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Monetary Policy Report: Using Rules for Benchmarking

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Introduction

This special report highlights ongoing work to benchmark the stance of monetary policy using a range of policy rules that are widely employed in studies of monetary economics.[1] We perform this exercise with a structural forecasting model based on the New Keynesian dynamic stochastic general equilibrium (NKDSGE) methodology. We then employ this model to explore the expected behavior of economic variables, including the policy rate, under alternative policy rules. The policy rules help to benchmark the current stance of the federal funds rate, and they provide guidance on how the path of policy is likely to evolve in the context of the model. Such an exercise as part of a more comprehensive quarterly monetary policy report would enhance communication and promote a more systematic approach to monetary policy.

We begin with an overview of the economy and then discuss the benchmark model we use to generate our forecasts.

Economic Overview

After averaging 1.6 percent in the first half of the year, real gross domestic product (GDP) is projected to have risen at an annualized rate of 2.7 percent in the third quarter of 2025, according to the median forecast prediction of the Survey of Professional Forecasters (SPF). While the underlying state of the economy is more uncertain than usual because of the delayed release of official government statistics, the available data point to sustained growth in personal consumption expenditures (PCE) and nonresidential fixed investment — and, to a lesser extent, in net exports.

The latest available data is still consistent with a slowing labor market. In September, the unemployment rate edged up to 4.4 percent. The latest employment report released by the Bureau of Labor Statistics showed that employers added 119,000 jobs in September, noticeably stronger than the average job gains over the summer (June–August), which was 18,000. Even so, private data from Automatic Data Processing points to slow job growth in the private sector during October and November, 7,500 on average, compared with a monthly average of 24,000 job gains in the third quarter. At current rates of population growth and labor force participation, it is estimated that the economy needs to add between 80,000 and 100,000 jobs a month to keep the unemployment rate stable. With the three-month moving average for job creation below this level, the unemployment rate ticked up to 4.4 percent in September, bringing the quarterly average to

[1] The views expressed in this report are those of the authors and do not necessarily reflect those of the Federal Reserve Bank of Philadelphia or the Federal Reserve System. We thank Jack G. Bunge and Riley E. Thompson for their assistance.

4.3 percent, a modest increase compared with the second quarter. However, monthly initial claims for unemployment insurance have remained well below recession levels.

The headline consumer price index (CPI) increased 3.0 percent over the 12 months ending in September. Core CPI inflation also rose 3.0 percent over the same period. The core PCE price index increased 2.8 percent over the 12 months ending in September. While the 12-month percent change in prices is elevated compared with the lows reached during the first half of this year, month-over-month inflation has eased slightly since June. Nonetheless, inflation remains about 1 percentage point above the Federal Open Market Committee's (FOMC's) 2 percent target and is expected to remain at similar levels over the next few months as higher tariffs work their way through to prices.

Data on housing point to continued weakness. Despite a recent increase, home sales remain low by historical standards. Inventories of homes for sale remain well below prepandemic levels but are rising slowly on a seasonally adjusted basis. Residential construction has shown little sign of rebounding after decreasing almost continuously since the spring of last year. Housing permits declined in July and August, but more recent data are not yet available. House prices, adjusted for seasonality, are still lower than in February, but the S&P National House Price Index has risen, reversing some of its losses in August and September.

Real consumer spending ticked up in the third quarter, driven by strong demand for durable goods — especially in August — and solid spending outside of durables. Services consumption increased at an annual rate of about 2.8 percent in the third quarter, the same growth rate as in the second quarter and only slightly weaker than its 2.9 percent pace in 2024. According to the preliminary results of the University of Michigan Surveys of Consumers for December, consumer sentiment is close to its historical lows, despite ticking up slightly in December. The decline relative to the spring is largely accounted for by a perception of worse current conditions. The Conference Board reported a similar pattern of consumer sentiment.

Given relatively contained inflation and softening labor markets, the FOMC reduced its target range for the federal funds rate by 25 basis points, to 3.5 to 3.75 percent, at its December meeting, the third consecutive interest rate cut. In the Summary of Economic Projections (SEP) for December, projections for real GDP growth in 2025 were revised slightly higher while the projection for the unemployment rate was unchanged. Core PCE inflation is expected to come in at 3.0 percent in 2025, falling to 2.5 percent in 2026, a touch lower than previously projected. The path of the federal funds rate was unrevised from the September projection. Accordingly, the median federal funds rate projection calls for two additional 25-basis-point interest rate cuts, one in 2026 and another in 2027, leaving the federal funds rate at 3.1 percent by the end of 2027.

