumer inflation expectations measure indicates that women, older respondents, and more educated respondents have tended to expect higher inflation over the next year than do their counterparts. The Cleveland Fed's indirect consumer inflation expectations measure, which started in 2021, is based on a nationwide survey with more than 10,000 responses and is updated on a weekly basis. Instead of asking consumers directly about overall inflation, the survey asks consumers how they expect the prices of the things they buy to change over the next 12 months and how much their incomes would have to change for them to be able to afford the same consumption basket and be equally well-off. See Hajdini, et al. (2022).

measures are higher than they were before the pandemic. Longer-term expectations should be less affected by changes in gasoline prices than near-term expectations and more reflective of consumers' perceptions of the Fed's commitment and ability to return the economy to price stability. The recent improvement in measures of medium- and longer-term inflation expectations occurred as Fed communications emphasized that we were taking decisive action against high inflation. So the decline in the expectations measures could indicate firmer anchoring. But the improvement also coincided with the decline in gasoline prices. So it is not clear yet that the measures won't move up again if gas prices rise, food prices remain high, or inflation developments take a turn for the worse as the year progresses.

[Figure 8: Dispersion among SPF and University of Michigan inflation expectations]

Dispersion in expectations across survey respondents also indicates how well inflation expectations are anchored, with lower dispersion indicating better anchoring.[11] The recent data are mixed. During the current period of high inflation, the dispersion in longer-tern inflation expectations across the respondents to the Survey of Professional Forecasts has risen only modestly. Those forecasters with relatively high and those with relatively low projections of inflation over the next 10 years expect PCE inflation to average more than 2 percent, but this is mainly concentrated in the next five years. The 5-year/5-year forward projection is still basically 2 percent.

In contrast, dispersion in the longer-run inflation expectations across respondents to the University of Michigan's survey has increased sharply since the start of the pandemic. Earlier it was driven by an increase in expectations at the top part of the distribution; most recently there has been a sharp drop off in expectations at the bottom part of the distribution, perhaps a reflection of respondents' outlook for the

[11] Reis (2021) discusses the relationship between dispersion in inflation expectations and signs of unanchoring. Naggert, Rich, and Tracy (2021) find that the lower end of the distribution of 5-year/5-year-forward PCE inflation expectations from the U.S. Survey of Professional Forecasters shifted up toward 2 percent and the dispersion of inflation expectations across respondents narrowed after the FOMC announced its revised monetary policy framework in August 2020.

economy. Such a large and rising level of dispersion suggests that inflation expectations among consumers may not be as well anchored as we would hope.

Monetary Policymaking Strategy

Since March, the FOMC has raised the target range of the fed funds rate a cumulative 3 percentage points, and in June, the FOMC began to reduce the size of the Fed's balance sheet according to the plan announced in May.[12] While this has been a relatively fast pace of tightening, given the current level of inflation and the outlook, I believe that further increases in our policy rate will be needed. In order to put inflation on a sustained downward trajectory to 2 percent, monetary policy will need to be in a restrictive stance, with real interest rates moving into positive territory and remaining there for some time.

[Figure 9. September 2022 SEP median fed funds rate path]

The FOMC released a new Summary of Economic Projections last week. The median path among FOMC participants moved up again in response to the implications of incoming data for the outlook. In particular, high inflation is proving to be more persistent, and more restrictive policy will be needed and for longer to ensure that inflation expectations do not move up and that inflation moves back down.[13]

We are operating in an uncertain environment, and assessing the balance between supply and demand will remain challenging as we go. In terms of the appropriate policy responses in an environment with a lot of uncertainty, some results in the literature suggest that when policymakers confront more uncertainty either in their data or in their models, they should be more cautious in acting, that is, be more inertial in their responses.[14] However, subsequent research has shown that this is not generally true. For example,

[12] Starting in September, the Fed will allow up to $60 billion per month of Treasury securities and up to $35 billion per month of agency securities to run off the balance sheet. To the extent that maturing Treasury coupon securities are less than the monthly cap, Treasury bills will make up the rest of the runoff up to the cap. See the Federal Open Market Committee (2022b).

[13] See Federal Open Market Committee (2022c).

[14] See Mester (2016). Aoki (2003) studied the optimal policy response when data are measured with error and concluded that the degree of response to a variable in the policy rule should be less the higher the variable's

Sargent (1999) points out that caution does not necessarily mean doing less. When there is uncertainty, it can be better for policymakers to act more aggressively because aggressive and pre-emptive action can prevent the worst-case outcomes from actually coming about.[15] Walsh (2003, 2022) points out that better economic outcomes are achieved by assuming that high inflation will be persistent and acting accordingly.

Following this robust-control view, in current circumstances I am going to be very cautious and not assume that one or two improved readings on inflation mean inflation is on a downward path or that inflation expectations are firmly anchored at our goal when expectations measures are elevated. Wishful thinking cannot be a substitute for compelling evidence. So before I conclude that inflation has peaked, I will need to see several months of declines in the month-over-month readings. I will also guard against being complacent that longer-term expectations are well anchored. The longer inflation remains elevated, the higher the risk that inflation expectations become unanchored and firms and households begin making decisions based on persistent high inflation. Were that unanchoring to occur, returning the economy to price stability would be more difficult and much more costly in terms of lost output and higher unemployment.

Research indicates that erroneously assuming that longer-term inflation expectations are well anchored at the level consistent with price stability when, in fact, they are not is a more costly error for the economy than assuming they are not well-anchored when they actually are.[16] If inflation expectations are drifting up and policymakers treat them as stable, policy will be set too loose. Inflation would then move up and this would be reinforced by increasing inflation expectations. And that will be harder to rein in. If, on the

measurement error. Brainard (1967) studied optimal policy in response to a shock when there is uncertainty about the effect of policy on the economy and concluded that policy should respond less when there is uncertainty than when there is no uncertainty. It has been shown that this result is not general across models.

[15] Giannoni (2002 and 2007) shows policymakers averse to uncertainty will react more strongly to fluctuations in inflation and the output gap than if there were no uncertainty. They would put more weight on stabilizing inflation and the output gap and less weight on stabilizing the nominal interest rate.

