

Getting inside the Fed's head

Three key policy drivers and three scenarios for the Fed

The global economy remains at a critical juncture. In the U.S. and Europe, inflation is at a multidecade high. Since the start of the year, the Federal Reserve has raised its policy rate multiple times, by 50 to 75 basis points per meeting. Policy rate changes of these magnitudes had not been used in years. At the August 2022 Jackson Hole Economic Policy Symposium, central banks reiterated their resolve to tame high inflation by maintaining a restrictive policy stance for some time.¹ The pandemic and the war in Ukraine have increased the extent of macroeconomic volatility. The threat of recession is real.

Will the Fed be successful in getting inflation back to target and delivering a softish landing? Our view is that the answer will hinge on three key policy drivers:

- The evolution of inflation expectations after a period of elevated inflation.
- The path of energy prices in light of the ongoing war in Ukraine.
- The degree of spare capacity in the economy, known as the output gap.

Relying on a simple robust model, we present three broad economic scenarios that the Fed could face in the coming months: softish landing, hard landing, and stagflation. This model helps analyze the impact that Fed policy could have on macroeconomic fundamentals and vice versa.

Where the economy ends up will depend heavily on the evolution of the three policy drivers and the Fed's response to them. Our model illustrates the dynamic and data-dependent nature of future Fed policy: Should future data show that the economy is going down a different route than initially predicted, we allow the Fed to update its path for interest rates.

A simple model that is tractable and empirically plausible

To inform our analysis, we use a simple three-equation New Keynesian model.² It relies on three fundamental economic relationships: aggregate demand, aggregate supply, and the formation of inflation expectations.

Aggregate demand captures the relationship between output and interest rates (the IS curve). Aggregate supply captures the relationship between inflation, the output gap, and inflation expectations (the Phillips curve).³

¹ See materials from the 2022 Jackson Hole Economic Policy Symposium, including remarks by European Central Bank Executive Board Member Isabel Schnabel and International Monetary Fund First Deputy Managing Director Gita Gopinath, at <https://www.kansascityfed.org/research/jackson-hole-economic-policy-symposium-reassessing-constraints-on-the-economy-and-policy/>.

² This model builds on the one used in Cochrane (2022). We modify the equation relating to inflation expectations. See Appendix B on page 14 for more details.

³ We use headline Personal Consumption Expenditures (PCE) Price Index inflation as the inflation measure in this model, as this is the Fed's preferred measure of inflation.

The formation of inflation expectations in our model takes a flexible form. At one end of the spectrum, the model can be set so that inflation expectations are "adaptive," or purely determined by past rates of inflation. At the other extreme, the model can be set to allow inflation expectations to be entirely "rational," or forward looking.⁴ In a credible inflation regime, inflation expectations would be anchored at the central bank inflation target of 2%. Between these two extremes is a range of possibilities that define the degree of inflation stickiness. A regime with more sticky inflation would be one in which expectations were more adaptive.

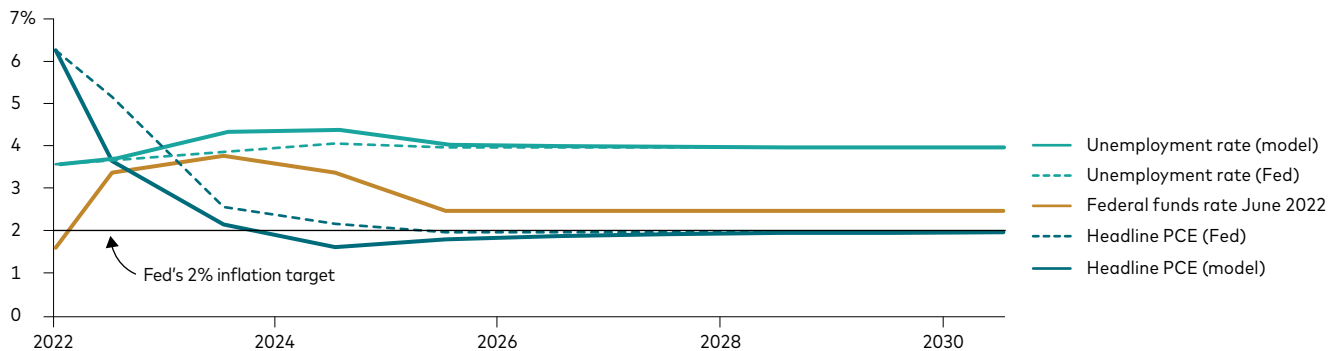
This simple model can be used to solve for the equilibrium path of the federal funds rate, the rate of inflation, and the output gap.⁵ The model

is flexible in that if one feeds in a path for the central bank policy rate, it will produce a path for inflation and output. Similarly, one can back out the policy rate necessary to deliver a given path of inflation.⁶

The model fits the data well. When we input the Fed's current interest rate projections, our model delivers paths of inflation and output that correlate well with the Fed's current economic projections (**Figure 1**).⁷ This gives us confidence that the model reflects the Fed's thinking.

