Finishing the Job, Risks Ahead

Introduction

Mickey D. Levy

This next session is entitled, "Finishing the Job, Risks Ahead." Before I begin, John Cochrane and Mike Bordo, thanks so much for organizing this conference, and John Taylor, congratulations.

When we think about finishing the job, two observations come to mind. First, the Fed has not achieved its dual mandate. Inflation remains well above 2%, and the general price level is nearly 25% higher than it was prepandemic, which does have adverse impacts on American citizens. Second, to finish the job, the Fed needs a robust strategic framework that guides it toward the right monetary policy.

The Fed's current strategic review provides a timely opportunity to correct some of the flaws in the 2020 plan, including restoring symmetry and clarity to its objectives. I would add that while the Fed covets its discretion, to help avoid future policy mistakes, I would love to see the Fed consider how to make better use of systematic rules like the Taylor rule as an input to its discretionary conduct of monetary policy.

As for the risks ahead, some are obvious: In the current environment of tariffs and uncertainties, how should the Fed respond to policy shocks that may conflict with its dual mandate? A more serious risk is the Fed's independence to conduct monetary policy without political interference. Considerations of this risk go beyond the current headlines about President Donald Trump to broader issues regarding the risks of political interference

stemming from the Fed's enlarged balance sheet, involvement in credit markets, and the proper scope of its monetary policy.

We truly have an outstanding group of panelists who have a lot to say. Peter Ireland is a professor of economics at Boston College with a focus on monetary policy, and he is my colleague on the Shadow Open Market Committee.

Kristen Forbes is the all-everything professor of management economics at MIT Sloan School and a significant, earlier contributor to policymaking with critical roles. Jim Bullard is the dean of Daniels Business School at Purdue University and a former president of the Federal Reserve Bank of St. Louis. And I note that Jim is also the newest member of the Shadow Open Market Committee.

Jason Furman is an economics professor at Harvard and was chair of the Council of Economic Advisers under President Barack Obama. He continues to play a critical role in the debate about economic policies.

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Targeting Nominal GDP:

A Monetarist Cross-Check for "Finishing the Job"

Peter N. Ireland

Intellectual diversity at the Federal Reserve, promoted by its decentralized structure, with twelve Reserve Banks scattered across the country and the Board of Governors in Washington, DC, was once one of its greatest strengths.[1] Today, by contrast, a troubling lack of diversity at the Fed appears as a significant liability.[2] One manifestation of this lack of diversity is a narrowness in the range of analytic approaches used by Federal Open Market Committee (FOMC) members to evaluate their monetary policy options and communicate the rationale for their decisions to the public.

Within the Fed, the dominant framework for monetary policy analysis and evaluation is, always has been, and probably always will be, the Keynesian one. According to the Keynesian view, the Fed conducts monetary policy by managing interest rates. Due to nominal price and wage rigidities, policy-induced movements in nominal interest rates translate into movements in real interest rates as well. Changes in real rates then induce consumers and businesses to rearrange their intertemporal spending plans. Shifting spending patterns affect today's measures of aggregate resource utilization, including the

unemployment rate and the output gap. Finally, changes in resource utilization drive movements in inflation. In that last step, the Phillips curve, describing an inverse relationship between unemployment and inflation, becomes the key mechanism through which monetary policy actions, which start by affecting interest rates, ultimately impact the economy as a whole.

Two problems with this Keynesian approach have emerged over the past fifteen years. The first problem stems from recurrent instability in the Phillips curve. From 2009 through 2019, as the US economy gradually recovered from the 2008 financial crisis, the unemployment rate declined to historically low levels. According to the Phillips curve, inflation should have accelerated, returning to the FOMC's 2% long-run target. But it never quite got there. More recently, the FOMC has been trying to bring inflation back down, following its surge in 2021–22.[3] According to the Phillips curve, this disinflation should have required a substantial increase in unemployment. So far, at least, it has not.

The second problem reflects the lack of intellectual diversity referred to earlier. With no other analytical framework to rely on except the Keynesian one, FOMC members have been left adrift by the Phillips curve's instability. They appear to be making policy decisions based mainly on guesswork. It's become increasingly difficult for them to explain to the public what they are doing and why. And it has become almost impossible to describe their contingency plan for how interest rates will need to adjust if something goes wrong, either if inflation remains stubbornly high or if unemployment begins to rise sharply later in 2025. The risks from excessive "data dependency" and discretion are highlighted by the FOMC's outsize, 50-basis-point reduction in the federal funds rate in September 2024, prompted by worries of cumulating weakness in the labor market that subsequently failed to materialize.[4]

Fortunately, there is an alternative framework for monetary policy analysis and evaluation that at least some FOMC members who value diversity might adopt and use "right off the shelf." This alternative view is based on the idea that the Fed should control inflation by targeting nominal GDP instead of relying on a potentially unstable Phillips curve. Its intellectual origins are monetarist instead of Keynesian.

Some, though by no means all, of the arguments favoring nominal GDP targeting are as follows.[5] First, nominal GDP is a nominal variable, measured in dollars or, more generally, "units of the local currency." Nominal GDP is, therefore, under the Fed's clear influence. Although the FOMC cannot control nominal GDP precisely on a quarterly or even an annual basis, through the appropriate choice of policy actions, it can bring about any desired growth rate of nominal GDP, on average, over a period of several years.

At the same time, nominal GDP growth can be decomposed into an equally weighted sum of aggregate price inflation and real GDP growth. Thus, by targeting nominal GDP, the Fed would automatically pursue modest stabilization objectives, as required by its statutory dual mandate, even as it controls long-run inflation. In this way, nominal GDP targeting is less ambitious but more robust than the Keynesian approach to policymaking, which depends on a stable Phillips curve. Nominal GDP targeting accepts that there will always be uncertainty as to how movements in aggregate spending will break down into real and nominal components in the short run. It therefore eschews some fine-tuning in favor of avoiding major policy mistakes.

The simple fact that data on nominal GDP appear quarterly rather than monthly may also be a plus. Focusing on nominal GDP would help the FOMC avoid overreacting to high-frequency noise in the monthly unemployment and inflation numbers, as happened in

September 2024. It would keep the committee's attention where it should be: on intermediate-term trends.

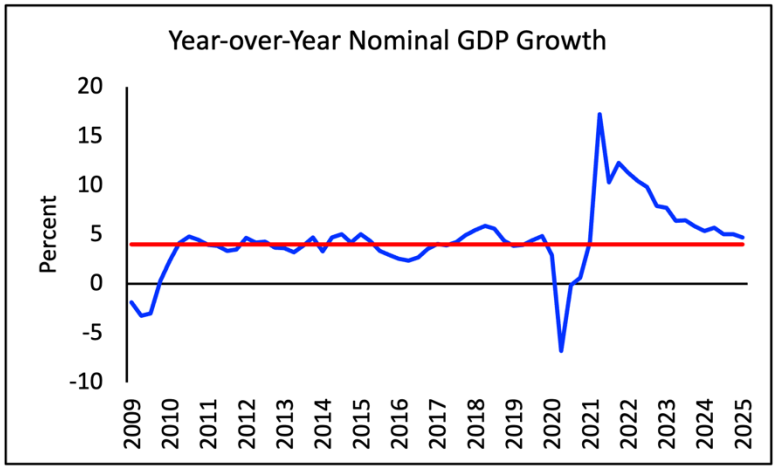
Yet another advantage of nominal GDP targeting is that transitory supply shocks of exactly the kind that have plagued the US economy recently work to move price inflation and output growth in opposite directions, with muted effects on their sum.[6] By aiming to stabilize nominal GDP, the FOMC can maintain the "balanced approach" called for by its 2012 strategy statement and help it avoid both the excessive monetary accommodation, which would generate more persistent and unwanted inflation, *and* the excessive monetary restriction that would weaken the real economy further.[7]