[16] See De Pooter, et al. (2016) and Walsh (2022).

other hand, inflation expectations are actually stable and policymakers view the drift up with concern, policy will initially be set tighter than it should. Inflation would move down, perhaps even below target, but not for long, since inflation expectations are anchored at the goal.

In summary, price stability is the foundation for sustaining maximum employment and a healthy, productive economy over time. So the FOMC will be resolute in putting inflation on a sustainable downward path to 2 percent. There will be some pain and bumps along the way as the growth in output and employment slow and the unemployment rate moves up. But the current persistent high inflation is also very painful for many households and businesses. I do not view the current situation as one in which there is a tradeoff between our two monetary policy goals. If we were to fail to take decisive action to get inflation down and firmly anchor inflation expectations, the costs would be high: we would not be able to sustain healthy labor markets over time, to the detriment of the public.

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Figures for "Inflation, Inflation Expectations, and Monetary Policymaking Strategy"

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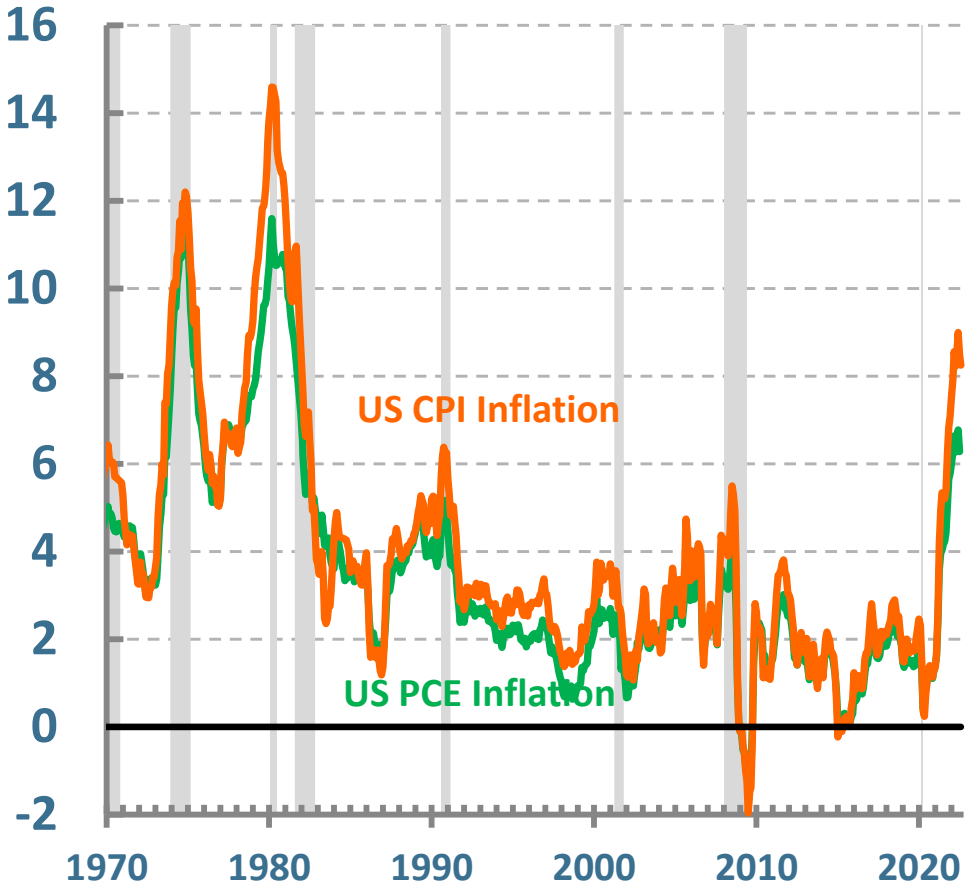
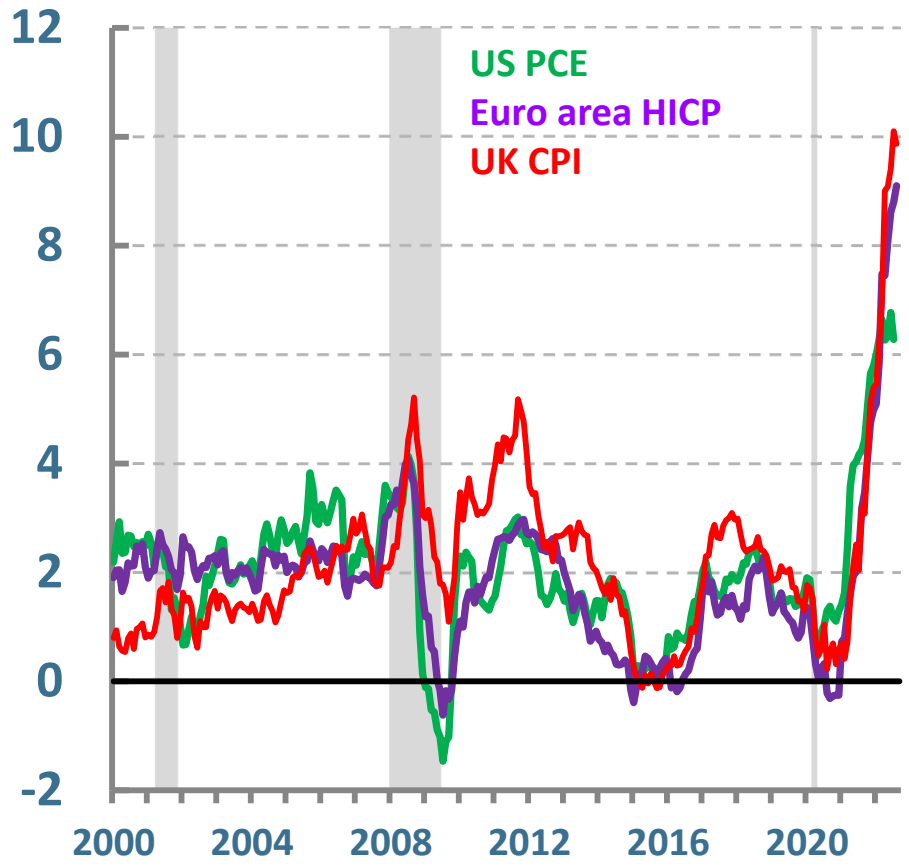
Figure 1. Inflation is unacceptably high in the U.S. and abroad