On balance, the economy appears to be expanding at about trend pace, but there are some warning signs. Downside risks for the labor market have risen. In addition, even though the worst-case scenarios for tariff-induced inflation seem now less likely, inflation may get a further boost in the months ahead as higher tariffs work their way through to prices. Uncertainty about the near-term future of the economy remains elevated.

The Benchmark Model

To create our forecast, we use a structural forecasting model based on the NKDSGE methodology, which is at the forefront of macroeconomic modeling and forecasting. Our model features households and firms that are forward-looking and that make decisions while facing resource constraints. The model includes a labor market in which firms and households engage in search-and-matching behavior, which allows us to model the unemployment rate in a meaningful way. The model features a rich menu of shocks as well as adjustment costs that make wages and prices less than fully flexible in responding to changes in economic conditions. We have added additional shocks to the model to account for the pandemic, but we have not changed the model's structural equations in response to the pandemic. Implicit in this view is that the structure of the economy has returned to a prepandemic state. Although some economic effects of the pandemic linger through the lens of our model, this forecast is largely based on the economy's prepandemic structure. Detailed documentation on the model structure is available from the authors upon request.

The underlying baseline policy rule in the model is a response function of the form

$$R_t = \rho R_{t-1} + (1-\rho)[\Psi_\pi(\pi_{t|t-4} - \pi^*) + \Psi_y ygap_t] + \varepsilon_t^R,$$

where R_t is the deviation of the effective federal funds rate from its long-run equilibrium value, $\pi_{t|t-4}$ is the four-quarter change in core PCE inflation (the one-year-average inflation rate), $ygap_t$ is a measure of the output gap, and ε_t^R is a monetary policy shock.[2] The parameters ρ, Ψ_π, and Ψ_y determine how monetary policy reacts to economic conditions. We run forecast simulations under four different versions of the basic rule shown here:

Table 1

Rule	ρ	Ψ_π	Ψ_y
Baseline	0.8	2.5	0.5
Taylor (1993)	0.0	1.5	0.5
Taylor (1999)	0.0	1.5	1.0
Inertial Taylor (1999)	0.85	1.5	1.0

The baseline rule uses parameter values that are estimated from the data using the full NKDSGE model. That is, the baseline rule depicts the historical behavior of monetary policymakers.

Model Forecasts Under the Baseline

The forecast, shown in Figures 1–4, is generated using observed data through the third quarter of 2025, together with an assumption of how output growth, inflation, the federal funds rate, and unemployment will fare in the fourth quarter of 2025. Due to the delay in the release of official statistics associated with the latest government shutdown, the model used monthly data and judgment instead of the official data for the third quarter of 2025.[3] The forecast then begins in the first quarter of 2026 and extends through the fourth quarter of 2028. In each figure, the baseline forecast corresponds to the median of the predictive distribution and is represented by a dark solid line. The colored bands around the baseline forecast represent 10 percent confidence intervals of the predictive distribution.[4]

The key features of the baseline forecast are as follows:

- Real output growth is forecast to be 1.6 percent in 2025 on a fourth quarter over fourth quarter (Q4/Q4) basis, stepping up to 2.3 percent in 2026. The higher growth in 2026 is largely due to base effects of the government shutdown on real government consumption and investment.[5] In the remaining two years of the forecast horizon, 2027 and 2028, growth is forecast to run at about 2.0 percent. This outlook represents a 0.4 percentage point upward revision in the forecast for 2025, and a 0.5 percentage point upward revision in the forecast for 2026.

[2] The model calibration implies that the long-run equilibrium value of the federal funds rate is 3.2 percent. The output gap is calculated using the flexible-price version of the model. The gap is then measured as the log difference of realized output from its flexible-price counterpart (also known as potential output). For the baseline rule, the output gap is a growth gap — the deviation of realized output growth from its longer-run trend.

[3] Our forecast was made prior to the most recent FOMC meeting.

[4] The forecast simulations are generated using Bayesian methods. The fan charts show 10 percent quantiles around the median of the posterior predictive distribution.

[5] Because real government consumption and gross investment were temporarily low in 2025Q4, on a Q4-over-Q4 basis, the lower base mechanically lifts growth in 2026 due to the resumption of government activities.

Absent the government shutdown, the 2026 forecast would be largely unchanged. For 2027 and 2028, the growth forecast is virtually unchanged since September (Figure 5a).

- Core PCE inflation is forecast to be 3.0 percent in 2025 on a Q4/Q4 basis, easing to 2.5 percent in 2026 before running near 2.0 percent in 2027 and 2028. The forecast overall is little revised compared with the September forecast, with a small downward revision for 2025 and small upward revisions in later years (Figure 5b).