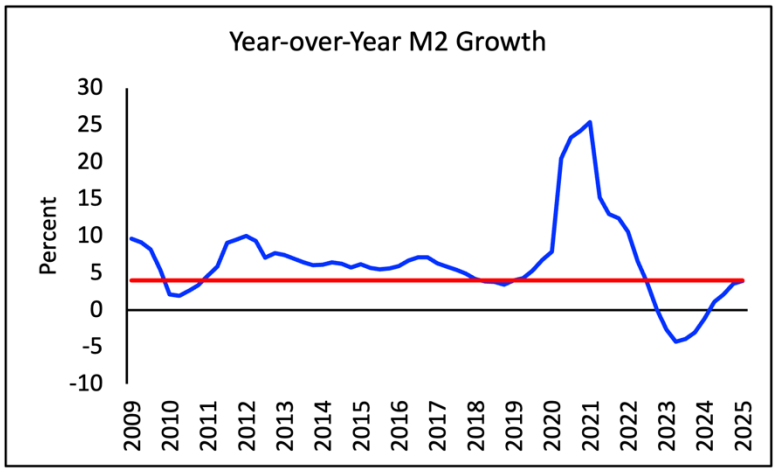
Finally, the equation of exchange $MV=PY$ links nominal GDP, as the product of the aggregate price level P and real GDP Y on the right-hand side, to the money stock M on the left, while also accounting for shifts in monetary velocity V. As the counterpart to Phillips curve instability in the Keynesian model, instability in velocity is the "Achilles heel" of monetarism.[8] But by targeting nominal GDP, "a velocity-adjusted monetary aggregate," the central bank reacts adaptively, calibrating its policy decisions to offset shifts in V with appropriate changes in M.[9]

A related benefit of nominal GDP targeting is that by refocusing some attention on money growth, it places less emphasis on interest rates and thereby downplays the significance of the zero lower bound (ZLB). Whether by traditional federal funds rate management or through large-scale asset purchases that expand the supply of bank reserves, monetary policy actions that stimulate broad money growth will generate faster growth in nominal GDP, both at and away from the ZLB.[10]

Ideally, the FOMC would implement a nominal GDP targeting strategy by following a specific, preannounced monetary policy rule, according to which it would adjust the federal funds rate in response to forecasted deviations of nominal spending growth from the target.[11] Even in the absence of a consensus for a rule-based approach, however, any individual governor or Reserve Bank president could restore some much-needed intellectual diversity to the FOMC's policy deliberations simply by consistently referring to nominal GDP growth as an indicator of the stance of monetary policy in public statements.

To illustrate how, the top panel of figure 10.1 plots year-over-year growth in nominal GDP from the first quarter of 2009 through the first quarter of 2025.[12] The graph nicely summarizes the evolution of both Federal Reserve policy and US economic performance over the past fifteen years. It clearly shows that the extended period of slow but stable nominal GDP growth from 2011 through 2019 was in line with a 4% target, largely consistent with 2% inflation and 2% real growth. Then came the sharp decline in nominal spending during the 2020 economic closures and the even more dramatic acceleration in nominal GDP growth, reflecting the unwanted surge in inflation since 2021. Ultimately, it led to a major policy mistake that highlights the danger of monetary overaccommodation in response to supply-side shocks.





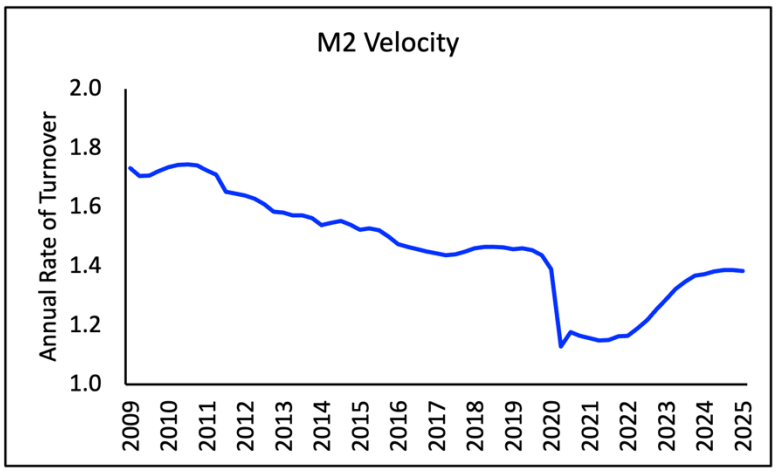


Figure 10.1. Quarterly US data, 2009Q1–2025Q1.
Note: The red lines in the top two graphs mark 4% growth in nominal GDP and M2, consistent with 2% inflation under stable 2% real GDP growth and constant monetary velocity.
Source: Federal Reserve Bank of St. Louis, FRED database.

Most recently, nominal GDP growth has trended steadily downward. But will this trend continue? To help answer this question, the center panel of figure 10.1 plots year-over-year growth in the broad monetary aggregate M2. Despite movements in velocity (falling before and during 2020 and rising since then, as shown in the bottom panel of figure 10.1), fluctuations in money growth since 2009 have paralleled and anticipated subsequent movements in nominal GDP growth.[13] Money growth remained slow but stable through 2019 before surging in 2020, providing a clear warning sign of the inflation that followed. Outright monetary contraction confirms that the interest rate increases by the FOMC in 2022 and 2023 worked as intended, removing excessive monetary accommodation and thereby reducing inflation pressures. Most recently, M2 growth has returned to a 4% annual rate while velocity has returned to its 2019 level, signaling a normalization of both money supply and money demand.

With reference to these graphs, therefore, any FOMC member could reassure the public that the current monetary policy stance remains consistent with a gradual return of

inflation to the 2% target, accompanied by stable real economic growth. And with ongoing reference to these graphs, any FOMC member could just as easily explain that the committee's future interest rate decisions will depend on the behavior of nominal GDP growth. A continuation of the downward trend in nominal GDP growth would allow the FOMC to implement additional gradual and modest interest rate cuts later in 2025. A reversal in this trend, conversely, would signal the need to keep interest rates elevated for longer, especially if accompanied by further acceleration in M2 growth.

Comments like these would add welcome elements of clarity and common sense to the Fed's communications with the public. More generally, monetary policy analysis built around the concept of nominal GDP targeting would provide a useful "cross check" against the far more popular Keynesian approach based on the Phillips curve. In this way, diversity could once again become one of the Fed's greatest strengths.

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I would like to thank Michael Mork for extremely helpful conversations on these topics while also emphasizing that all opinions expressed herein are entirely my own.

[1] Bordo and Prescott (2023, 2025) document how ideas originating at various Federal Reserve Banks led to significant innovations to both monetary and bank regulatory policymaking over the period from 1950 through 2000.

[2] Blanchflower and Levin (2023) and Lacker (2024) provide evidence of increased uniformity of viewpoints expressed by Federal Reserve officials in recent years and discuss the problems this lack of diversity causes for effective policymaking.

[3] Ireland (2022, 2023, 2025) present more detailed quantity-theoretic analyses of both the recent surge in inflation and the Fed's efforts to bring inflation back down.

[4] Hetzel (2025) supplies a broader critical discussion of the FOMC's revealed preference for discretion over monetary policy rules.

[5] Beckworth (2019) provides a more comprehensive list.

[6] Beckworth and Horan (2024) discusses this general point more fully, while Horan (2025) provides specific examples.

[7] Federal Open Market Committee (2012) introduces this "balanced approach."

[8] The "Achilles heel" expression comes from Bernanke and Blinder (1988, p.438).

[9] Tobin (1983) and McCallum (1985) draw this association between nominal GDP and what they more specifically call a "velocity-shift-adjusted monetary aggregate. Related, Ireland (2024a) surveys the events that led prominent monetarist economists on the Shadow Open Market Committee to gradually move away from policy rules stabilizing the money stock and toward alternative rules for targeting nominal GDP.