Year-over-year percentage change

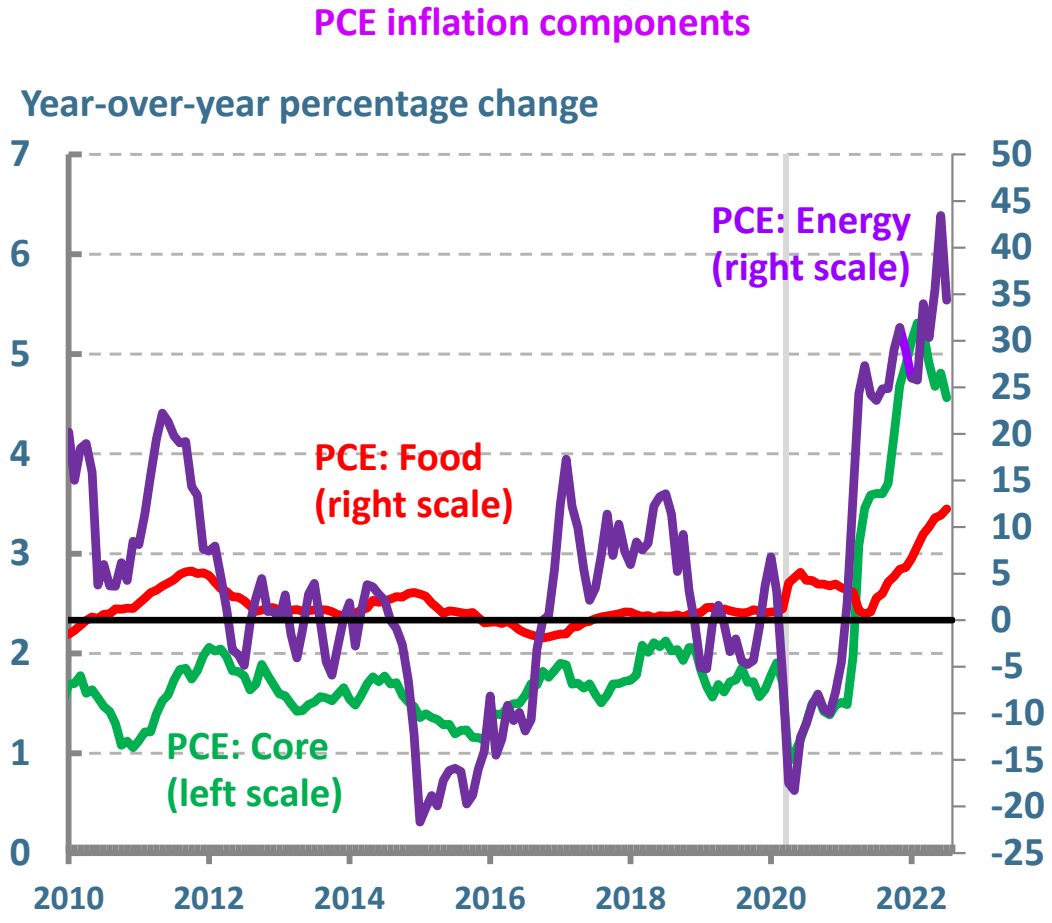


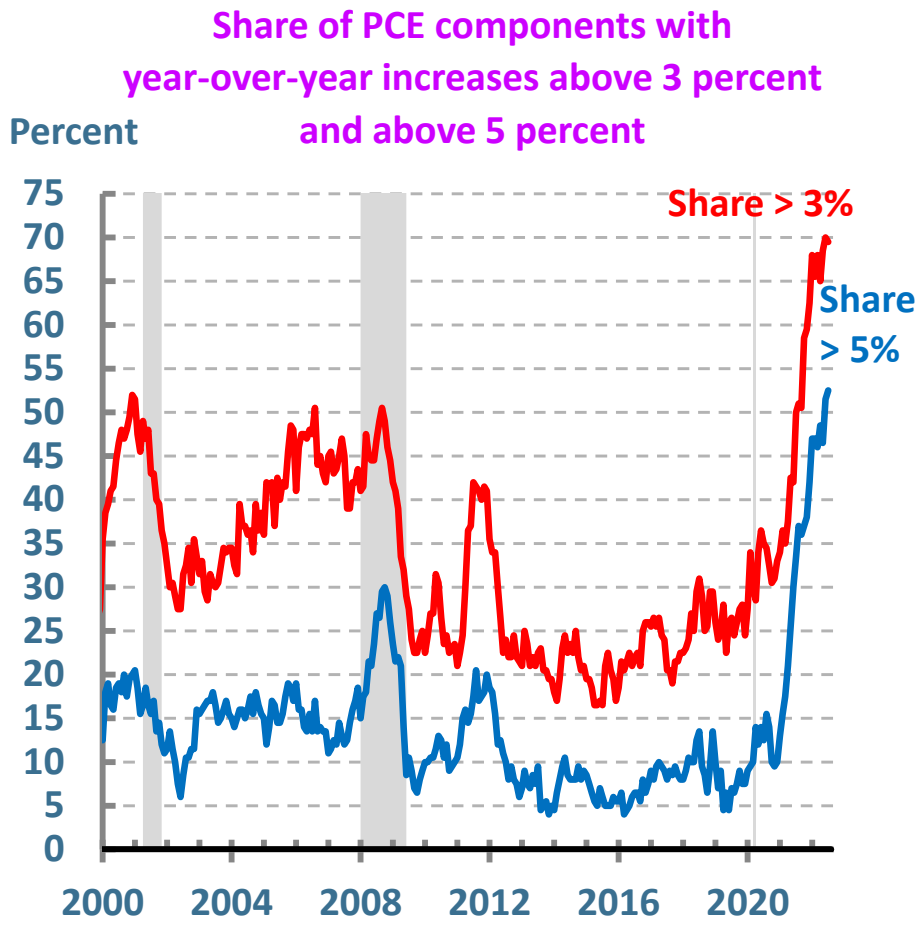
Year-over-year percentage change



Source: For US: Bureau of Labor Statistics and Bureau of Economic Analysis;
For UK: Office of National Statistics; For Euro area: ECB; all via Haver Analytics
Monthly data: Last obs. July 2022 for US PCE, and August 2022 for the others