The model can help us quantify how the economy and monetary policy landscape could evolve under the three economic scenarios.

FIGURE 1.
Our simple model tracks the Fed's June 2022 projections well



Notes: The figure shows the Personal Consumption Expenditures (PCE) Price Index inflation and unemployment rate projections from our model (solid lines) and the inflation and unemployment rate projections from the Federal Reserve's June 2022 Summary of Economic Projections (dashed lines). For more details on our modeling assumptions, see Appendix A on page 13.

Sources: Vanguard, Cochrane (2022), and Federal Reserve (2022).

⁴ Sheffrin (1996) provides a detailed discussion of rational expectations.

⁵ The equilibrium path of the federal funds rate is the interest rate path at which demand and supply for money are in equilibrium. The output gap measures the gap between actual demand in the economy and the supply potential of the economy. A negative output gap means there is spare capacity in the economy. We use the output gap to illustrate the degree of slack in the economy. We show this instead of the unemployment rate because we consider it to be a more robust measure. One can derive the unemployment rate from Okun's law, a mapping between the output gap and the unemployment gap (the difference between the actual and natural unemployment rate). But we judge such a projection to be less reliable because of structural changes to the labor market post-COVID.

⁶ For more details on the model, see Appendix A on page 13.

⁷ The Fed's current economic projections are based on its expectations for the federal funds rate in its June 2022 Summary of Economic Projections (SEP).

High rates of inflation could become embedded into the economy

In times of low and stable inflation, inflation expectations generally stay anchored at the Fed's 2% target.⁸ These expectations feed into the price- and wage-setting process, and they deliver low and stable inflation outcomes.⁹

A strong post-COVID economic recovery coupled with elevated global energy and food prices emanating from the war in Ukraine have given rise to inflation that is higher and more persistent than normal.

The fear is that the resulting high inflation will push up inflation expectations, causing them to de-anchor from the target. Higher inflation expectations, in turn, are likely to be used to negotiate higher wages and justify price increases. If this is successful, the higher inflation (which is partly generated from stocks outside the U.S.) would become entrenched into the domestic economy (**Figure 2**). The risk is that it allows the economy to transition from a low-inflation to a high-inflation regime.¹⁰ That is exactly what the Fed and other central banks want to avoid.

FIGURE 2.
Why the Fed's reaction function might have changed



Sources: Vanguard and the National Bureau of Economic Research.

⁸ See Bank for International Settlements (2022a).

⁹ See Sathe, Wieland, and Davis (2021).

¹⁰ See Bank for International Settlements (2022b).

In June, the Fed signaled a change in its policy reaction function

In March, the Fed's "dot plot" showed that it expected the policy rate to reach 1.9% by year-end 2022 before reaching 2.8% by 2023 and staying there until 2024.¹¹ Only three months later, in June, the Fed's tone became significantly hawkish. It projected that the policy rate would rise to 3.4% by the end of 2022 and to 3.8% by the end of 2023, then fall back to 3.4% by the end of 2024.¹²

What changed between March and June? What led the Fed to justify a faster pace of hikes in June?

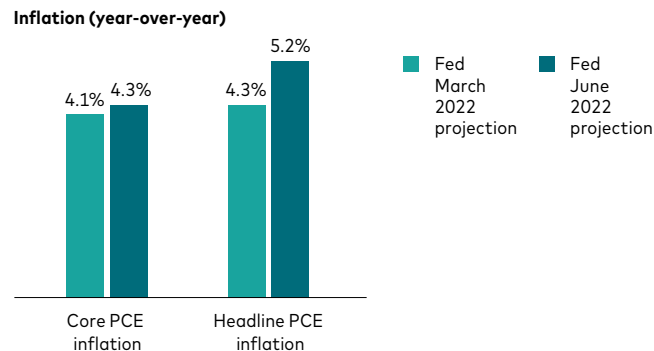
Our view, supported by our simple model, is that between March and June the Fed changed its policy reaction function to some extent. It started to put more weight on headline inflation and less on core inflation (a measure of inflation that strips out the volatile components of food and energy). The path of core inflation was largely unchanged between March and June, so it would have been an unlikely trigger for the change in policy stance. However, the path for headline inflation was revised upward significantly (**Figure 3**).

Usually, the Fed ignores what it believes to be short-term fluctuations in headline inflation. In the current environment, however, that would be a mistake, because the high inflation could become entrenched into the economy. Headline inflation could prove to be more persistent and start to push inflation expectations higher.¹³ Instead, the Fed hopes to anchor expectations by signaling its strong commitment to the 2% inflation target and its willingness to achieve this by enduring a period of short-term economic pain for the benefit of a stable and more productive economy over the longer term.