[10] Belongia and Ireland (2017, 2024) and Ireland (2024b) elaborate on this point.

[11] Beckworth and Hendrickson (2020) and Orphanides (2025) suggest and advocate further for specific nominal income targeting rules.

[12] Tracking year-over-year percentage changes helps keep the focus on intermediate-term trends and avoids overreaction to special factors, such as the surge in imports in early 2025, that often distort the quarterly growth rate figures.

[13] Again, Ireland (2022, 2023, 2024b, 2025) provide details.

11

Fighting Inflation after the Pandemic:

Lessons for the Next Battle

Kristin J. Forbes

When inflation spiked in 2022 to its highest level since 1982 in advanced economies, a number of prominent economists predicted that returning inflation to target levels would require sharp recessions and substantial job losses. Since then, however, inflation has fallen sharply and is expected to stabilize at 2.0% in 2027, while unemployment rates have remained low and most advanced economies have avoided sharp recessions. In fact, some countries have avoided a recession altogether.

The "sacrifice ratio," measured as the output losses per unit of inflation reduction, captures this apparently seamless adjustment (see figure 11.1). The ratio was substantially lower during the postpandemic period than during any historical period of monetary policy tightening since 1970. (See below for details on the calculation of this ratio.)

Most households, businesses and governments, however, are unlikely to agree that this was a "sacrifice-free" disinflation. Many were unprepared for the sharp and unexpected increases in inflation and interest rates, and continue to be unhappy with the permanent increase in prices.

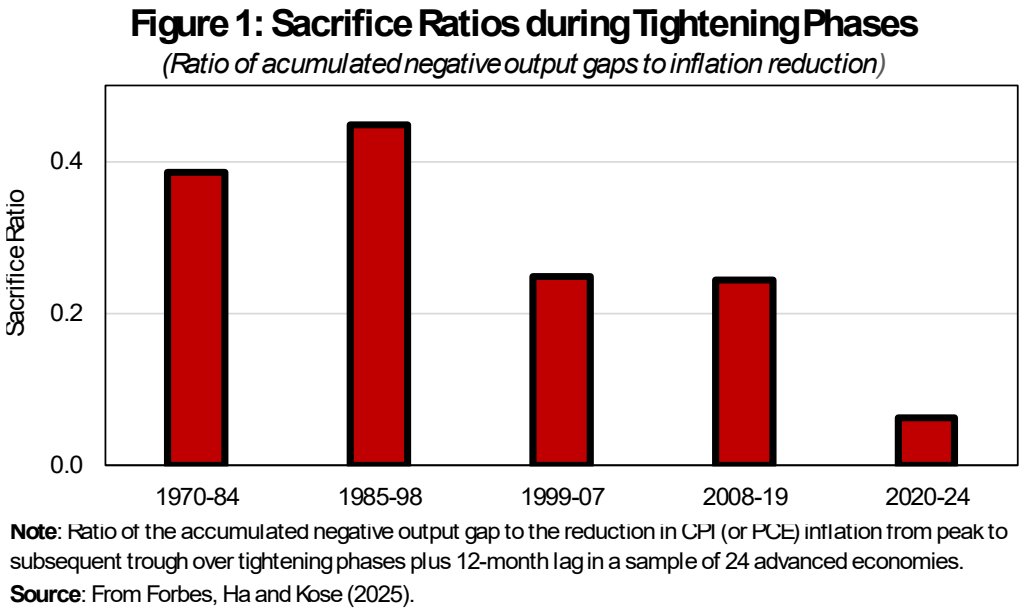


Figure 11.1. Ratio of the accumulated negative output gap to the reduction in CPI (or PCE) inflation from peak to subsequent trough over tightening phases plus 12-month lag in a sample of 24 advanced economies. Source: Forbes et al. 2025.

What can we learn from this episode? Was the postpandemic disinflation the unqualified success implied by the sacrifice ratio? Should the monetary policy strategy followed by central banks after the pandemic be a model for the next battle against high inflation?

My comments will draw three lessons from this experience, with the goal of providing insights into how central banks should respond to the next inflation shock. First, central banks should broaden their approach for defining success, taking into account the extent and duration of deviations in inflation (i.e., the impact on the price level) and not just focus on returning inflation to the target with minimal output losses. Second, central banks should be wary about replicating the "start late, then sprint" approach used for tightening policy, as this involves substantial risks and costly trade-offs. Finally, central banks should prioritize maintaining well-anchored inflation expectations and central bank credibility.

These aspects have played a critical role in stabilizing inflation without larger output losses, but they are weaker today and can no longer be taken for granted. This analysis and discussion draw heavily on my joint research with Jongrim Ha and Ayhan Kose (Forbes et al. 2024, 2025).

While policymakers should always be cautious about drawing lessons from a recent episode (particularly when it involved a global pandemic and an outbreak of war among major commodity exporters), the monetary policy responses to the postpandemic inflation provide important insights for today. Most importantly, central banks should be wary about reusing this playbook for the next battle with inflation. Before the pandemic, many advanced economies had a decade of inflation at—or in some cases well below—their 2% target. This kept inflation expectations well anchored even as inflation spiked. But this is not the case today. This weaker anchoring is of most concern in countries such as the United States, where tariffs will cause inflation to pick up such that annual inflation could remain above 2% for a decade (according to a range of forecasts). In this scenario, much more "sacrifice" would likely be required for central banks to fight the next battle with inflation.

Lesson 1: Define Success More Broadly to Include the Price Level

To better understand the low sacrifice ratios in advanced economies, it is useful to focus on the details of one country. I will focus on the United States, although the patterns are broadly shared across most other advanced economies, and on the nine "tightening" phases for US monetary policy from 1970 through 2024. These are defined based on the algorithm developed in Forbes et al. (2025), which identifies "rate cycles" as the tightening and easing

phases for monetary policy, similar to how a business cycle includes expansionary and contractionary phases.[1]

The sacrifice ratios for these US tightening phases are calculated as the ratio of the accumulated negative output gaps (ANOGs) relative to the reduction in the personal consumption expenditures (PCE) inflation (based on the headline or core index) from peak to subsequent trough.[2] The fall in the sacrifice ratio during the postpandemic period is even more striking than the average for the larger set of advanced economies, as shown in figure 11.1. More specifically, in the United States, the sacrifice ratio collapses to almost zero (0.01 to be precise), well below the prepandemic average for the United States of 0.7–0.8 (based on headline and core PCE inflation, respectively) and lower than during any other tightening episode in our sample.

Why is the sacrifice ratio so much lower after the pandemic than during earlier tightening phases? To understand this sharp decline, it is useful to break out the two components of the ratio, which show unusual movements in both the numerator and denominator. The accumulated output loss is only -0.04% of GDP in the postpandemic period, the smallest of any historical tightening phase. The inflation reduction is an impressive 5.1 percentage points for headline inflation and 3.0 percentage points for core inflation, each of which is larger than during any US historical tightening phase since 1970.

According to these statistics, the postpandemic disinflation appears to have been a resounding success. A quick poll of people who are not central bankers or economists, however, would likely yield a starkly different conclusion. Most surveys showed a sharp deterioration in consumer sentiment over this period, and widespread dissatisfaction with the

economy. This frustration was so strong that it carried over to the polls and played a key role in the turnover of many governments during this period.

What explains this disconnect? Why were households so disenchanted with the economy during this period, despite a record low sacrifice ratio, avoiding the widely expected recession, low unemployment, and inflation falling quickly toward target levels?