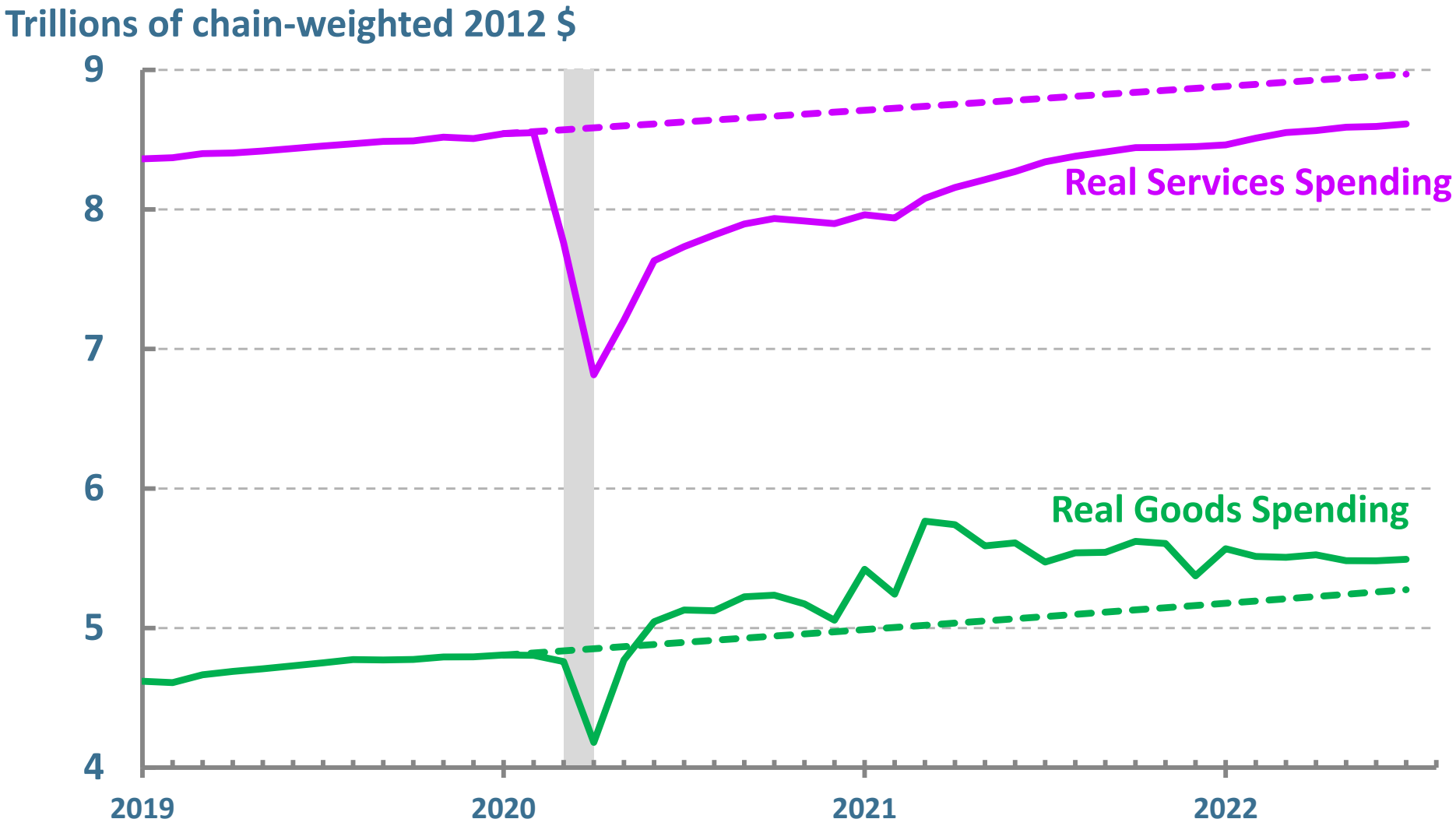
Figure 2. High inflation has broadened beyond food and energy