Inflation expectations have become more backward looking

Our model can be used to interpret how well inflation expectations are anchored. We do this by considering what type of inflation expectations best fit the Fed's March and June 2022 economic projections. In March, our model produced a good fit under the assumption of mainly rational or broadly anchored inflation expectations.¹⁴ But those same assumptions don't match the Fed's June economic projections as well. A better match is found when the model allows for a higher degree of adaptive, or backward-looking, inflation expectations. From this we infer that the Fed has rightly become more worried about a de-anchoring of inflation expectations.¹⁵

FIGURE 3.
The Fed puts more focus on headline inflation



Note: Headline PCE refers to the all-items Personal Consumption Expenditures Price Index.

Sources: Vanguard and Federal Reserve (2022).

11 The dot plot is a chart that shows the projection of each Federal Open Market Committee member for the future path of the federal funds rate. It is published quarterly.

12 According to the Fed's expectations for the federal funds rate in its June SEP.

13 See Kilian and Zhou (2021).

14 "Mainly rational" expectations are simulated as 30% backward looking and 70% forward looking. Rational expectations rest on the assumption that economic agents understand the economic model being leveraged and react, in this case by setting expectations in line with central bank inflation targets. Adaptive expectations, on the other hand, assume that expectations give more weight to past readings of inflation and hence are more backward looking.

15 For details, see Appendix A on page 13.

What's next for the Fed: Three scenarios

What comes next for the Fed? We focus on three possible scenarios (**Figure 4**)—a hard landing, stagflation, and a softish landing. Which one materializes depends on the path of the three key policy drivers we previously described—inflation expectations, energy prices, and spare capacity (the output gap).¹⁶

The evolution of inflation, output, and policy under all three scenarios is derived from our model. The starting point for the model is the Fed's June economic projections, labeled as the "No Fed reaction (ex-ante)" line in Figures 5–7. In all three scenarios, we allow the Fed to respond to new information by recalibrating the future policy path. If the Fed wants to change tack, we assume that it can only do so with a lag (assumed to be in 2023), because a couple quarters are needed to receive and assess new data. We label the Fed's revised dynamic policy path as the "Fed reacts (ex-post)" line in Figures 5–7.

FIGURE 4.
Three policy-driver scenarios that the Fed is facing

Policy driver	Scenarios		
	Softish landing	Hard landing	Stagflation
Oil prices (per barrel)	Lucky: Less than \$100	\$100–\$130	Unlucky: Greater than \$130
Inflation expectations	Rise in the near term; anchored at 2% in the long term	Anchored at 2%	4% and above (de-anchored)
Spare capacity	Output gap closes	Output gap widens moderately	Output gap widens substantially

Source: Vanguard.

¹⁶ We use oil prices as a proxy for energy prices.

Hard landing

In the hard-landing scenario, we assume that the pace of Fed hikes, driven by the three policy drivers, ends up being too aggressive (with the benefit of hindsight). This gives rise to a hard landing, leading the Fed to recalibrate policy and later easing off the planned pace of rate hikes.

The starting point for this scenario is the Fed's June dot plot (dashed lines in **Figure 5**). The Fed has signaled a hawkish stance, with plans to reach a terminal rate—the rate at which interest rates peak during a tightening cycle—of at least 4% by next year. It has justified this stance based on the three policy drivers: inflation being at a four-decade high (which would impact inflation expectations), a tight labor market (suggesting less spare capacity), and elevated oil prices because of the ongoing war in Ukraine. The Fed is concerned that high inflation could become entrenched into the economy, initiated through the wage-price spiral and prolonged by unlucky shocks—most notably in this instance, oil supply and prices.

But what if these concerns about the policy drivers turn out to be misplaced? Inflation expectations might end up more anchored than anticipated. This puts a brake on the wage-price spiral, and inflation could end up falling faster than expected. Should this scenario materialize, the Fed would realize that sticking to its June dot plot would lead to a contraction in demand (dashed lines).

Indeed, according to our model, the Fed's June stance would risk causing a sizable contraction in demand. As shown by the dashed line in **Figure 5c**, the output gap would widen to roughly -1.5% of GDP in 2023 and 2024.

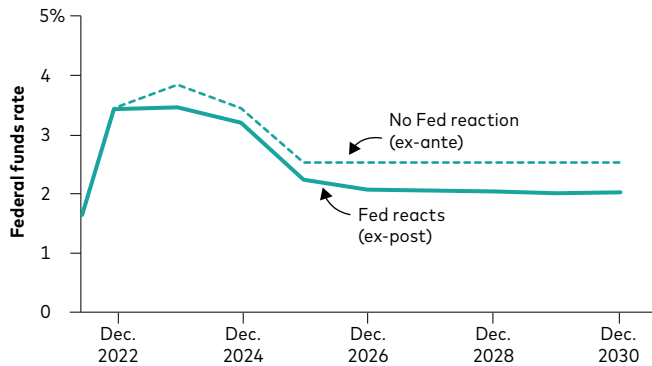
If faced with this situation later this year, the Fed would eventually adjust its policy path lower and in doing so would deliver a milder recession for the U.S. economy (solid line in **Figure 5c**).¹⁷ This is shown by a smaller widening of the output gap, to roughly -1% of GDP in 2023 and 2024 as the Fed updates its policy stance in response to new information.