- The unemployment rate is expected to be 4.4 percent at the end of 2025, inching up to 4.5 percent at the end of 2026 before decreasing to 4.1 percent at the end of 2027 and to 3.8 percent at the end of 2028. This projection is largely unrevised compared with the September forecast (Figure 5c).

- The federal funds rate is now expected to reverse most of its recent declines and peak at 4.5 percent in the second half of next year before resuming its march toward its long-run value in late 2026. Specifically, conditional on a quarterly average value of 3.9 percent for the federal funds rate in 2025Q4, the model projects the federal funds rate at 4.4 percent at the end of 2026 before gradually declining to 3.1 percent by the end of 2028. For 2025, the nowcast is close to the prior forecast. For 2026, this represents an upward revision of 0.7 percentage point relative to the September forecast. For 2027 and 2028, the forecast has been revised up by 0.3 percentage point (Figure 5d).

Overall, the model forecast sees stronger output growth over the next few quarters and broadly unchanged inflation and unemployment. Because the baseline policy rule responds to fourth quarter over fourth quarter growth in addition to inflation, the combination of a strong near-term outlook for output and above-target inflation leads to a transitory rebound in the federal funds rate in 2026. The forecast for the federal funds rate for the current quarter is determined by nowcasts and is in line with the expectations of the Federal Funds Futures market as of late November. From the first quarter of 2026 onward, the federal funds rate forecast is completely determined according to the model's policy-reaction function, and it calls for higher rates in the face of above-trend output growth in the first half of next year. Looking ahead, as output growth slows down in 2027 and 2028, the funds rate is forecast to decline by 1.25 percentage points over two years to its longer-run value. This projection is at odds with both the SEP and the federal funds market: The median SEP projection sees the funds rate at 3.4 percent at the end of 2026, and at 3.1 percent at the end of both 2027 and 2028, implying a lower federal funds rate path than the baseline model over the next two years. As we discuss below, the SEP and the federal funds market projections can be better explained by alternative policy rules that react to a measure of economic slack instead of reacting to output growth and that give a relatively larger weight to economic slack than the baseline rule.

Uncertainty about how the economy will evolve over the near term remains elevated due to several factors, such as uncertainty about the size and effects of federal policy changes on tariffs and on immigration. The delayed release of official macroeconomic data has also made it harder to extract a clear signal of current macroeconomic conditions.

Despite volatile quarter-to-quarter changes, output growth averaged an annualized rate of 1.6 percent in the first half of this year. We assume output expanded at an annual pace of 2.7 percent in the third quarter of 2025, and at an annual rate of 0.8 percent in the current quarter. Partly due to the end of the shutdown, the model anticipates that annualized output growth will rebound to an above-trend pace of 2.3 percent in 2026 before moderating to a near-trend pace of 2.0 percent in 2027 and 2028. Our current-quarter nowcast is close to the SPF value of 1.1 percent. On an annual average over annual average basis, the forecasts for output growth in 2026, 2027, and 2028 (2.3 percent, 2.0 percent, and 2.0 percent, respectively) are somewhat stronger than the 1.8 percent, 2.1 percent, and 1.8 percent growth projected by the median SPF participant for each of those years, respectively.[6]

[6] The model features long-run real per capita output growth of 1.6 percent. We assume that population growth equals 0.7 percent in 2025, 0.6 percent in 2026, 0.5 percent in 2027, and 0.4 percent in 2028, on a Q4/Q4 basis. This projection is roughly in line with the Congressional Budget Office's "Demographic Outlook: 2024–2054."

The labor market is predicted to soften slightly. We impose a nowcast for the unemployment rate of 4.4 percent for the current quarter, which is 0.1 percentage point higher than in the September forecast. Revising up both real GDP growth and the unemployment rate is at odds with Okun's Law and hints at stronger underlying productivity growth. After 2025, the model predicts that the unemployment rate will edge up to 4.5 percent in 2026 before declining gradually to 4.1 percent at the end of 2027 and to 3.8 percent at the end of 2028. Thus, in the near term the unemployment rate is expected to increase slightly above the model's natural rate of unemployment — i.e., the level of unemployment that the model returns to in the long run, which is 4.3 percent. The model projection for 2026 lines up with the latest median SPF projection, which also sees the unemployment rate rising to 4.5 percent.