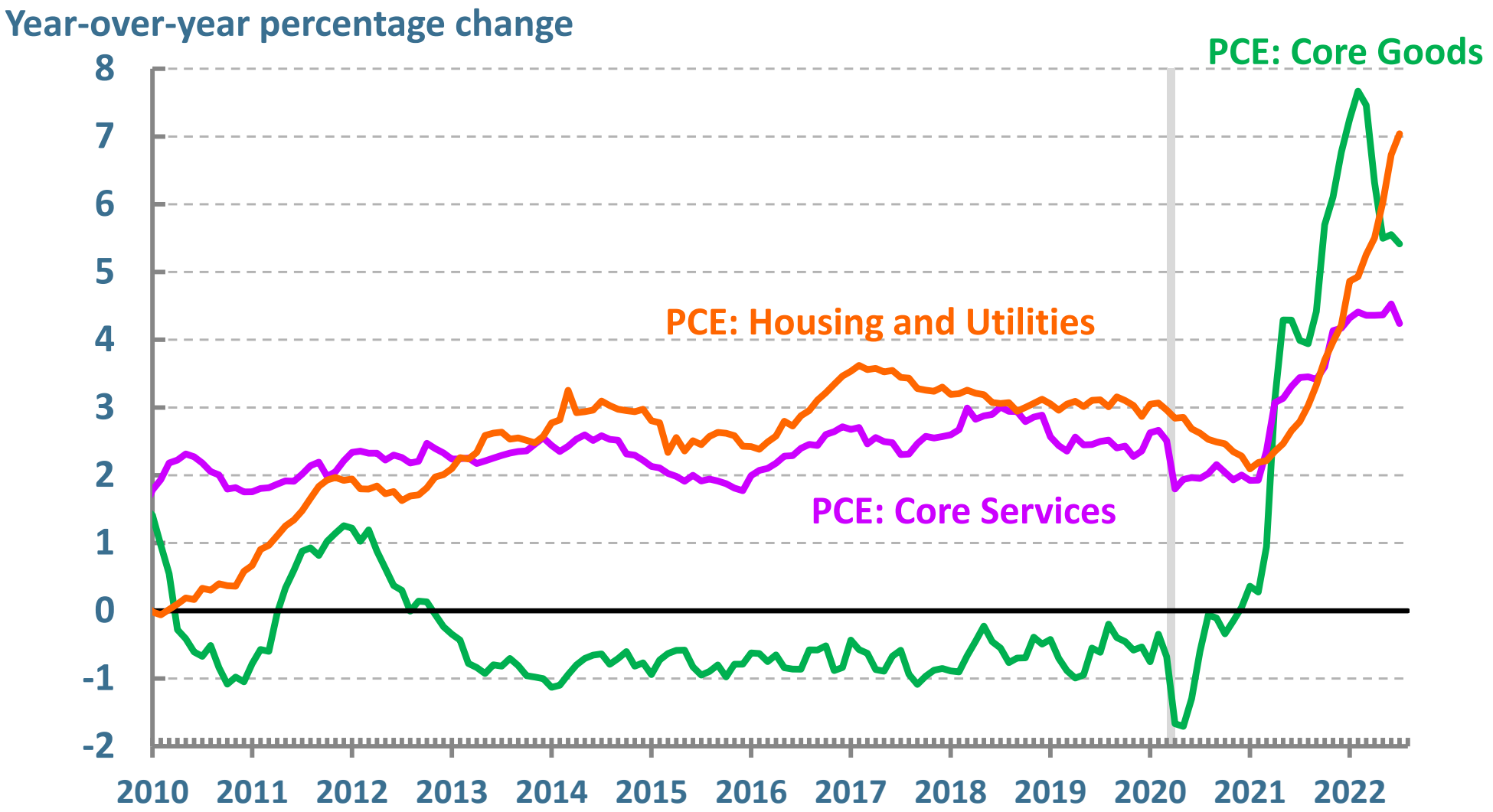
Source: Bureau of Economic Analysis via Haver Analytics
Monthly data: Last obs. July 2022

Figure 3. Real goods spending is still above trend and real services spending is still below trend



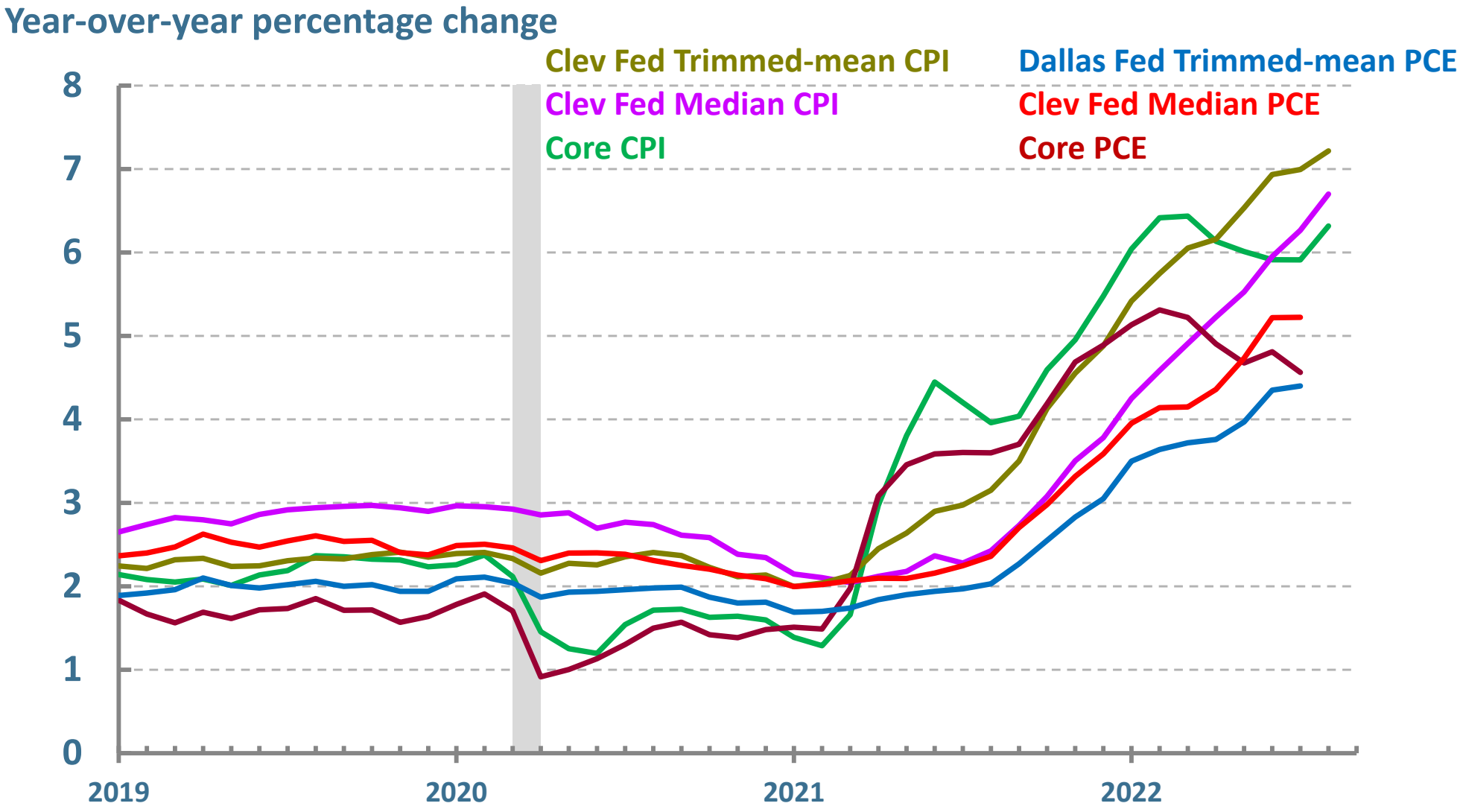
Source: Bureau of Economic Analysis via Haver Analytics
Monthly data: Last obs. July 2022

