HASSAN AFROUZI
Columbia University

KENNETH ROGOFF
Harvard University

MARINA HALAC
Yale University

PIERRE YARED
Columbia University

Changing Central Bank Pressures and Inflation

ABSTRACT We introduce a simple long-run aggregate demand and supply framework for evaluating long-run inflation. The framework illustrates how exogenous economic and political economy factors generate pressures that, in the presence of central bank discretion, can have an impact on long-run inflation as well as transitions between steady states. We use the analysis to provide a fresh perspective on the forces that drove global inflation downward over the past four decades. We argue that for inflation to remain low and stable in the future, political economy factors, such as strengthened central bank independence or more credible public debt policy, would need to offset the global economic pressures now pushing average long-run inflation upward.

The global increase and persistence in inflation during the past two years has led to much debate regarding the long-term path of inflation. A prevailing view is that inflation levels will not only fall back toward central bank inflation targets, but that they will also on average stay there for the indefinite future. This is certainly true for medium-term official projections: the US Federal Reserve dot plot and the European Central Bank staff project an inflation rate of 2.0 and 1.9 percent in 2026, respectively, essentially at the 2 percent inflation target.[1] Several emerging market central banks

1. See US Federal Open Market Committee (2023) and European Central Bank (2023).

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also project long-term inflation rates very close to their targets (which are generally higher than those of advanced economies).[2]

An alternative albeit less common view, articulated in a recent book by Goodhart and Pradhan (2020), is that persistent structural changes in the global economy will keep future global inflation higher on average than in the past. Put differently, factors that may have previously eased political economy pressures on central banks to inflate—including globalization, demographics, and fiscal restraint (Rogoff 2003)—may be reversing themselves, reawakening a latent inflationary bias. In practice, this upward bias may not necessarily imply a rate of inflation that is continuously above current target levels, but it could materialize in the form of occasional bursts of sharply elevated inflation.

The purpose of this paper is to consider these two views—and the subject of long-run inflation more broadly—using economic theory and data. The economic, social, and geopolitical changes that have taken place over the past few years, especially post-pandemic, are quite striking, and we suggest it is useful to have a framework that encompasses at least some of them. This framework can help us understand the implications of recent developments for the political economy of inflation.

As a starting point, we observe that current approaches to the study of the New Keynesian model assume away political economy issues to such an extent that they are ill-suited for an analysis of long-run inflation. These standard and indeed ubiquitous models typically abstract away from the issue of long-run inflation entirely and consider transitory dynamics around a zero-inflation steady state. There exist some normative models that allow for long-run dynamics, but they too predict that long-run inflation is independent of political economy pressures that interact with the underlying economic environment. More specifically, under the optimal central bank policy with commitment (i.e., assuming the central bank can commit to an infinite sequence of future policies), inflation converges to zero in the long run, a result that holds independently of economic parameters.[3] But what if

2. For example, Banco Central do Brasil (2024) projects an inflation rate of 3.2 percent in 2025, just above its 3 percent inflation target.

3. This result is formalized in Benigno and Woodford (2005) and Schmitt-Grohé and Uribe (2011) in a deterministic economy. Coibion, Gorodnichenko, and Wieland (2012) reach a similar (approximate) conclusion in a numerical analysis of a stochastic economy subject to a zero lower bound.

the issue of commitment is not as thoroughly solved in practice as current consensus posits, and central banks actually use their discretion? What if the past few decades marked an epoch where political economy pressures on central banks to inflate were unusually low? Once that is considered, we show that the standard New Keynesian model gives a perspective on central bank commitment and long-run inflation that goes well beyond the models of Friedman (1968) and Barro and Gordon (1983). In our framework, long-run monetary policy has long-run real economy implications. Moreover, we elucidate how long-run inflation depends on the economic environment both theoretically and quantitatively, and how it evolves dynamically in response to permanent changes in the environment.

Our framework is a heuristic representation of the theoretical model we have analyzed in detail in Afrouzi and others (2023). That model consists of a standard nonlinear New Keynesian economy with sticky-price monopolistically competitive firms, but with a couple of distinct features. First, we depart from the conventional approach of employing a linear approximation in the neighborhood of zero inflation. In doing so, we unmask an important long-run effect of inflation on aggregate demand that gives long-run comparative statics more akin to Tobin (1965) than Friedman (1968). This is not a result of introducing political economy factors; it follows from looking more closely at first-order effects that are obscured in the standard linearization around zero inflation of New Keynesian models. Second, we introduce political economy factors by assuming that the central bank lacks commitment and uses its discretion, with central bank strategies and private sector beliefs that are a function of payoff relevant variables. As Halac and Yared (2022) have shown, this implies that steady-state inflation may be higher than optimal in the New Keynesian model.