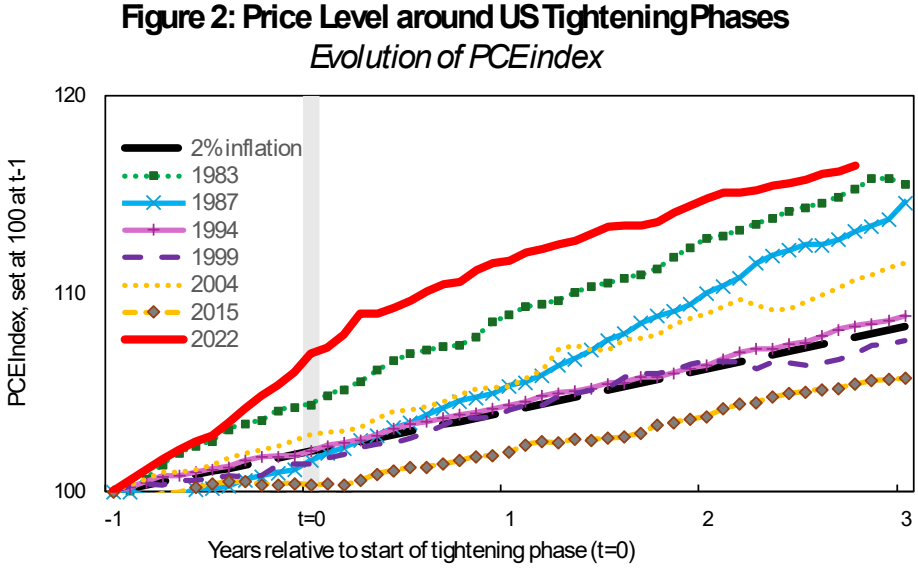


Figure 11.2. Price level around US tightening phases: evolution of PCE index.
Source: Based on data and analysis in Forbes et al. 2025.

A key factor explaining this disconnect is the concurrent increase in the price level. Figure 11.2 illustrates the evolution of the PCE price level for the United States during each tightening phase since 1980, with the postpandemic increase in red and the path for prices if inflation was steady at 2% in black.[3] Prices increased 17 percentage points (cumulatively) over the four years starting in March 2021, much faster than had previously occurred during tightening phases. Prices were 8 percentage points higher than they would have been if

inflation had been at the target over this period. This increase in prices is even sharper than what occurred during the pre–inflation targeting era in the 1980s and is undoubtedly more painful today, as households and businesses have become accustomed to low inflation.

While this sharp increase in the price level contributed to negative assessments of the economy and voter frustration after the pandemic, should central banks care? One of the main justifications for central banks' independence is to give them the ability to make difficult decisions—e.g., "remove the punch bowl"—that may be painful and politically unpopular in the short term but that will benefit the economy in the medium and long run. This critique is important. Central banks should stick to their mandates and should not make decisions to boost their popularity.

With this caveat, large, rapid, or unexpected changes in the price level can have first-order effects on the transmission of monetary policy and a central bank's ability to accomplish its goals. For example, a large or sustained deviation of inflation from target can affect the wage- and price-setting process, potentially leading to a de-anchoring of inflation expectations. When inflation increased sharply after the pandemic, companies adjusted prices more often and households became more attentive to price changes, contributing to more forceful bargaining for wage increases. Even as inflation falls, these changes in behavior and attentiveness are unlikely to return to prepandemic levels. As a result, any inflation shock is more likely to propagate across the economy more quickly, generating larger second-round effects and further weakening the anchoring of inflation expectations (as discussed in more detail below).

For all these reasons, one lesson from the postpandemic disinflation is that central banks should not just focus on returning inflation to target with minimal harm to activity, but

also take into account the impact on the price level. In other words, they should evaluate the magnitude and duration of any inflation deviations when assessing different strategies to obtain their primary targets. This does not, however, imply that central banks should target the price level; the optimal response to certain types of shocks may involve large changes in relative prices and an adjustment in the overall price level. Nonetheless, even while focusing on their current targets, central banks could adjust frameworks and choose strategies that pay more attention to the price level, such as through more explicit discussion and modeling or incorporating language that they will respond "more forcefully" to larger or longer lasting deviations in inflation from targets in both directions (as adopted by the European Central Bank in July 2025).

Lesson 2: Be Wary of the "Start Late, Then Sprint" Strategy

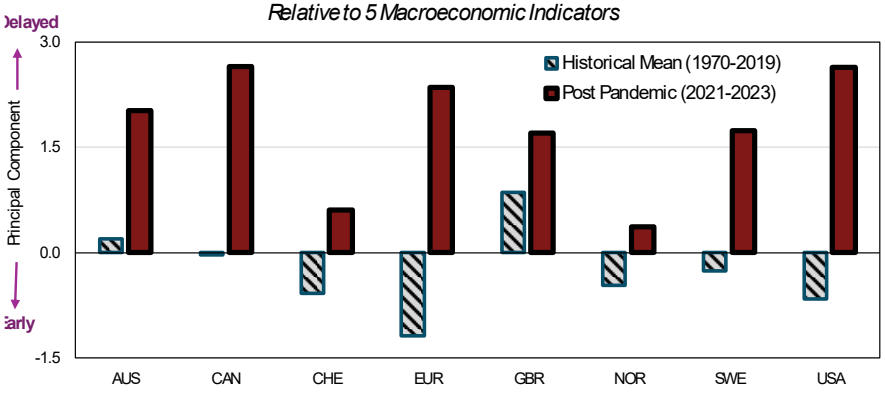
How else could central banks adjust their monetary policy strategy if they decide to place more weight on the price level while still prioritizing returning inflation to target with minimal output losses? A closer look at the central banks' response to the postpandemic inflation—what could be described as a "start late, then sprint" strategy—highlights the impact of decisions such as the timing of the first rate hike ("liftoff") and subsequent rate path.

When inflation picked up much faster than expected after the pandemic, central banks were slow to pivot from easing to tightening monetary policy. As a result, both headline and core inflation rates were already above central bank targets in most economies before liftoff. This was a sharp detour from the textbook strategy of raising interest rates well before inflation exceeds the target, given the long and variable lags for monetary policy

to affect the economy. A number of factors contributed to this delay: inaccurate forecasts; belief the Phillips curve was flat so that inflation and wage growth would remain muted; caution about derailing the nascent recovery after the post-2008 stagnation; belief the inflation surge would be transitory; and constraints adjusting policy due to prior policy commitments through forward guidance and asset purchases (English et al. 2024).

If the spike in inflation was small, short-lived, and driven by external price shocks in a way that did not affect the broader economy, this delay to liftoff may have made sense. A closer look, however, suggests that central banks were also slow to respond to the broader recovery in activity, as demand accelerated faster than expected and faster than supply. Instead, growth bounced back, unemployment rates fell sharply, and output gaps closed. Figure 11.3 shows a measure quantifying the timing of liftoff based on the broader economic recovery (Forbes et al. 2025) and highlights how unusually slow central banks were to start tightening policy given the overall recovery.[4] It is also worth noting that the United States stands out as one of the slowest (along with Canada) to raise rates relative to the strength of its recovery. This delay likely reflected constraints from the new Flexible Average Inflation Targeting (FAIT) framework, which made it more difficult for the Federal Reserve to respond preemptively to the acceleration in inflation.

Figure 3: Timing of First Rate Hike
Relative to 5 Macroeconomic Indicators



Notes: Principal component of timing of first rate hike of each tightening phase based on: CPI (PCE) inflation, core inflation, unemployment gap, output gap and GDP growth
Source: Taken from Forbes, Ha and Kose (2025).

Figure 11.3. Timing of first rate hike relative to five macroeconomic indicators.
Note: Principal component of timing of first rate hike of each tightening phase based on CPI (PCE) inflation, core inflation, unemployment gap, output gap, and GDP growth.
Source: Forbes et al. 2025.