Inflation edged up in the third quarter of this year and is expected to further tick up to 3.3 percent (annualized) in the current quarter. This implies an annual inflation rate of 3.0 percent in 2025. Even so, based on historical data, the model anticipates that inflation will fall below 3.0 percent in the near term and average 2.5 percent at the end of 2026. In 2027 and 2028, the model sees inflation running at 2.0 and 1.9 percent, respectively. Thus, inflation is expected to return to levels consistent with the FOMC target of 2 percent (annualized) average inflation at the end of next year. The SPF's core PCE inflation forecast is 3.0 percent for the current quarter, easing to 2.7 percent in 2026 and 2.3 percent in 2027. Thus, on inflation, the SPF forecast is slightly above the model baseline forecast from 2026 onward.

The December 2025 SEP by FOMC participants shows the median projection for output growth at 1.7 percent in 2025, 2.3 percent in 2026, 2.0 percent in 2027, and 1.9 percent in 2028. The median FOMC member forecast for the unemployment rate is 4.5 percent in the last quarter of 2025, gradually declining to 4.4 percent in the last quarter of 2026 and to 4.2 percent in the last quarter of 2027, where it remains through the end of 2028. Core PCE inflation, on a fourth quarter over fourth quarter basis, is projected to be 3.0 percent in 2025, stepping down to 2.5 percent in 2026, 2.1 percent in 2027, and 2.0 percent in 2028. The median FOMC member forecast anticipates that the federal funds rate will decline to 3.6 percent at the calendar year end of 2025 and to 3.4 percent at the end of 2026 before stabilizing at 3.1 percent at the end of both 2027 and 2028.

Alternative Policy Rules

As indicated in Table 1, the alternative rules are variants of the monetary policy rule described above, with differing weights on inflation, the output gap, and the lagged interest rate. Relative to the baseline, the alternative rules bring higher output growth, a lower output gap, and lower unemployment. At the same time, inflation rises above the baseline. In the case of the noninertial (Taylor 1993 and Taylor 1999) rules, this goes hand in hand with a higher federal funds rate over the next few quarters. In the case of the inertial Taylor 1999 rule, rates remain steady at the current level before declining in 2027.

To understand these results, recall Table 1. The three alternative rules react to the output gap defined as the difference between real output and real potential output; in contrast, the baseline rule reacts to the output gap defined as a growth gap. In addition, the long-run response to inflation of the alternative rules is lower than in the baseline. Thus, the relative importance of economic slack is higher in all these rules. It is strongest in the Taylor 1999 rule, with its coefficient on the output gap of 1.5 and no inertia. Consequently, since the model features a negative output gap in the current quarter, this rule closes the output gap the most, lowers the unemployment rate the most — and raises inflation the most. It also results in the highest peak for the federal funds rate. Interestingly, however, the inertial Taylor 1999 rule remains below the baseline. More specifically, the level of the federal funds rate implied by the alternative rules peaks at 5.1 percent for the Taylor 1999 rule in the fourth quarter of 2026. For the Taylor 1993 rule, it peaks at 4.9 percent one quarter earlier. For the inertial Taylor 1999 rule, interest rates remain flat through the end of 2026. All three rules call for a gradual decrease in rates from 2027 onward and imply rates near 3.0 percent at the end of 2028.

The Taylor 1993 and Taylor 1999 rules call for a somewhat higher level of interest rates in 2025 and 2026 relative to the baseline. As mentioned, these rules are noninertial and place more weight on the output gap. Consequently, they support output growth, leading the output gap to close faster than in the baseline. The federal funds rate under these rules peaks in the second half of 2026. Thereafter, the rules call for gradual interest rate cuts. Qualitatively, the interest rate path implied by the inertial Taylor 1999 rule (with its relatively high weight on the output gap and built-in gradualism) comes the closest to the funds rate path projected by the median SEP forecast.

Let us highlight that in the alternative rules without inertia, the short-term real interest rate — the difference between the federal funds rate and expected inflation — is lower than in the baseline. By itself, this stimulates current demand and provides an intuitive explanation for a faster narrowing of the output gap and higher inflation relative to the baseline. The inertial Taylor 1999 rule also induces lower real interest rates in the short term but through a different mechanism: Lower real rates in the short term are achieved by keeping the nominal rate steady while inflation increases only modestly relative to the baseline. The resulting changes in the forecast are more powerful, however, than the change in short-term rates can explain. This is because of the expectations channel: Households act on the expectation that monetary policymakers are more committed to closing the output gap and less concerned about inflation in the current period and in future periods. Forward-looking households and firms adjust their demand and prices accordingly, closing the output gap faster with a moderate tick up in inflation without requiring strong actions by the monetary authority.