¹⁷ We use our model to calibrate the path of policy consistent with anchored inflation expectations and a faster return of inflation to target.

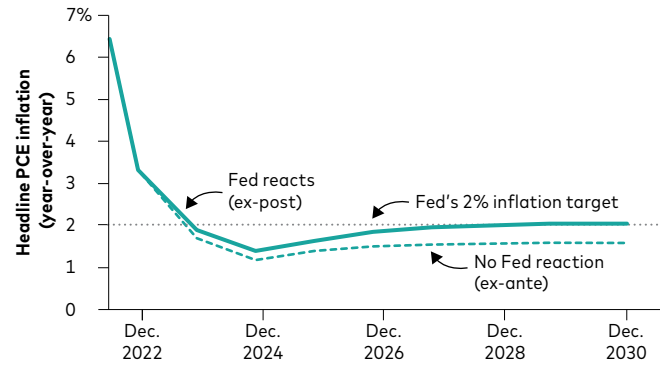
FIGURE 5.

Hard landing: Policy proves too restrictive, and the Fed drives down demand

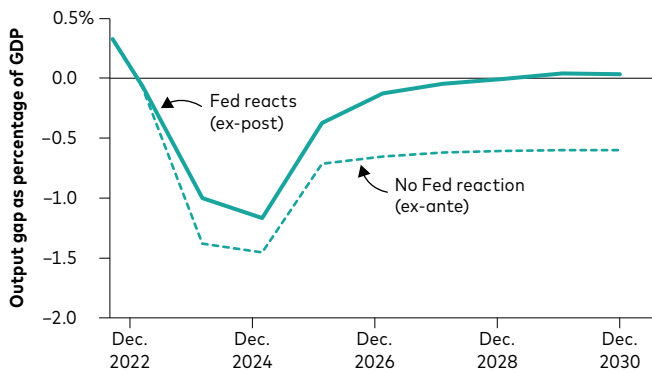
a. The Fed is forced to pause



b. Inflation falls faster than expected



c. The Fed avoids a deep recession; it is moderate instead



Notes: The above projections are based on our simple New Keynesian model. Beginning with the June 2022 dot plot federal funds rate estimate (dashed line in Figure 5a; referred to here as “ex-ante”), the model projects an accelerated decline in inflation (dashed line in Figure 5b) and an output contraction (dashed line in Figure 5c). If the Fed recalibrates policy (solid line in Figure 5a; referred to here as “ex-post”), affecting our inflation and output gap projections (solid lines in Figures 5b and 5c), the economy would undergo a mild recession. See Appendix A on page 13 for more details. Headline PCE refers to the all-items Personal Consumption Expenditures Price Index.

Sources: Vanguard, Cochrane (2022), and Federal Reserve (2022).

Stagflation

Under stagflation, we assume that the U.S. economy experiences a series of additional unlucky supply-side shocks related to oil prices, one of our three policy drivers. Inflation ends up rising further or staying higher for longer. This gives rise to a de-anchoring of inflation expectations. The Fed ends up delivering too little too late and chasing inflation from behind. Our model suggests that the terminal rate could creep above 5%, plunging the economy into a deep, prolonged recession.

Once again, the starting point for this scenario is the Fed's June dot plot. The war in Ukraine is far from settled, and the likelihood of further escalation and sanctions remains elevated. Oil prices could continue pushing higher and settle above \$130. Continued unrest relating to the war in Ukraine could adversely affect food prices in 2023. Ukraine and Russia account for about 13% of world exports of corn and about 20% of world exports of wheat.¹⁸ All these factors combined could lead to inflation surprising to the upside, setting off the cycle where the economy begins adapting to a new and higher level of inflation.

We model this scenario as one in which inflation expectations become more adaptive (backward looking) than the other two scenarios. As those higher expectations feed into the wage- and price-setting process, the inflation dynamics become stickier. This shows up in the form of high and rising service-price inflation.

As a result, inflation falls back at a slower pace than the Fed's June economic projections, staying above 4% well into 2023 and settling around 3.5% thereafter, as the dashed line in **Figure 6b** shows.

In such a scenario, the data reveal that the Fed misjudged the momentum of stickiness in inflation. The Fed sees the economy as more buoyant than had been expected, with a positive and rising output gap (dashed line in **Figure 6c**). The Fed finds itself having to play catchup; in such a situation it would have to hike even more aggressively to combat high inflation and rising inflation expectations. Our model suggests that rates could rise above 5% under this scenario (**Figure 6a**), with a high likelihood that the amount or pace of these hikes will surprise financial markets.