As central banks realized that inflationary pressures were stronger than expected and that they were late to start raising interest rates, they quickly shifted to a more aggressive strategy for tightening monetary policy. Interest rates in advanced economies were hiked much more quickly after the pandemic than in any historical period since 1970–85. These rate hikes were more aggressive than the tightening phases that have occurred since at least 1999 by a range of metrics, including velocity (magnitude of rate hikes over the first six months), amplitude (total magnitude of hikes), and pace (average hike size per months of tightening). Rates were also kept at peak levels for an unusually long period before shifting to easing phases (Forbes et al. 2025).

How did this "start late, then sprint" strategy contribute to the successes and criticisms of the postpandemic disinflation? Regression analysis and simulations in Forbes et al. (2025) suggest that this strategy contributed meaningfully to the low sacrifice ratios and large increases in the price level discussed above. More specifically, the late start contributed significantly to the large disinflations in the denominator of the sacrifice ratio (see figure 11.1) but mainly after contributing to the larger prior increases in the price level (see figure 11.2). If central banks had started raising rates earlier, the price level would still have increased by more than 2% per year, given the nature of the shocks hitting the economy, but by meaningfully less than actually occurred. The aggressive path of rate hikes helped bring inflation down faster, without driving up the price level, but contributed to significantly larger output losses than would have otherwise occurred.

One possible interpretation of these outcomes is that the strategy of "start late, then sprint" is a model to follow in response to future inflation shocks. The delayed liftoff, with the benefit of hindsight, occurred during a period of substantial uncertainty and provided central banks with more time to ensure the recovery was on track. The output losses that traditionally result from aggressive rate hikes were mitigated in many countries through other polices—such as fiscal policy (particularly in the United States)—and were less painful due to the nature of the shocks driving inflation.

This sanguine interpretation, however, ignores three important costs for central banks (besides any fiscal costs). First, this strategy causes the price level to increase by more than would have occurred, and if this increase is large enough, it can change the transmission of monetary policy (as discussed above) and undermine support for the central bank, including the case for central bank independence. Second, more aggressive rate hikes, especially when not expected, are more likely to "break something." Households, companies, financial institutions, and even governments are unlikely to be prepared or hedged. In the extreme, this could generate banking collapses and undermine broader financial stability. The collapse of Silicon Valley Bank and several regional banks in the United States shows how quickly things can "break." Although widespread contagion was contained in this episode, it was a poignant reminder of the risks from unexpected and rapid rate hikes.

Finally, this strategy of "start late, then sprint" can undermine the anchoring of inflation expectations. This is such an important topic that it merits its own discussion.

Lesson 3: Do Not Take Inflation Anchoring for Granted

Over the decade before the pandemic, inflation averaged 1.5% in advanced economies and was below 2% every year from 2013 through 2020. Granted, there was some variation across individual countries, but this extended period with inflation close to (and often below) targets contributed to a strong anchoring of inflation expectations. Critical to this anchoring and window of price stability was the institutional independence and credibility of central banks in advanced economies.

This strong anchoring of inflation expectations and the corresponding credibility of central banks was crucial to bringing down inflation with fairly small output losses after the pandemic. Despite the slow start to raising interest rates, and despite inflation surging to an average of over 7% in advanced economies (and reaching double digits in many countries), long-term inflation expectations remained fairly close to the 2% targets. This helped reduce the second-round effects on wage and price setting, avoiding the need for even more aggressive rate hikes or sharp recessions to stabilize inflation. Although difficult to measure, Forbes et al. (2025) provides estimates of how improved central bank credibility contributed significantly to the unusually low sacrifice ratios after the pandemic, mainly by reducing output losses (that roughly balanced the usual negative impact of the aggressive rate hikes) while mitigating even larger increases in the price level from the delayed liftoff.

What is particularly noteworthy about central bank credibility and inflation anchoring is that they do not involve the difficult trade-offs implicit in other central bank strategies. For example, delaying liftoff has the benefit of providing central banks with more time to assess the economic outlook, but comes at the cost of a larger increase in the price level. More aggressive rate hikes have the benefit of reducing inflation more quickly, but at the cost of larger output losses. Improved central bank credibility and more anchored

inflation expectations have several benefits (lower sacrifice ratios, smaller output losses, and more muted increases in the price level) but no costs, at least in terms of macroeconomic outcomes.

While the postpandemic experience highlights the importance of inflation anchoring and central bank credibility, it may also have weakened these important foundations. As discussed above, the inflation surge has made consumers and businesses more sensitive to price changes and has caused related behavioral changes. These changes are unlikely to fade quickly, even as inflation falls, as seen in consumers' recent preoccupation with the price of eggs and businesses' faster tweaking of prices in response to changes in input costs.

As a result, long-run inflation expectations are not as well anchored as they were before the pandemic.[5] Granted, different measures often provide very different results, and in economies (such as the euro area) where inflation expectations were anchored below 2% before 2020, some of this shift may be welcome. Nonetheless, the recent upward movement to meaningfully above 2% for long-term inflation expectations in some countries is worrisome. For example, the monthly University of Michigan Consumer Sentiment Index of 5-year inflation expectations in the United States has recently jumped from an average of 3.0% over 2024 to 4.4% in April 2025. This is well above the peak of 3.1% during the recent inflation surge, and the highest level since 1991. Although this is just one survey in one country, there has also been an upward movement in other surveys and other countries (such as the United Kingdom).

If inflation picks up again, particularly if the increase is large, it will likely involve more "sacrifice" to return inflation to targets. If inflation is not as strongly anchored, even short-term or transitory increases in inflation will cause larger second-round effects on wage

and price setting. Inflation will be "stickier" and slower to stabilize without even more aggressive rate hikes that cause more painful adjustments in activity. Central banks will need to be more attentive to inflation deviations and ready to respond quickly to any inflation overshoots. The "start late, then sprint" strategy that was followed after the pandemic would be much more costly.

Conclusions

Although the battle for price stability is still ongoing in some countries, the "sacrifice" required to accomplish the large disinflation to date is much less than initially predicted. Countries adjusted to the postpandemic inflation shocks primarily through allowing large increases in the price level and avoiding hits to activity and employment.[6] The sharp increase in the price level, however, raised frustration with central banks and governments, made consumers and businesses more attentive to price changes, and changed wage and price-setting behavior in ways that are likely to persist. Perhaps most disconcerting, this series of events may have weakened the anchoring of inflation expectations—an anchoring that was critically important in achieving the minimal output losses and low sacrifice ratios during the postpandemic disinflation.

What are the lessons for the next time inflation picks up above target, particularly if there is an important supply-side component as occurred after the pandemic? How should the Federal Reserve, or any central bank in a country implementing tariffs, respond to the subsequent increase in import prices and inflation?

Although the impact of tariffs on inflation differs from the postpandemic inflation surge in many important ways, there are several relevant insights. First, central banks should

not focus solely on returning inflation to target at some distant point in the future while minimizing output losses. They should also consider the extent and duration of any deviations from the 2% inflation target. How they balance the relative adjustments between activity and prices, however, would require a detailed welfare analysis. Second, if rate increases are necessary, central banks should try to act preemptively to avoid unexpected and aggressive rate hikes that increase the risk that "something breaks."

Finally, and perhaps most importantly, governments and central banks should put more weight on supporting the anchoring of inflation expectations. For governments, this implies reinforcing the independence of central banks. For central banks, this implies stronger communication and commitment to avoiding another large or sustained deviation of inflation from the target rate. The anchor is weaker than it was in 2020 before the pandemic and could easily break if inflation increases again before stabilizing around targets. In other words, central banks' responses to the next inflation shock should be different.

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This chapter draws heavily on research with Jongrim Ha and M. Ayhan Kose, both at the World Bank, and particularly our joint paper "Tradeoffs over Rate Cycles: Activity, Inflation and the Price Level," written for the *NBER Macroeconomics Annual*, April 2025 (Forbes et al. 2025).