Figure 4. Growth in shelter costs is likely to keep inflation high for some time



Source: Bureau of Economic Analysis via Haver Analytics
Monthly data: Last obs. July 2022

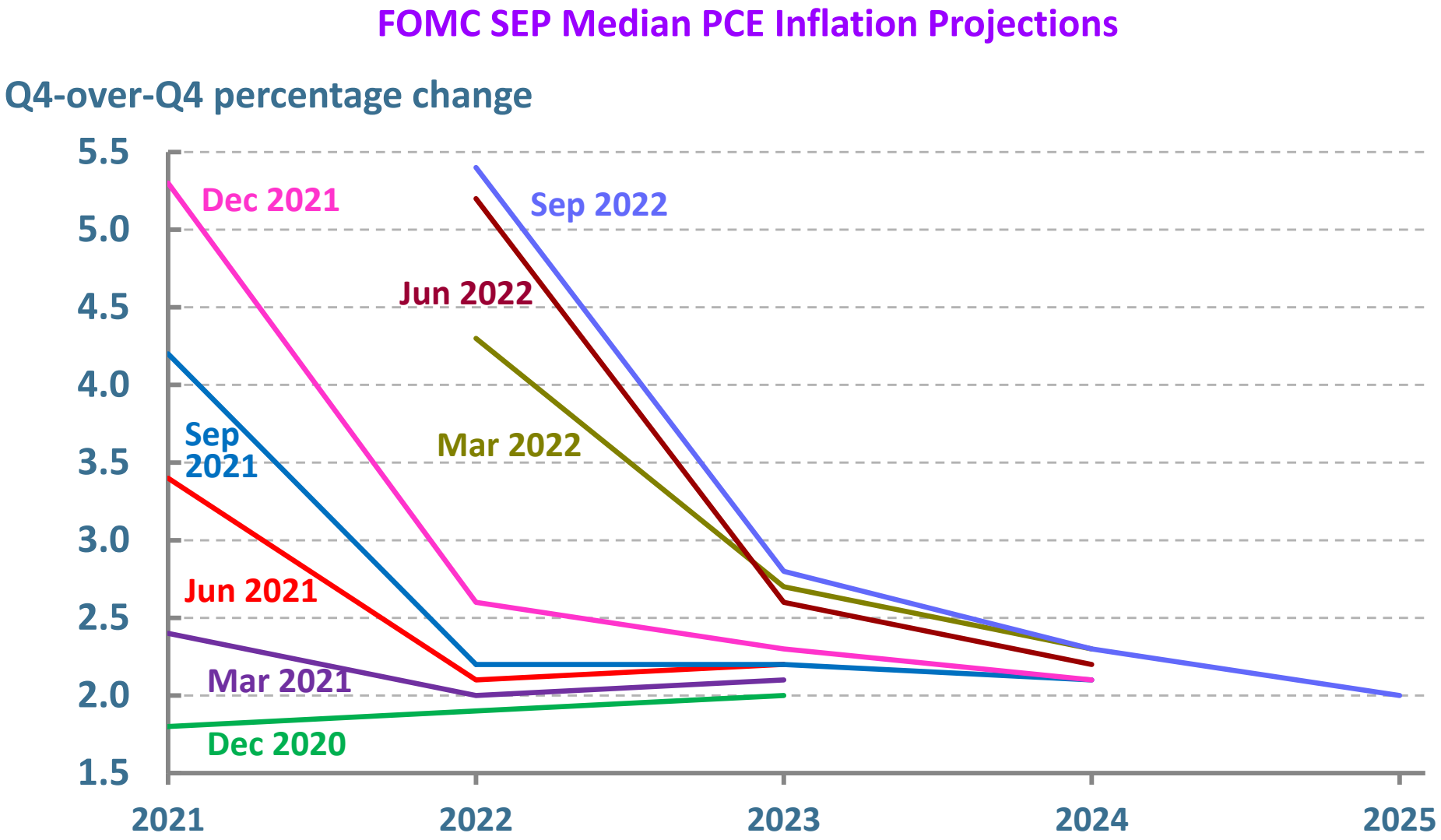
Figure 5. Measures of underlying inflation are high and most have continued to rise



Source: Bureau of Economic Analysis, Bureau of Labor Statistics, Federal Reserve Bank of Cleveland, and Federal Reserve Bank of Dallas, via Haver Analytics