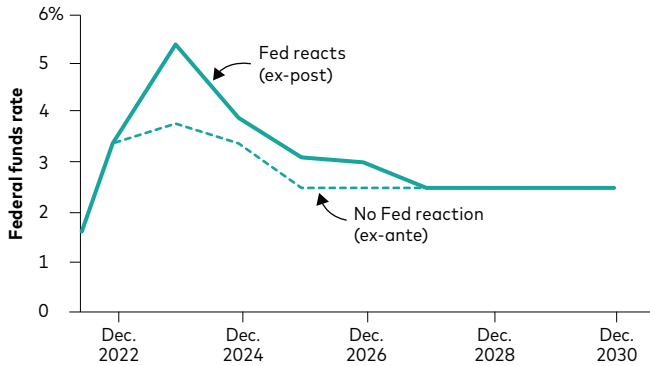
Such an extreme move in policy rates would lead to a negative output gap and eventually dampen inflation. This scenario would deliver a severe recession for the U.S. As the solid line in **Figure 6c** shows, the output gap would widen significantly, to -1.5% of GDP. This is much higher than the -1% in the hard-landing scenario where the Fed eventually backs off of intended rate hikes.

¹⁸ Sources: <https://www.worldstopexports.com/wheat-exports-country/> and <https://www.worldstopexports.com/corn-exports-country/>.

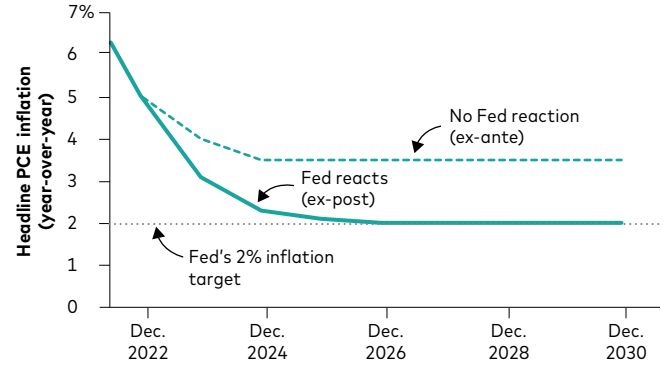
FIGURE 6.

Stagflation: The Fed chases inflation expectations and is forced to catch up

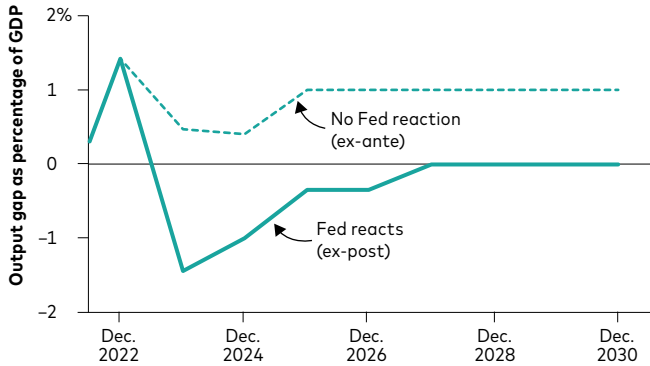
a. The Fed has to tighten more aggressively as it finds itself behind the curve



b. Inflation remains above target for longer



c. This drives the economy into a severe recession



Notes: The above projections are based on our simple New Keynesian model. The starting point is the June 2022 dot plot federal funds rate estimate (dashed line in Figure 6a; referred to here as “ex-ante”) and more adaptive inflation expectations (meaning that expectations give more weight to past readings of inflation and hence are more backward looking). The model projects persistently higher inflation (dashed line in Figure 6b). If the Fed has to play catch-up with inflation and recalibrates the policy path higher (solid line in Figure 6a; referred to here as “ex-post”), it will alter the likely path of inflation and the output gap (solid lines in Figures 6b and 6c). The economy would undergo a severe recession. See Appendix A on page 13 for more details. Headline PCE refers to the all-items Personal Consumption Expenditures Price Index.

Sources: Vanguard, Cochrane (2022), and Federal Reserve (2022).

Softish landing

Having discussed the dire consequences for the economy in the form of mild and severe recession in both high- and low-inflation environments, we turn to the question of what it would take to get the elusive soft landing.

The third scenario, a softish landing, is not impossible. The starting point for our scenario analysis is again the Fed's June economic projections.

In our view, this scenario is driven more by good luck than good policy.¹⁹ The assumptions here are that inflationary pressures mitigate faster than expected. To get here we would need to see all three policy drivers end in favor of downside inflation surprises: falling oil prices, a re-anchoring of inflation expectations, and more spare capacity in the economy than expected.²⁰ More spare capacity is possible if more workers return to the labor market than currently expected, allowing a recovery in the participation rate.

If this set of conditions played out, it would show up as some months of deflation (the decline in prices for goods and services) and year-on-year disinflation (a decrease in the rate of inflation). The fact that inflation expectations would end up being more anchored than anticipated would act as a lid on services inflation, because (luckily) goods inflation also dissipates as supply constraints ease.