Of course, lack of commitment may not matter if the central bank has a strong enough anti-inflation bias. However, we argue in this paper that such a bias cannot be taken for granted looking into the future. In fact, this bias may have been exaggerated as an explanation for the decline in inflation over the past several decades, which was also likely due to a favorable economic environment. In our model, central bank discretion interacts with economic factors, such as globalization, to generate *endogenous* political economy pressures on central banks that drive changes in long-run inflation as well as in the real economy. To account for varying degrees of anti-inflation bias in our framework, we augment the baseline model presented in Afrouzi and others (2023) by considering central bank preferences that might differ from those of households, as in

Rogoff (1985).[4] This extension allows us to also capture the *exogenous* political economy pressures on central banks or changes in institutional design that increase or decrease long-run inflation. The model that we propose is not a normative guide to monetary policy, but a positive model to evaluate long-run inflation given the endogenous and exogenous political economy pressures on central banks.[5]

In our framework, the long-run aggregate supply curve corresponds to the well-known Phillips curve that characterizes New Keynesian models, except that we allow for nonzero steady-state inflation. The long-run aggregate demand curve, which is less familiar, emerges in a nonlinear setting where higher long-run inflation leads to higher price dispersion, and that leads to lower demand. Naturally, if there is perfect long-run indexation to the aggregate price level, this effect would go away. But if one accepts the staggered price setting assumption that plays such a critical role in explaining output and inflation dynamics in the New Keynesian synthesis, then the long-run aggregate demand effect of inflation can be first order.

The long-run aggregate demand and supply curves shift in response to factors that exogenously alter the economic environment and thus, endogenously, change the political economy pressures on central banks (such as structural changes that have an impact on the monopoly power of firms). The curves also shift in response to factors that exogenously change the political economy pressures experienced by central banks directly (namely, factors that affect the stance of monetary policy). The changing central bank pressures lead to changes in long-run inflation and output, which can be quantitatively evaluated.

Our analysis reveals new long-run comparative statics implications of the New Keynesian model and delivers predictions for transitional dynamics across steady states. We show that if deglobalization leads to an increase in firm monopoly power, long-run inflation will increase, and short-run inflation will overshoot its new higher long-run level. That is, if deglobalization were to lead to a new long-run average inflation of 3 percent instead of 2 percent, the short-run inflation rate may temporarily be

4. The central bank that we consider lacks commitment as in the model of Barro and Gordon (1983). However, an implicit type of commitment emerges if society can delegate monetary policy to a central banker whose preferences differ from those of households. The degree to which the central bank values household leisure over consumption reflects its anti-inflation bias.

5. Several papers find evidence that political economy pressures on central banks impact inflation, for example, Weise (2012), Binder (2021), and Drechsel (2024).

much higher. Additionally, since the long-run aggregate demand curve is not vertical in our economy (unlike in the standard model linearized around zero inflation), steady-state output would decline. There are other kinds of shocks that can also affect inflation: for example, a strengthening of central bank independence through an increase in the central bank's anti-inflation bias would lower inflation. In this case, the labor share of income would decline, and monopoly distortions would rise, though with the benefit of a more efficient allocation of resources due to lowered price dispersion. The total impact on real output would depend on whether the decrease in output due to higher monopoly distortions outweighs the increase in output due to reduced price dispersion. Quantitatively, we find in Afrouzi and others (2023) that the second channel dominates and thus output increases in the neighborhood of 2 percent inflation.[6]

The social cost of inflation due to higher price dispersion emerges in our framework whatever the degree of price stickiness or anticipation by firms. The magnitude of the costs of inflation is the subject of some discussion. Nakamura and others (2018) argue that these costs are small; however, work by Christiano (2015), Cavallo, Lippi, and Miyahara (2023), and Afrouzi, Bhattarai, and Wu (2024) suggests that in calibrated economies, even small changes in long-run inflation from 2 percent to 3 or 4 percent can have substantial output costs.[7,8] Accordingly, even small increases in future inflation resulting from global economic pressures could have non-negligible economic costs, and this highlights the importance of counteracting (exogenous) political economy pressures to prevent future inflation from rising. Moreover, if a higher average long-run rate of inflation came about because of infrequent bursts of very high inflation, then the average cost would likely be higher than simply having a steady inflation rate above target. The same principle applies if there is overshooting in the transitions as our model suggests.

6. Note that in the New Keynesian model, inflation does not enter directly into the central bank's objective function as in the ad hoc formulation of the Barro and Gordon (1983) model, but only indirectly through its effect on price dispersion. This effect is significant in our nonlinear New Keynesian economy, even in the long run.

7. The cost of inflation in the input-output production network of Afrouzi, Bhattarai, and Wu (2024) is higher than in one-sector models both because sectors with higher dispersion costs have disproportional effects, and because misallocation in one sector spills over to other sectors.

8. This negative relationship between inflation and output in the long run, which emerges in structural models, is consistent with econometric evidence; see Ascari, Bonomolo, and Haque (2023).