[1] This approach identifies rate cycles for twenty-four advanced economies based on changes in policy interest rates and major new balance sheet programs. The US tightening phases started in 1972 (January), 1977 (January), 1983 (March), 1987 (January), 1994 (February), 1999 (June), 2004 (June), 2015 (December) and 2022 (March).

[2] The ratio is calculated over the tightening phase plus one year (to capture the lagged effects of monetary policy), and the output gap is calculated as a share of GDP using Haver data and an HP filter. See Forbes et al. (2025) for details, graphs, and comparable results using other measures of the output gap.

[3] In each case, the price index is set at 100 one year before the start of the tightening phase. Forbes et al. (2025) also shows these results for the two tightening phases in the 1970s, during which the price level increase during the postpandemic period was initially larger, but then the price level increased by more to exceed that of the postpandemic period after 2 years from the first rate hike.

[4] This measure calculates the timing of the first rate hike during tightening phases based on a principal component of five variables: headline inflation, core inflation, output gap, unemployment gap, and GDP growth.

[5] Movements in short-term inflation expectations are less worrisome as they often reflect temporary movements in gas or food prices and tend to be more volatile, although they can still impact decisions by consumers and companies. See Coibion and Gorodnichenko (2025) for a much more detailed discussion.

[6] Forbes et al. (2025) proposes capturing these relative adjustments with a Price-Output Tradeoff Ratio, measured as the accumulated change in the price level relative to the accumulated output losses during tightening phases. In the United States, this ratio spiked after the pandemic to well above levels during the historical tightening phases since 1970. For a larger sample of twenty-four advanced economies, the ratio increased after the pandemic to levels not seen since the 1970–84 tightening phases.

12

Three Suggestions for Improved Macroeconomic and Monetary Policy

James B. Bullard

This conference has emphasized many of the constructive improvements made in macroeconomics over the postwar era. These improvements have led to a better understanding of how the macroeconomy works, especially with regard to the impact of monetary policy. Countries that have followed the general advice of the macroeconomics profession have tended to have relatively good outcomes with respect to economic growth and inflation, while those that have not have tended toward worse outcomes. This policy success has shaped much of the current global narrative around monetary policy.

Yet all is not well in macro land. Important issues remain unresolved, and some portions of the existing monetary policy narrative are questionable. In this short commentary, I will focus on three parts of the current narrative that I consider to be relatively unsatisfactory and offer three suggestions for improvement. My suggestions are carefully chosen to align with the successes of previous literature. They would merely tweak how we think about the nature and impact of monetary policy and demonstrate how to

implement improvements to the current narrative and the associated public policy choices on each of the three dimensions (Bullard et al. 2024; Bullard and Cakir 2025).

The three areas I wish to focus on are (1) the raison d'etre for monetary policy, which inside macroeconomic models is the friction that rationalizes government intervention in financial markets; (2) the ability of our models to address the impact of monetary policy on the distribution of financial wealth, income, and consumption; and (3) the ability of macroeconomists to discuss the level of nominal indebtedness in the society in a meaningful way.

The three improvements I will suggest together involve blurring the otherwise very sharp Chicago-school distinction between what economists think of as "money" and what we think of as "debt." That distinction was based importantly on rate-of-return dominance. Yet, after the 2010–19 experience, during which a great deal of nominal debt traded at negative nominal interest rates globally, perhaps the time has come to relax this sharp line to some extent.

The Narrative of Monetary Policy

The macroeconomics profession realized in the 1980s and 1990s that in formal models, public policy has to be motivated by an assumed friction—something has to be blocking the invisible hand from allocating resources appropriately; otherwise, one obtains the sort of results found in RBC-type (or real business cycle models), where no public policy intervention is required. In monetary economics, this friction is attributed to sticky prices. During the original debate, this was a highly contentious assumption, but some of the

argument was that the sticky price assumption was a shortcut and would be revisited later. I suggest that now would be a good time to revisit it.

A problem with the sticky price assumption is that the profession is saying, in effect, that we observe an elaborate global monetary policy industry because firms are unable to manage their pricing decisions on their own. This is not a very satisfactory state of affairs, as firms seem to be perfectly capable of designing and implementing sophisticated pricing strategies for their products to maximize profits, and all the more so in the virtual era, as algorithmic real-time price adjustment has become commonplace. A reality check occurred in 2021–22, when a large and mostly unexpected inflation swept through many nations, leading to rapid price changes across nearly all industries.

Could the profession do better by introducing the friction that rationalizes monetary policy slightly differently, but in a way that leaves intact most or all of the valuable logic developed in the literature of the past few decades? I think the answer is yes.

The friction might be better studied as "nominal contracting." Doepke and Schneider (2006) have documented the enormous volume of assets denominated in nominal terms. These nominal assets are vulnerable to unexpected inflation developments, and Doepke and Schneider famously documented the large effects that can be observed through this channel. It seems natural to motivate a major friction as non-state contingent nominal contracting (NSCNC), meaning that assets are nominally denominated and that contracts are agreed to with a fixed nominal interest rate and a fixed repayment not based on the state of the economy or the state of the borrower or the lender at the date of repayment (Koenig 2013; Sheedy 2014). These contracts are known to be suboptimal to optimal contracts, which

would be real, state-contingent contracts of the "equity share" type, provided preferences are homothetic.

Models with this friction, such as those discussed in Bullard, Singh, and Suda (2024) and Bullard and Cakir (2025), come to a conclusion familiar from the sticky price model of Woodford (2003): Policymakers should strive to achieve the Wicksellian natural real rate of interest. This is the real rate of interest that characterizes the equilibrium in the situation where there is no friction in the economy at all. Thus, the basics of optimal monetary policy would not change with the new friction, and the policymaker will still wish to use available policy tools to reach the "correct" real and nominal interest rate for the society. By doing so, the policymaker is able, in effect, to convert the suboptimal non-state contingent nominal contracts into optimal real state-contingent contracts.

While the basics of optimal monetary policy would not change, the narrative would improve. The profession would now be saying, in effect, we observe an elaborate global monetary policy industry because households and firms commit to nominal credit contracts and need to know what the future price level will be in order to make these commitments. A subsidiary comment might be that well-run monetary policy makes the suboptimal nominal contracts work as well as optimal real state contingent contracts.

In this narrative, what monetary policy really needs to do is promise the right level of nominal GDP into the future so that households are assured that when they contract in nominal terms, they will have enough nominal dollars to pay off all their debts. If that works well, then we will obtain a high-quality equilibrium. I think this is a great story about what monetary policy is actually doing. We are all contracting, let's say, five or ten years in the future. We all want to know what the price level will be at various points in the future. The

central bank cannot control the real growth rate of the economy, but it can control the price level in a way that will ensure that the right level of nominal dollars will be there to pay off all future debt.

The Household Heterogeneity Narrative

Household heterogeneity is a well-known fact of economic life. US Gini coefficients (a measure of financial inequality) are approximately 0.78 for financial wealth, 0.55 for income, and 0.32 for consumption. Despite this, nearly all the intuition concerning high-quality monetary policy has been developed using models without household heterogeneity. This left practicing macroeconomists with little to say when the inequality debate was reinvigorated following the global financial crisis.

The profession has responded with a high-quality and burgeoning HANK (Heterogeneous Agent New Keynesian) literature, which has made progress in building models that incorporate inequality and monetary policy (Kaplan et al. 2018). These models do, however, seem to be upsetting the conventional distinctions between monetary policy and redistributional fiscal policy. Sargent (2023) remarks that "[HANK models challenge] the neoclassical synthesis and a widely believed prescription for separating macro policy design from policies to redistribute income and wealth." Bhandari et al. (2021) found that their HANK model breaks down conventional boundaries between monetary and fiscal policy, as the Ramsey planner devotes nearly all policy effort toward providing insurance for households against otherwise uninsurable idiosyncratic income risk.