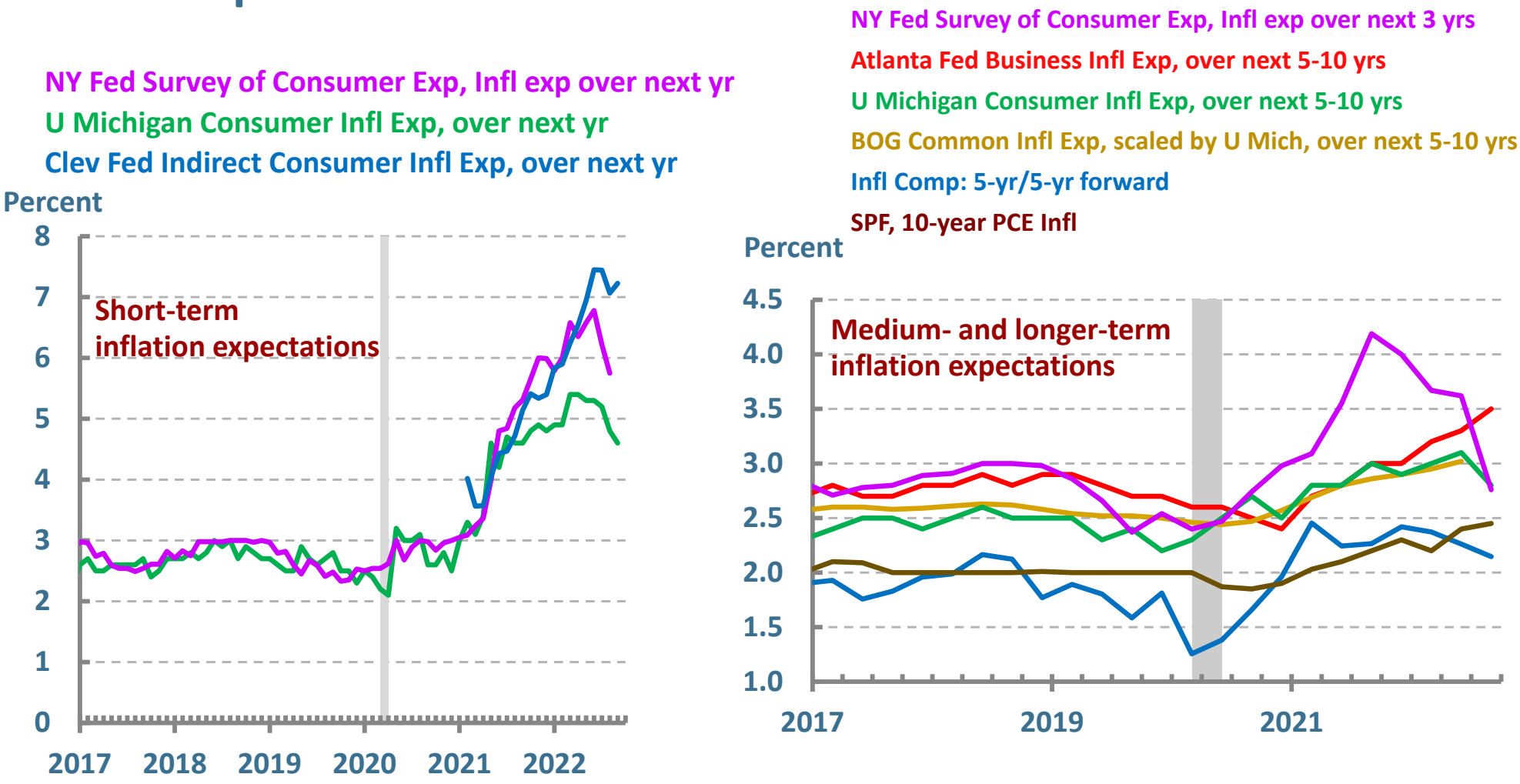
Monthly data: Last obs. August 2022 (CPI measures) and July 2022 (PCE measures)

Figure 6. Inflation has moved up much faster than anticipated



Source: FOMC Summary of Economic Projections (SEP)

Figure 7. Short-term inflation expectations have declined with gasoline prices; medium- and longer-term inflation expectations remain elevated

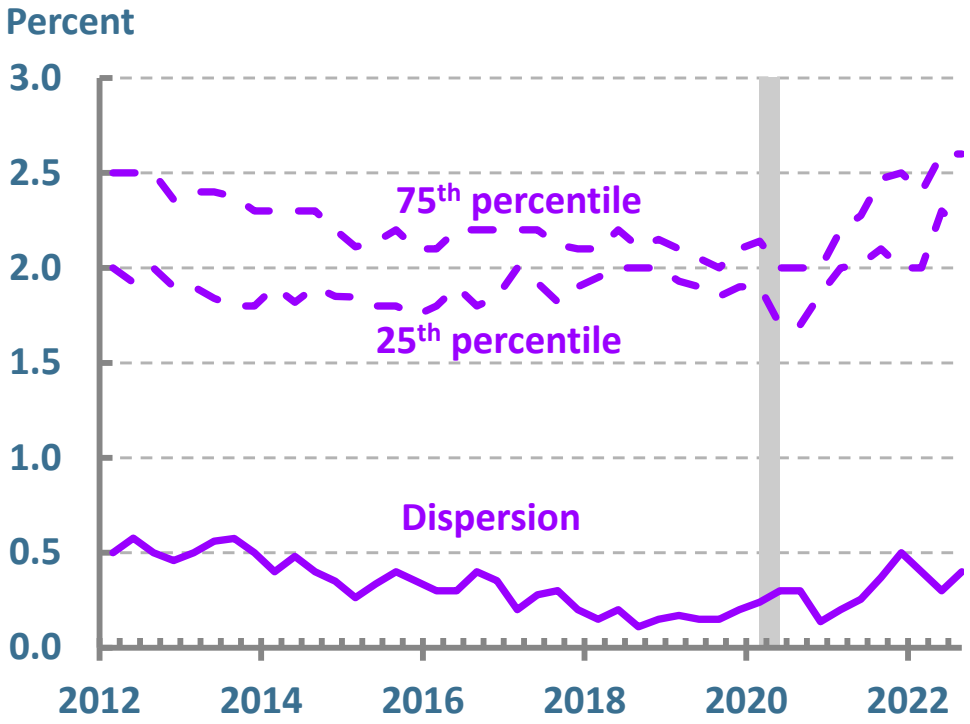


Source: Federal Reserve Board, Federal Reserve Bank of Atlanta, Federal Reserve Bank of Philadelphia, Federal Reserve Bank of New York, University of Michigan via Haver Analytics

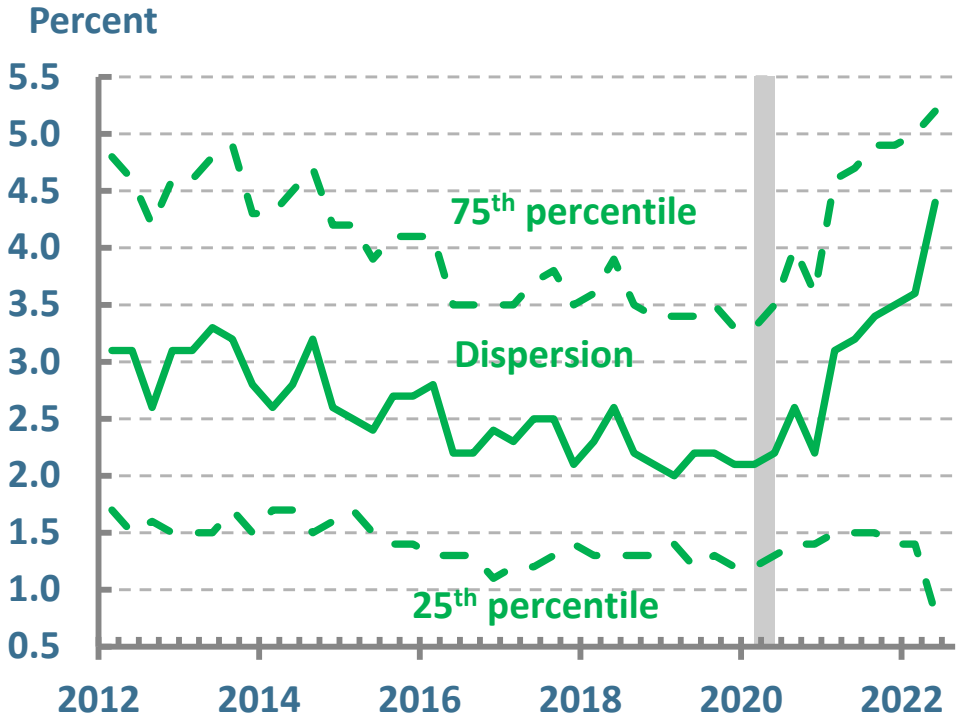
Quarterly data (last month of qtr for NY Fed, U Mich, and Infl Comp; weekly avg for Clev Fed):
Last obs. 2022Q3 for NY Fed, Atlanta Fed, U Mich, SPF;
daily avg Sep 2022 for Infl Comp and Clev Fed; 2022Q2 for BOG