In this scenario, the Fed could reverse some of the planned rate hikes, allowing the economy to narrowly avoid recession (**Figure 7**). The terminal rate of interest would be just above 3%, with rate cuts possible starting in 2023. Inflation would converge back to the Fed's 2% target. Annual GDP growth would remain most resilient compared with the other two scenarios. We expect output to briefly fall below trend in 2022 before rebounding in 2023 and settling back to trend long before it would have under either a hard landing or stagflation scenario.

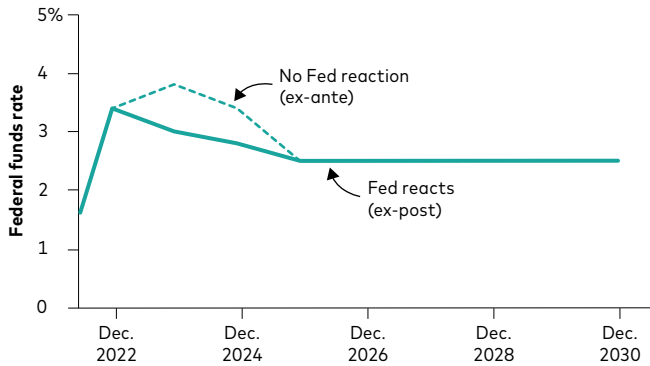
¹⁹ For a discussion of the role of good luck versus good policy in delivering "the Great Moderation" in economic activity, see Canova and Gambetti (2009). (The Great Moderation refers to a period of decreased economic volatility in the U.S., from around 1984 until the mid-2000s. Economists generally propose that three things led to this period of relative calm: changes in the structure of the economy, good luck, and good policy.)

²⁰ See Vanguard (2022).

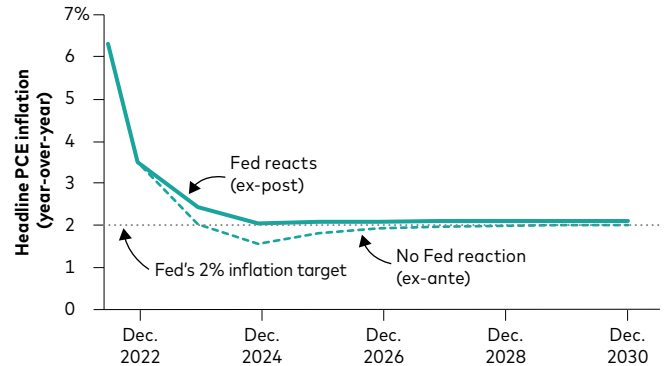
FIGURE 7.

Softish landing: Not impossible, but more good luck than good policy

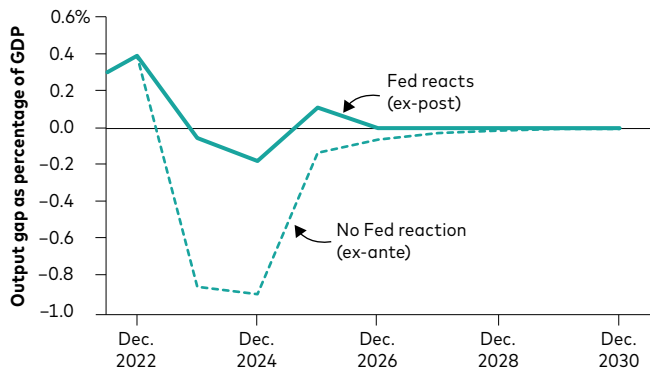
a. The Fed can reverse some of the planned rate hikes



b. Inflation will converge toward target



c. A recession can be avoided



Notes: The above projections are based on our simple New Keynesian model. Beginning with the June 2022 dot plot federal funds rate estimate (dashed line in Figure 7a; referred to here as “ex-ante”) and factoring in good luck in terms of the three policy drivers, our model projects a path of falling inflation (dashed line in Figure 7b). Favorable economic conditions allow the Fed to recalibrate the policy path lower (solid line in Figure 7a; referred to here as “ex-post”), such that inflation falls more gradually and the economy would narrowly avoid a recession (solid lines in Figures 7b and 7c). See Appendix A on page 13 for more details. Headline PCE refers to the all-items Personal Consumption Expenditures Price Index.

Sources: Vanguard, Cochrane (2022), and Federal Reserve (2022).

Conclusion

Investors remain concerned about high inflation, the prospect of recession, and market volatility. The 2022 Jackson Hole Economic Policy Symposium raised questions about the monetary policy framework that we haven't had to discuss in decades. The effectiveness of the inflation-targeting regime in the face of supply-side shocks is at the heart of this debate. Against this backdrop, the future path of the economy seems more uncertain than ever. The path will hinge on three key policy drivers: the evolution of inflation expectations, the direction of energy prices, and the degree of spare capacity in the economy.