Summary

The baseline NKDSGE model uses historical correlations in the data to generate its forecasts and does not incorporate significant judgmental adjustment. The NKDSGE model also does not explicitly account for any structural changes to the economy that may have been induced by the pandemic. The model projects that output will expand at a near-trend pace over the forecast horizon and that inflation will gradually ease — despite an uptick in current-quarter inflation — toward the FOMC target of 2 percent in 2027. Forecast uncertainty remains high due to several factors, including the size and effects of federal policy changes on tariffs and on immigration. The delayed release of official data for the current quarter also contributes to this uncertainty as it makes it harder to obtain a clearer signal of current macroeconomic conditions. These factors are not directly incorporated into the model forecast.

Figure 1: Real GDP Growth

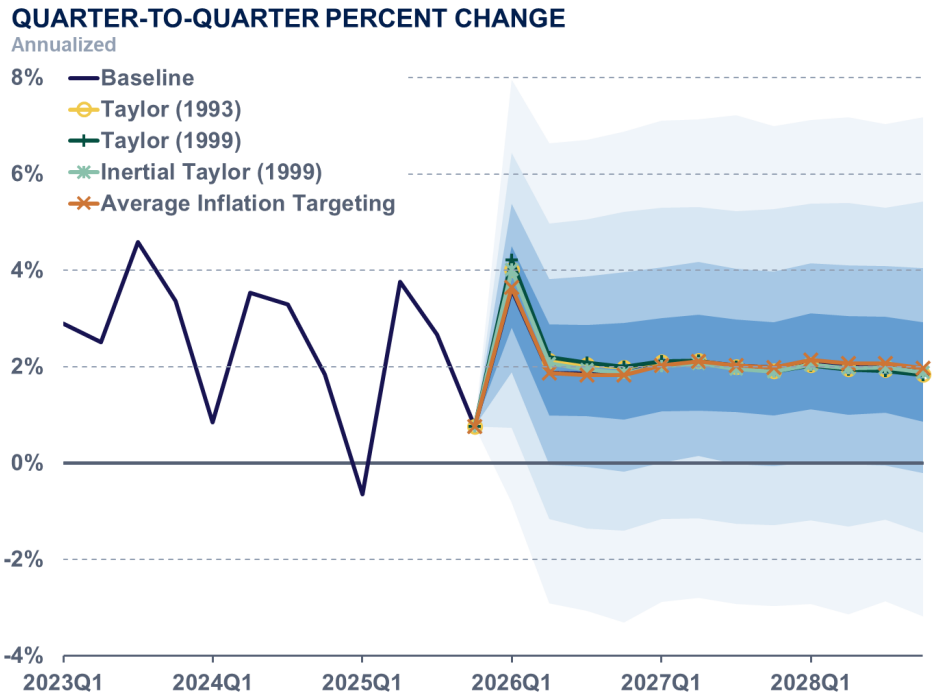


Figure 2: Core PCE Inflation

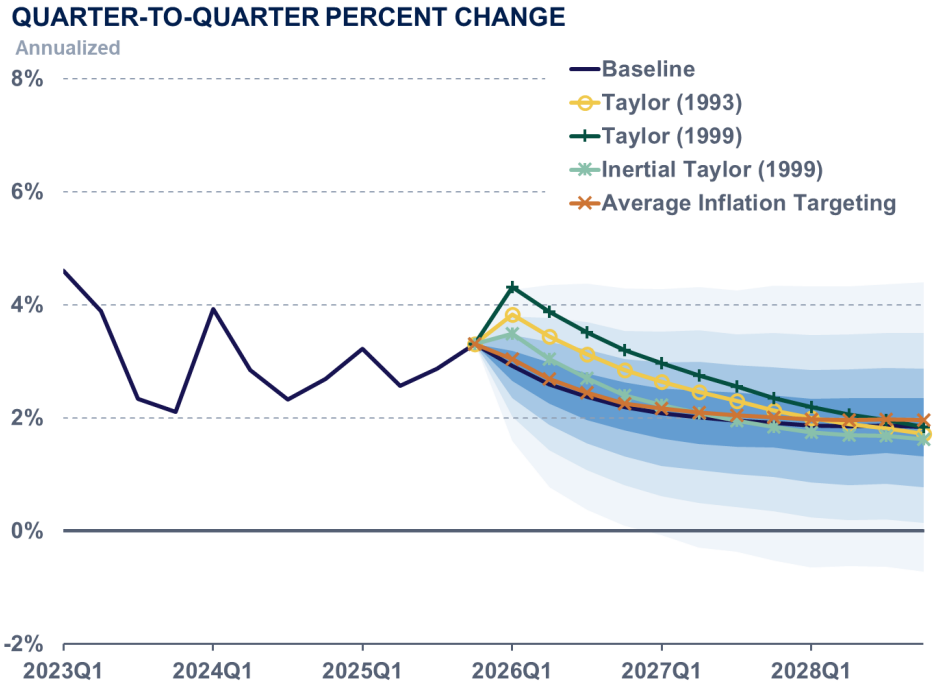


Figure 3: Unemployment Rate

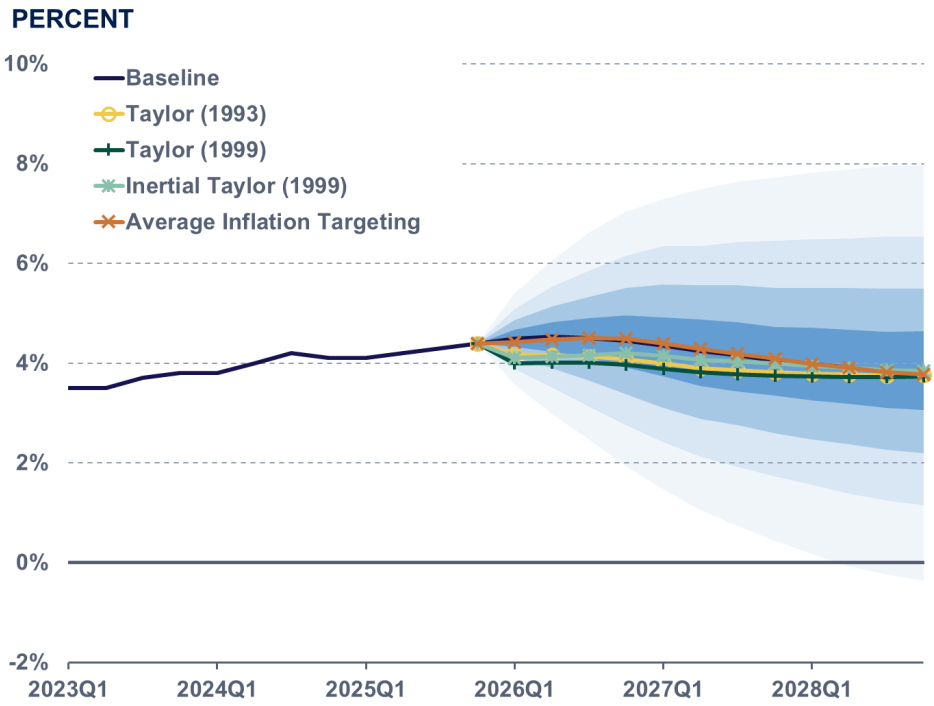


Figure 4: Federal Funds Rate

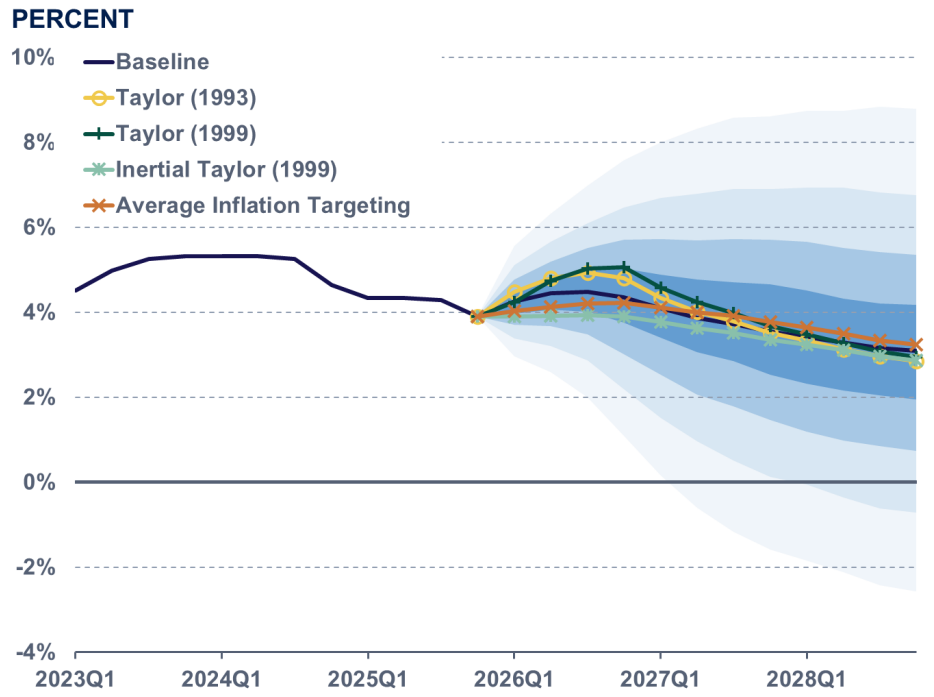