Figure 8. Dispersion in longer-term inflation expectations has changed little among SPF respondents but has risen significantly among Univ Michigan respondents

Survey of Professional Forecasters: quarterly forecasts of annual average PCE inflation over the next 10 years

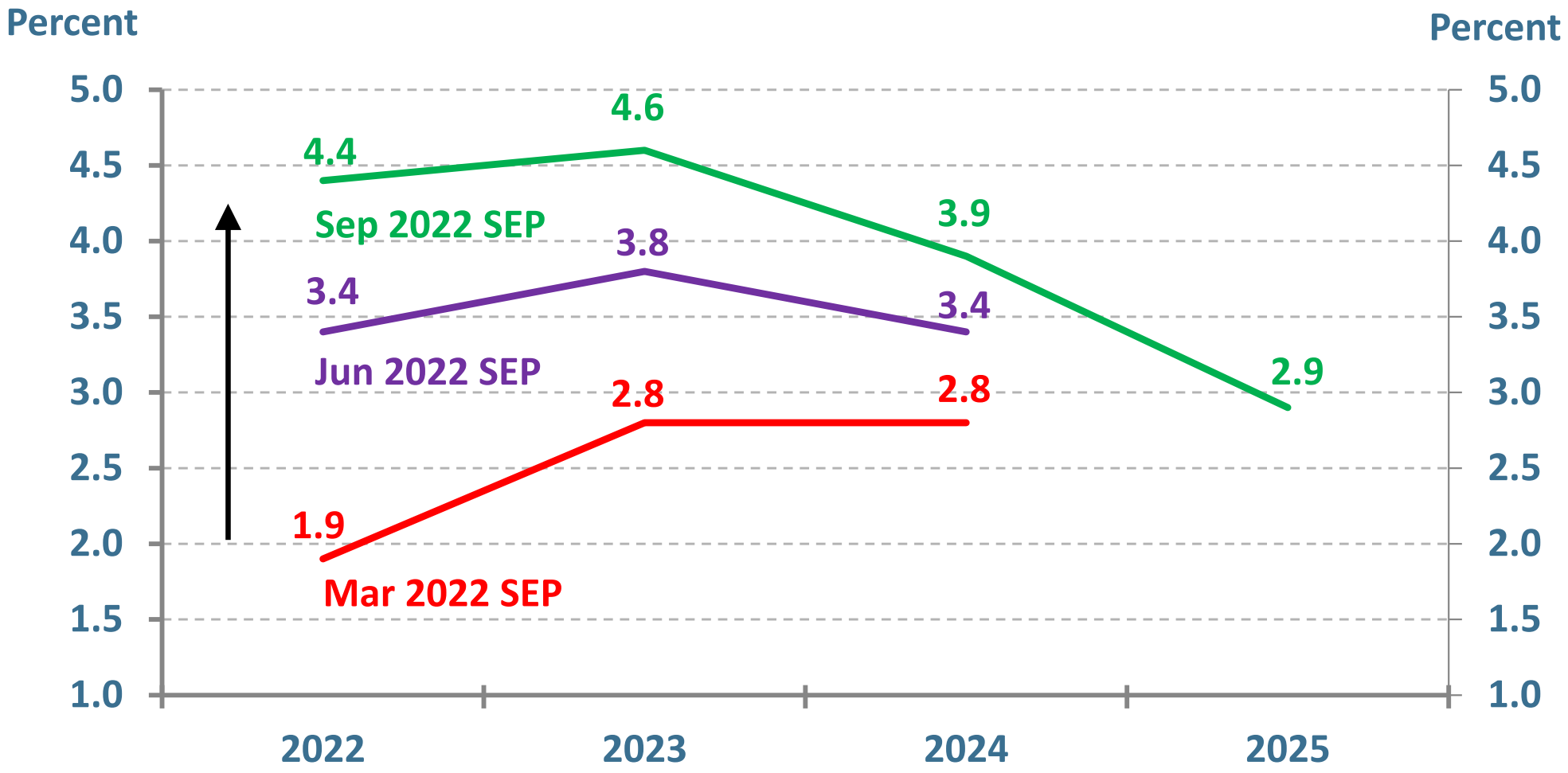


University of Michigan Surveys of Consumers: expected inflation over next 5 to 10 years



Source: Federal Reserve Bank of Philadelphia and University of Michigan
Quarterly data for SPF and last month of each quarter for U Mich: Last obs. 2022Q3 for SPF and June 2022 for U Mich

Figure 9. The median fed funds rate path in the FOMC's Summary of Economic Projections has moved higher



Source: FOMC Summary of Economic Projections (SEP)

Figures for "Inflation, Inflation Expectations, and Monetary Policymaking Strategy"

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Federal Reserve Bank of Cleveland

Distinguished Speaker Series
Massachusetts Institute of Technology Golub Center for Finance and Policy
Cambridge, MA

September 26, 2022

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