Our simple model helps us illustrate how the Fed might respond to three possible scenarios for the economy. The Fed has communicated that it will remain responsive to developments, recalibrating policy as necessary based on incoming data and trends. As with all models, the results will be determined by the assumptions made as well as other model parameters. We take comfort from the fact that our model fits the Fed's June economic projections well.

The model allows us to quantify how high (or low) interest rates might go in coming years. It tells us that if the U.S. economy were to experience a series of positive shocks, interest rates could peak well below 4% and fall back to neutral more rapidly than is currently anticipated. This would provide relief to the economy and markets. In contrast, if the U.S. economy experiences a plausible set of negative shocks, interest rates might have to rise to 5%–6%, which is what it would take to successfully return inflation to the Fed's 2% inflation target, though not before inducing a deeper and more prolonged recession than under the other scenarios we tested.

The advantage of a simple model is that it allows us to build scenarios into our analysis so that we can explore different paths for the economy. These scenarios help us track how Fed policy might respond as macroeconomic conditions evolve. Getting inside the Fed's head is not easy, but it is worth a try.

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Appendix

Appendix A: A simple three-equation model

We use a simple three-equation model to inform our analysis. It relies on three fundamental economic relationships: aggregate demand, which captures the relationship between output and interest rates (the IS relationship); aggregate supply, which captures the relationship between inflation, the output gap, and inflation expectations (the Phillips curve); and the inflation-expectation formation process, which takes a flexible form. Inflation expectations are partly backward looking and partly rational.

IS relationship

Relationship between output gap and the expected real interest rate gap.

$$x_t = -\sigma(i_t - \pi_t^e - r^*)$$

Phillips curve

Relationship between inflation, expected inflation, and the output gap.

$$\pi_t = \pi_t^e + kx_t$$

Inflation expectation formation process

Inflation expectations are partly backward looking and a function of the inflation anchor.

$$\pi_t^e = \theta \pi_{t-1} + (1 - \theta) \pi^A$$

π^A represents the inflation anchor. It usually is close to the inflation target, but it can change if the underlying inflation process becomes more persistent.

θ can be interpreted as the degree of central bank credibility in achieving the inflation anchor. It could be time-varying.

For illustrative purposes, we can also use Okun's law to derive the unemployment rate; however, we choose not to use this method because we find such a projection to be less reliable in light of structural changes to the labor market because of COVID-19.

Okun's law

Each 1 percentage point rise in the output gap results in a 0.5 percentage point decline in the unemployment gap.

$$u_t = 4 - 0.5x_t$$

This is a rule of thumb; it assumes a fixed mapping between the labor market disequilibria (the unemployment gap) and the output gap. But that relationship has varied a lot over time; our expectation is that it underestimates the rise in unemployment. It also assumes that the two gaps move in tandem—but there may be leads or lags (for example, the labor market could respond with a lag).

Variables

x_t	output gap
i_t	nominal interest rate
r^*	real neutral interest rate (estimated at 0.5%)
π_t^e	expected inflation rate
π_t	inflation rate
π^A	inflation anchor
4	assumed natural rate of unemployment
u_t	unemployment rate gap
σ, k, θ	model parameters

The modeling starting point assumes the federal funds rate from the June economic projections. Assumptions are that inflation expectations are largely anchored and that inflation won't be persistently higher in the medium or long run. The nominal neutral rate of interest is assumed to be 2.5%. Based on Cochrane (2022), we use $k = 0.5$ and $\sigma = 1$.

$$\theta * \pi_{t-1} + (1 - \theta) * \pi^A$$

with $\theta = 0.3$ and $\pi^A = 2$

For the hard-landing scenario, we assume that inflation expectations remain anchored (more anchored than expected by the Fed). As a result, the Fed's tightening path ends up too restrictive. We model this narrative as a neutral rate, which is at 2% instead of 2.5%. We keep the other parameters unchanged from the modeling starting point mentioned above.

For the stagflation scenario, inflation expectations are largely anchored at first. But inflation proves more persistent, and inflation expectations start to de-anchor as a result.

$$\theta * \pi_{t-1} + (1 - \theta) * \pi^A$$

with $\theta = 0.3 + \delta$ and $\pi^A = 2 + \rho$

The parameters ρ and δ are the levers we use to alter the degree of inflation persistence and the extent to which inflation expectations are anchored. Low values of ρ and δ correspond to low inflation persistence and anchored expectations.

ρ starts at 2 and then halves every year to 0.25.

δ starts at 0.3 and then increases by 0.1 every year to 0.6.

We keep the other parameters unchanged from the modeling starting point mentioned above.

For the softish-landing scenario, we assume that lucky supply-side shocks bring the inflation projections down faster. We assume a faster fall in inflation, with inflation reaching 2% in early 2024. Inflation expectations remain anchored.

$$\theta * \pi_{t-1} + (1 - \theta) * \pi^A$$

with $\theta = 0.3$ and $\pi^A = 2 + \rho$

ρ starts at 1.5 in 2022 and reduces to 0.4 in 2023 before converging to 0 beyond 2023.