Can we develop a benchmark heterogeneous household model that preserves conventional monetary-fiscal boundaries? I think the answer is yes. One simple step is to

place increased emphasis on the lifecycle as a source of measured income, financial wealth, and consumption inequality (Bardóczy and Velásquez-Giraldo 2024). Huggett et al. (2011) found that 63% of lifetime earnings could be explained with information available at age twenty-three. This suggests 37% can be explained by uninsurable idiosyncratic risk (in other words, luck). Ideally, we would like a model of macroeconomic inequality that preserves the predictable nature of lifetime earnings and still leaves some room for idiosyncratic risk.

Bullard and Cakir (2025) provide one model with this feature. The equilibrium they study features high levels of inequality but maintains conventional monetary and fiscal boundaries. In particular, the central bank aims to maintain a smoothly functioning credit market for all households by alleviating the nominal contracting friction, leaving the fiscal authority to focus on the desired degree of redistribution. A model in this class can provide a benchmark, which can be used to study more complicated economies.

A Better Nominal Assets Narrative

Including a nominal contracting friction along with more emphasis on household heterogeneity via lifecycle features gives rise to a natural demand for nominal assets. These assets are not money, as typically defined in the literature, because they are interest bearing, but they are, nevertheless, a close relative of money. This demand for nominal assets is due in part to the NSCNC friction. But it is also due to (1) the degree to which households wish to hold assets to smooth consumption over their lifecycle, and (2) the degree of luck experienced over the lifecycle. Bullard et al. (2024) calibrated the (positive net) supply of nominal assets in the US data as 4.52% of GDP. In a $30 trillion economy, that would be about $135.6 trillion worth of nominal assets, a big-ticket item.

The macroeconomic profession has wrestled with ideas about what constitutes "too much debt" and, especially, "too much government debt" for many decades. The narrative in the model outlined here suggests that notions of excessive or unsustainable levels of nominal assets would have to first take into account the natural demand for those nominal assets within the society. That, in turn, would depend on the need to hold such assets over the lifecycle to smooth lifecycle consumption, as well as the degree to which uninsurable income risk affects lifetime earnings. One cannot begin to answer queries concerning excessive or unsustainable debt without answering these preliminary questions. Furthermore, in a multicountry model, all countries would have a natural demand for nominal assets based on these fundamentals in the particular countries, and ultimately, assessments would have to be made at the global level, not the local level.

Conclusion

The global monetary policy narrative has produced broadly successful policy advice in the decades following the publication of Taylor (1993). Nevertheless, changes will likely have to be made to have the same level of success in future decades. I have made three suggestions: (1) Focus the friction motivating monetary policy on the credit market as non-state contingent nominal contracting (NSCNC) motivated by Doepke and Schneider (2006); (2) develop a more extensive model of household inequality with lifecycle features and calibrate so that more than half of lifetime earning is predictable early in the lifecycle, following Huggett et al. (2011); and (3) assess observed levels of outstanding net nominal assets against the natural demand for such assets (which, in the model, is substantial) in order to make judgments about whether observed debt levels are excessive or manageable.

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Any views expressed are my own and do not necessarily reflect the views of the Mitch Daniels School of Business or Purdue University.

General Discussion

Mickey D. Levy: You [the panelists] have all articulated your strategy for how to improve the future. What are the risks ahead? Does anything jump out at you now?

Kristin J. Forbes: I can jump in as this links to what I said in my comments. I worry that inflation expectations are not as well-anchored as we have all come to believe, and trust and count on.

The fact that inflation went up to double digits in some advanced economies over the last couple of years, and medium and long-term inflation expectations stayed pretty well-anchored is really, really remarkable. Now inflation has come back down, but people are much more sensitive. Open up the newspaper in the US, and we know what's happening with egg prices on a day-by-day basis.

People are just paying a lot more attention to inflation. So I am worried if in the US prices go up, say around tariffs, even if all our models suggest it's temporary and something you could look through in some circumstances, that only works if inflation expectations stay well-anchored. And I don't think we can count on it today, the way we could a few years ago.

James Bullard: What I was trying to get across in my comments was that the intellectual underpinnings of success in monetary policy are being undermined in the direction that the literature is going in right now. If you take the HANK (Heterogeneous Agent New Keynesian) models very seriously, and I think the lead research does tend to be very

influential over time, you might get a very different room full of people and a very different type of monetary policy in the future. I'm not sure it would be good, but that's the direction things are going.

Jason Furman: I think uncertainty is just the biggest problem we face, and there are three levels of it. The first is, what will happen to tariffs in July, for example? Reciprocal tariffs are supposed to come back. But it took a whole month to negotiate a free trade agreement, a sort of minor deal, with the United Kingdom. What's it going to be for the rest of the world?

The second is uncertainty about the consequences of that policy. Notwithstanding research done, including by people in this room, I don't think we have a completely reliable way to plug uncertainty into a model and tell us what's going to happen to unemployment and inflation.

And third, there is uncertainty about the outlook for uncertainty itself. We are unlikely to have a complete resolution to the tariff thing in July. Will the whole issue be behind us, and will we be focusing on tax cuts and deregulation? Or will tariffs just pop back again constantly? Three levels of policy-induced uncertainty are something we haven't seen before.

Michael J. Boskin: First, I applaud, especially Jason. I interpret what you're saying is we need a little humility in policymaking, and I think that's really, really desirable. My second point is that I view by far the greatest uncertainty and risk facing the economy is, over the long run, productivity growth and what happens if there's any sizable difference over long periods of time, say, between 1% and 2%.

What does that do to populations that are not seeing their standard of living grow any faster, and the demands they place on systems, and so on? So it's in the background [as] we

talk about short-run stabilization policy. But just FYI, let's not forget that it gets me to my third point in a question for Jim [Bullard], which is that you emphasize Hank models.

And yes, they give us some insight, and you emphasize Bhandari, Evans, Golosov, and Sargent (2021), but that and fiscal monetary interactions and the Taylor rule don't work so well for an infinitely lived Ramsey planner program. But in the Bhandari et al. model, you only have lump-sum taxation and a linear labor tax, and so you're ensuring against states of the world with monetary policy.

But we have very different fiscal instruments, and they do a lot both to stabilize the macroeconomy to some extent with automatic stabilizers, and to redistribute the way we have transfer payments and contingent transfer payments, depending on the state of the economy, and a variety of things of that sort.

Plus, we have a progressive income tax, as many countries do. You could argue it's too progressive, not progressive enough, doesn't raise enough revenue, raises too much, whatever you want to do. But I would just be very careful about concluding anything about monetary fiscal interactions based on a model with such a primitive understanding and primitive modeling of the fiscal system.

We know from decades of public finance and second-best public finance literature that results can vary a lot depending on what you assume the instruments are, how they're fixed, and how much they can vary. So, I just urge a little bit more humility in jumping to have the Fed pay a lot of attention to inequality issues.

We have an old theorem in economic planning that you need as many instruments as you have targets. And so, we had better be pretty careful about having the Fed take even

more things into account or try to compensate for inadequate redistribution or insurance in the fiscal system, when actually a lot more exists in the real world than in the model.

Steven J. Davis: I share Jason Furman's concern about the extent of uncertainty, much of it induced—most of it induced—by policy. He rightly pointed out that our capacity to quantify that uncertainty is limited, and our understanding of how uncertainty actually works through the macroeconomy is also limited.

There are many ways to improve along those dimensions. One that I've been involved in with folks at the Atlanta Fed and various other projects is to ask individual people, influential ones, what they perceive about the environment they operate in and how it will affect their decision making and their plans over the next six months.