Figure 5: Baseline Forecast Comparisons

Figure 5a: Real GDP Growth

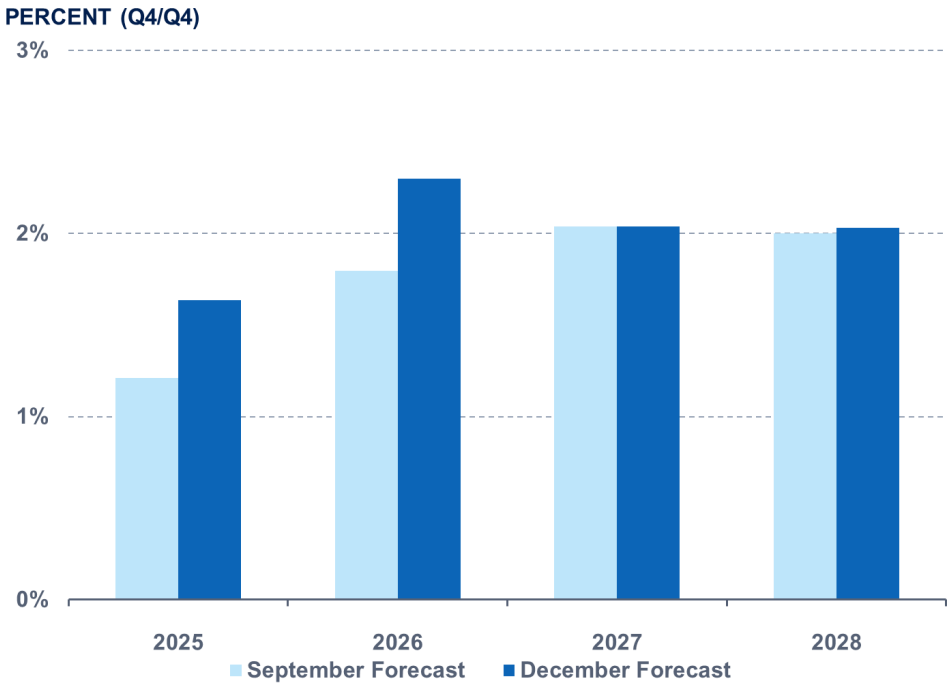


Figure 5b: Core PCE Inflation Growth

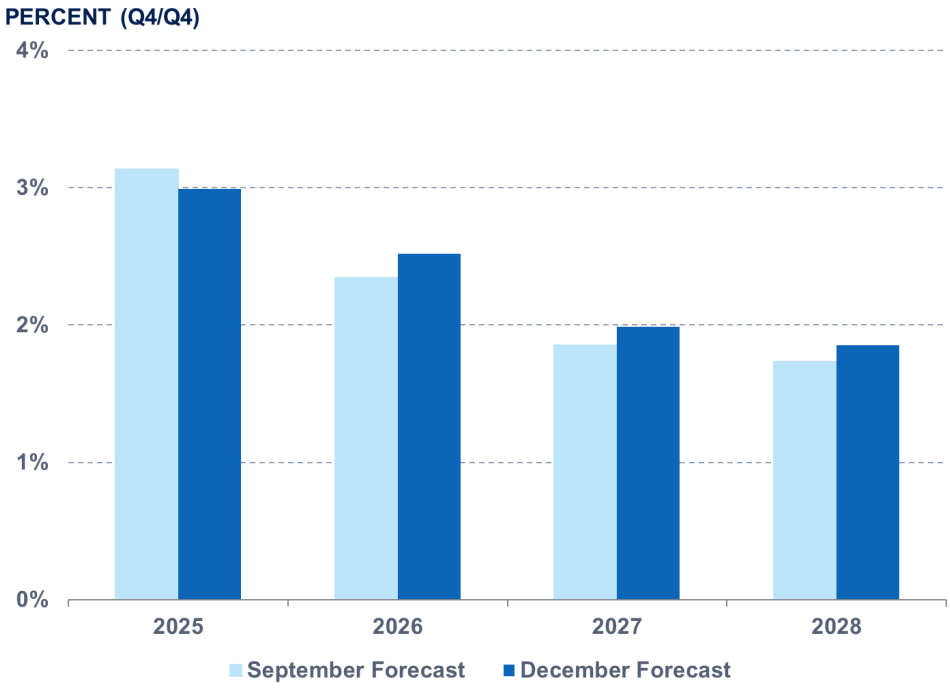


Figure 5c: Unemployment Rate

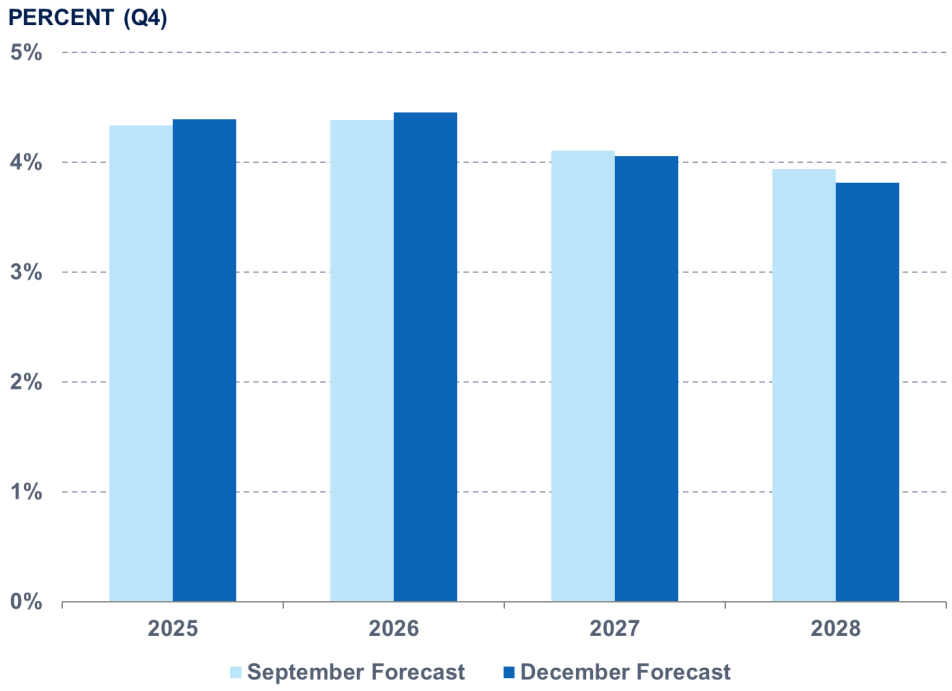
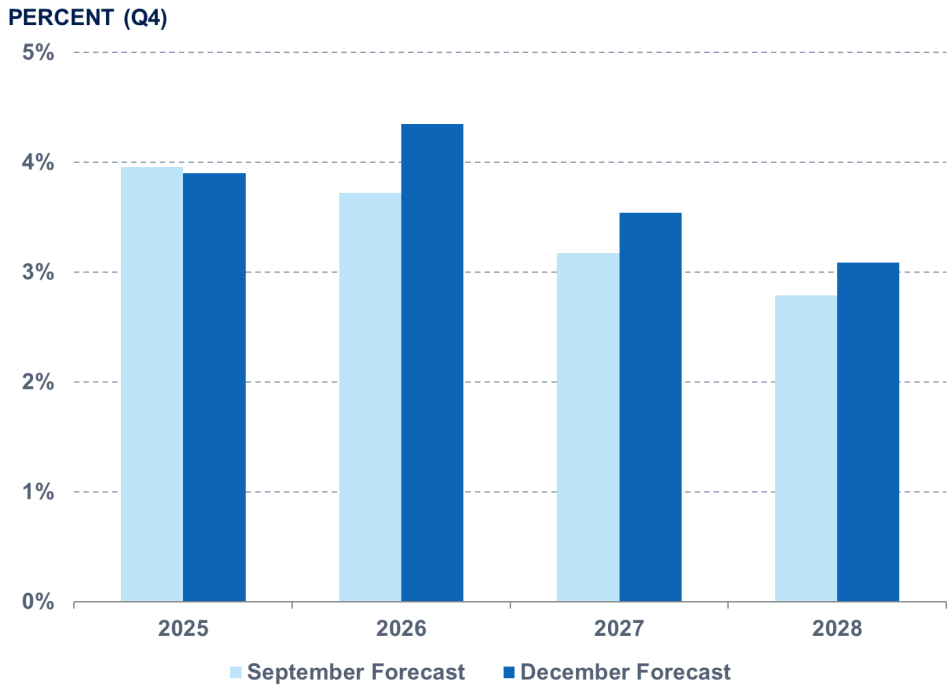


Figure 5d: Federal Funds Rate



Note: Historical data have been retrieved from Haver Analytics.