We keep the other parameters unchanged from the modeling starting point mentioned above.

Appendix B: Inflation expectations have become more adaptive

Using our model, we can estimate the degree to which inflation expectations could have become more backward looking compared with usual periods.

In March, our model produced inflation projections that tracked the Fed's March economic projections well, while assuming mainly rational inflation expectations. **Figure B-1a** shows that these were simulated as 30% backward looking and 70% rational (solid green line).

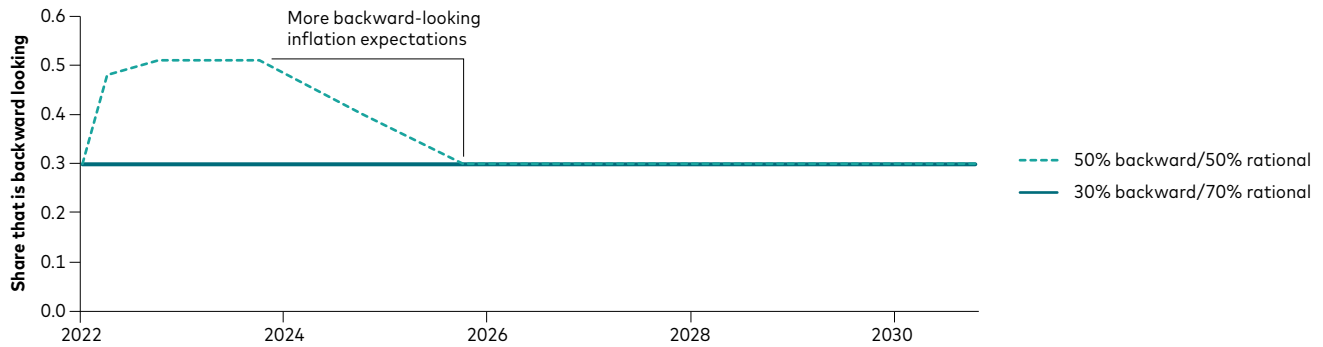
Assuming the same inflation expectation formation process but basing it on the June dot plot produces an inflation projection that undershoots the 2% target, as shown in **Figure B-1b** (solid green line). This implies that policy would be too restrictive assuming inflation expectations are 30% backward looking.

However, assuming more backward-looking inflation expectations (dashed line in Figure B-1a) and still basing the model on the June dot plot would produce an inflation path (dashed line in Figure B-1b) that converges to target as per the Fed's June economic projections.

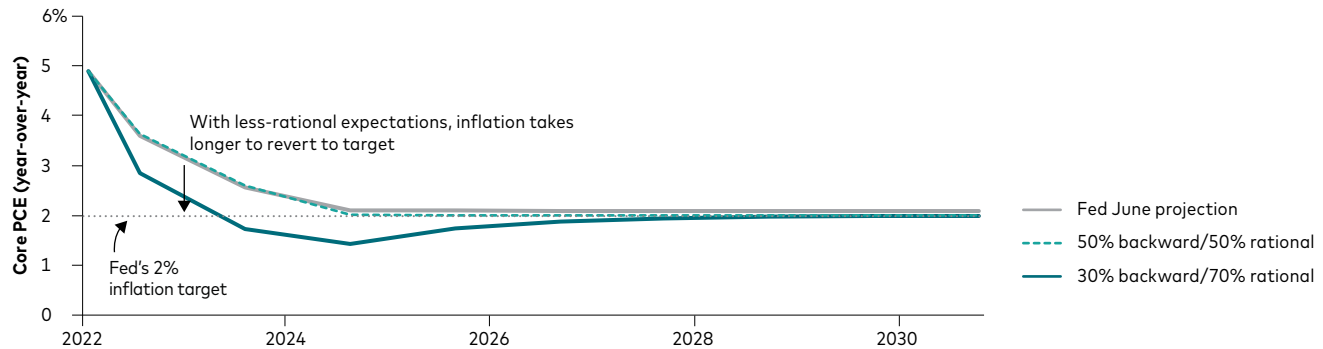
Figure B-1a also shows that this current period of high inflation has not permanently changed the degree to which inflation expectations are backward looking. This is visible in the share reverting to "normal" in the medium run (dashed line in Figure B-1a).

FIGURE B-1.
Inflation expectations have become less rational

a. Share of inflation expectations that is backward looking



b. PCE projections based on June dot plot



Notes: Figure B-1a shows the assumptions on inflation expectations in March 2022. They were mainly rational, with 30% backward looking and 70% rational (solid line). Assuming this same inflation-expectation formation process but based on the June 2022 dot plot, our model suggests that this policy rate path is too restrictive because inflation undershoots (solid line in Figure B-1b). However, assuming more backward-looking inflation expectations (dashed line in Figure B-1a) would produce a convergence of inflation toward target (dashed line in Figure B-1b) that resembles the Fed's June inflation projections.

Sources: Vanguard and Bloomberg.

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IFHISG 092022