A survey of business uncertainty fielded by the Atlanta Fed that I helped design is one systematic effort in this direction. The questions we fielded in the April 2025 survey, and explicitly asked business executives about, included the impact of policy uncertainty on investment and hiring plans over the next six months at their firms. We had about a thousand responses drawn across industries and states.

Specifically, we asked about the own-firm impact of uncertainty around tariffs and taxes over five or six categories, and whether it is influencing their plans over the next six months for investment and hiring. About 40% of the executives said the uncertainty that they face in the policy environment has caused them to scale back their hiring plans in the next six months, and about half of them said it's causing them to scale back their investment plans. Those are big numbers.

We followed up with a quantitative question. Business executives tell us that the uncertainty that's arisen in the past couple of months is leading them to cut their capital

investment spending plans by about 16%, on average, over the next six months and to reduce their gross hiring by about 13% over the next six months. In calculating these averages, we include the firms that say policy uncertainty is not affecting their plans.

These are nontrivial effects of policy-generated uncertainty. They're probably not enough by themselves to drive the economy into recession, but they are large enough to contribute to a material slowdown in the economy.

We also asked them what the most important sources of policy-related uncertainty were for their own businesses. You won't be surprised to find out that tariff policy is the overwhelming winner.

Evan Koenig: This is motivated mostly by Peter Ireland's comments, but I think it's also related to things that Jim said and that Kristen said. You were looking at nominal GDP growth over a four-quarter period, I believe. Is that the appropriate horizon? One reason we saw a huge increase in the price level was that, although nominal GDP growth initially fell in response to the pandemic, it then overshot for an extended period of time. Even though the growth rate has gotten back close to 4%, the level of nominal GDP is a heck of a lot higher than it would otherwise have been. What's the appropriate horizon for looking at nominal GDP growth? Perhaps we need to look at the level of nominal GDP instead.

Sebastián Edwards: Larry Christiano yesterday brought me all the way back to my undergraduate years when he drew the IS-LM curves. When I learned macro, my first textbook was Martin J. Bailey. If you remember Martin, he was a great economist for the University of Chicago and at the University of Maryland. Now, the LM curve, which Larry Cristiano was shifting around, is the synthesis of the supply for money and the demand for

money. The one thing that we haven't heard at this conference is anything about the demand for money in an explicit way.

This brings me back to Argentina. Maybe the demand for money is not that important anywhere in the world, but I can assure you that in Argentina, it is very important. And with CBDCs (central bank digital currency), there's no reason. If Argentina relapses—it's doing well right now, but if it relapses back into inflation—there will be no demand for Argentine pesos, and the central bank of Argentina will have a very difficult time.

Is the demand for money still something that the people in the panel and generally at this conference worry about?

The second issue: we've talked a lot about the history of thought here. I really liked what Jim Bullard did, but I think that his nominal contracting can be found back in Don Patinkin's work, who is another name that has disappeared from our discussion. He was at the University of Chicago, my first professor in monetary theory. If one goes back to his thick book, there's a lot of nominal contracting and real balance effects, and they play a very important role in the transmission mechanism. So I wonder whether Jim's very interesting work would take into account some of those contributions.

Peter N. Ireland: Let me respond to Sebastián. In the paper I prepared for today's session, I dig one step deeper behind the trends in nominal GDP growth and look separately at M2 and velocity. I think one of the ways in which nominal GDP targeting can add intellectual diversity is to gently push some economists in that direction. As it happens, M2 growth has stabilized at about 4% per year. Velocity is more or less back to where it was in 2019. So using these numbers as a cross-check, what they tell me is that monetary conditions have normalized and are consistent with a return of inflation back to 2%.

Forbes: I'll jump in on the comments on uncertainty and productivity growth, based on my experience when I was at the Bank of England during Brexit. We spent a lot of time thinking about the effect of uncertainty after the surprise Brexit vote. Initially, we saw all the survey data collapse. We all knew uncertainty was bad, but it was very hard to know how large the effect would be. Back to Steve's comment on "What is the impact? How big will it be?"

The initial reaction by many people was that Brexit would freeze business and freeze activity. All the surveys suggested it would be extremely negative. That caused the Bank of England to do a very aggressive easing in response to what we thought would be a collapse in output. But instead, what we saw was how resilient firms and consumers were.

Maybe half the country wanted Brexit, but companies adjusted pretty quickly in the short run. So the impact of uncertainty actually wasn't big in the short run. Where it hit was longer term via reduced investment. Activity continued, companies figured out how to work around Brexit, but they hesitated with new investment. Over time, that meant productivity growth fell quite a bit, and now UK productivity growth is quite a bit lower than its peers.

I see this as the biggest risk around uncertainty today in a lot of ways. We've seen how resilient companies are over the last few years, handling the pandemic and handling sanctions. We've seen trade reroute around the world. Companies are resilient, but there will be less investment. And in some ways, the resulting lower productivity growth, longer term, will be the biggest cost overall.

Bullard: I would like to respond to Michael Boskin, remarking that public finance includes a lot of insurance. I totally agree. But it does make sense that, facing all the idiosyncratic risk out there, a Ramsey planner is going to want to insure people against that risk if they can. And the planner might use monetary policy to do that. That's the message of the Bhandari et

al. paper. Surely, it's not a very realistic setting. I agree with that. But my point is to write down a benchmark model that has the same heterogeneity that HANK models have and then get the separation we all think is there concerning monetary policy and fiscal policy.

Why does that separation come about? It is because monetary policy influences the real economy through the real interest rate, which is the same for the whole economy. All kinds of people, rich and poor, young and old, use credit markets. You do not want to distort that because that affects everybody in the economy.

If you want to redistribute to the lower end of the income distribution, you use fiscal policy to do that. You want to have a model that starts from there; that's your benchmark model. Then you go and do all kinds of things with heterogeneity from there.

So that's a little bit of a twist on what I think the HANK literature is doing.

Evan Koenig asked about the horizon for nominal GDP in the model I'm talking about. It would be one period ahead. But by extension, it's at all horizons, all the way up to thirty years or farther if you want. So there would be this whole path of nominal income that the central bank felt like they could realistically deliver on. And in the model, they deliver perfectly.

You say, well, given circumstances in the economy and what I think I can do with the price level, I think the nominal income will be 5% higher (for example) two years from now. If you say something like that, then everyone goes and contracts based on that. And then you make sure you deliver on that. That's perfect credibility. And then you get this really nice outcome of optimal monetary policy. So the answer is all the horizons, I guess.

To answer Sebastián Edwards, yes, there is money demand. These ideas are blurring the distinctions that would be very popular in this room, that there is something called

money, and then there is something very different called debt. But I would challenge you to recall that between 2010 and 2019, there seemed to have been a lot of pieces of paper out there that had an interest rate on them, but the interest rate was zero.

So what was the difference between that stuff and the currency that you were carrying in your wallet? We even observed negative nominal interest rates during this period. If you think more in those terms, maybe it's not so bad to think about the money as being interest-bearing money.

How much demand is there for interest-bearing money? Do your monetarist-type calculations. That's been unpopular, but I think that's the direction things should go in. And the model I'm talking about goes in that direction.

Jason Furman: On productivity: First of all, for our long-run well-being, obviously it's more important than anything else we've been talking about.

It makes me more worried about nominal GDP targeting when the variance of possible productivity outcomes over the next decade or two is so large. Maybe there's some mechanism for adjusting what the reference target and the like are. In the shorter run, it does raise some interesting questions.

I think we're getting more demand associated with the hope for future productivity than we are getting actual productivity now. And even if we get the productivity, will it work out as it did for Alan Greenspan? Did he figure it out sooner than anyone else, or did he just get lucky? Should the next central banker try to do that?

I think the greater emphasis on rules over discretion would say don't try to be Alan Greenspan and readjust monetary policy based on a bet around productivity.