The framework that we present provides a richer narrative explanation for the trend in global inflation over the past four decades, beyond those simply pointing to the advent of increased central bank independence and inflation targeting. Through the lens of the model, the global decline in inflation, which took place beginning in the 1980s and 1990s and which accelerated in the 2000s and early 2010s, can be understood to have been underpinned by rising globalization, the deepening Washington Consensus, and deunionization, which all diminished pressures on central banks to inflate. This view may help explain why inflation declined even in countries where central bank reform was at best limited. For those economies with successful central bank reforms to promote independence and inflation targeting, our predictions are not only consistent with the decline in inflation in response to weakened exogenous political economy pressures, but they are also consistent with the decline in the labor share and rising monopoly profits that were experienced by many of those same economies.[9]

Our framework also provides new perspectives on the path of inflation moving forward. We argue that several global economic trends will, more likely than not, increase pressures on central banks to inflate. These include: deglobalization; rising fiscal pressures due to populism and entitlement spending, the green transition, defense spending, and industrial policy; as well as the concomitant rise in long-term real interest rates. In the face of these global economic trends, central banks no longer as constrained by the zero lower bound (which, in a sense, enhances anti-inflation credibility) may find it increasingly challenging, in political economy terms, to maintain average inflation at current target levels. Temporary periods of elevated inflation—perhaps even as high as post-pandemic—could become more common relative to the past. Thus, in contrast to the three decades ending in 2021, implementing stable and low inflation in future decades may require reforms, such as (even further) strengthened central bank independence or (as unlikely as it may seem) more credible public debt policy, to offset the inflationary pressures on central bankers.

Connection to Debate on Monetary Neutrality and Superneutrality

Our work is the first to consider how inflation responds in the long run to persistent economic and political economy pressures on central banks in the New Keynesian model. As such, it connects to much older literature. Since the late 1960s, the dominant paradigm in policy has been Friedman (1968), who posits that money is neutral in the long run. Temporary monetary shocks,

9. See Karabarbounis and Neiman (2014) and De Loecker, Eeckhout, and Unger (2020).

whether to the price level or to inflation, do not have real long-run effects because of an anticipatory channel. Forward-looking firms can only be surprised by monetary shocks temporarily, since they eventually adjust their prices, eroding any of the real effects from temporary monetary shocks.[10]

In the language of the debate on monetary policy of the 1960s and 1970s, money in our model is also neutral in the long run, but it is *not* superneutral; higher steady-state inflation affects real variables. Importantly, this feature does not emerge because firms are myopic; firms in the New Keynesian model set prices in the present in anticipation of future price increases as in Friedman (1968). Rather, because price setting is staggered, long-run inflation affects allocations even in the steady state by changing the long-run dispersion of prices, an effect that is invisible in the standard New Keynesian model linearized around zero inflation. Of course, there are other approaches to modeling the efficiency costs of higher inflation, but the effect that we highlight has long been hiding in plain sight in the most widely used model of central banking. The long-run benchmark of Friedman (1968) coincides with the special case of our framework where firms can index price increases to long-run inflation. In that special case, the stance of monetary policy has no impact on long-run steady-state output, and the long-run aggregate supply curve is vertical.[11]

I. Model of Central Bank Pressures and Long-Run Inflation

We study a simple deterministic environment that is a representation of the model analyzed in Afrouzi and others (2023), but much simplified for expositional purposes. As previously noted, this is a standard New Keynesian model (Clarida, Galí, and Gertler 1999; Woodford 2003; Galí 2015), with monopolistically competitive firms that set prices under Calvo-style rigidity (Calvo 1983). Wages are fully flexible, and households make consumption, labor, and savings decisions. Firms and households optimize their decisions while considering current economic conditions and policies and their expectations of future economic conditions and policies. Critically, however, we

10. The debate on monetary neutrality is far from settled. For example, see recent work by Jordà, Singh, and Taylor (2020) and Ma and Zimmermann (2023).

11. A natural question is whether the effects that we emphasize have quantitative and empirical relevance if the economy is close to the Friedman (1968) benchmark of fully flexible prices. Indeed, for calibrated versions of our model, we find that the economy is close to this benchmark, with an almost vertical long-run aggregate supply curve. However, it is precisely in this case that long-run inflation is most sensitive to small changes in economic and political economy pressures on central banks.

do not follow the literature in assuming that fiscal policy works in the background to provide production subsidies to firms to completely neutralize their monopoly incentives in the steady state.[12] Under such an assumption, typically imposed for tractability, the impact we emphasize of inflation on output and the labor share would become second order. Additionally, as highlighted in our introduction, we do not impose a linearization around zero inflation but instead allow for positive long-run inflation.

We note that in the New Keynesian model, the stance of monetary policy at any given point in time directly maps to a value for the labor share, which is inversely related to the equilibrium level of monopoly distortions (or markups). The more expansionary the monetary policy, the higher the demand, the higher the value of the labor share, and the lower monopoly distortions. Moreover, as we explain below, a constant equilibrium labor share emerges in our model under central bank lack of commitment, with its value being a direct function of exogenous central bank preferences. We use these observations in our analysis to index the choice over monetary policy as a choice over labor share as opposed to inflation or the interest rate. This is for analytical convenience.[13,14] In the Barro and Gordon (1983) framework, of course, monetary policy cannot affect anything real as in Friedman (1968), but that is not the case in the canonical New Keynesian framework, even in the long run.

We next turn to a formal discussion based on a special case of Afrouzi and others (2023), where the analysis collapses to a very simple diagram.

I.A. Steady-State Representation

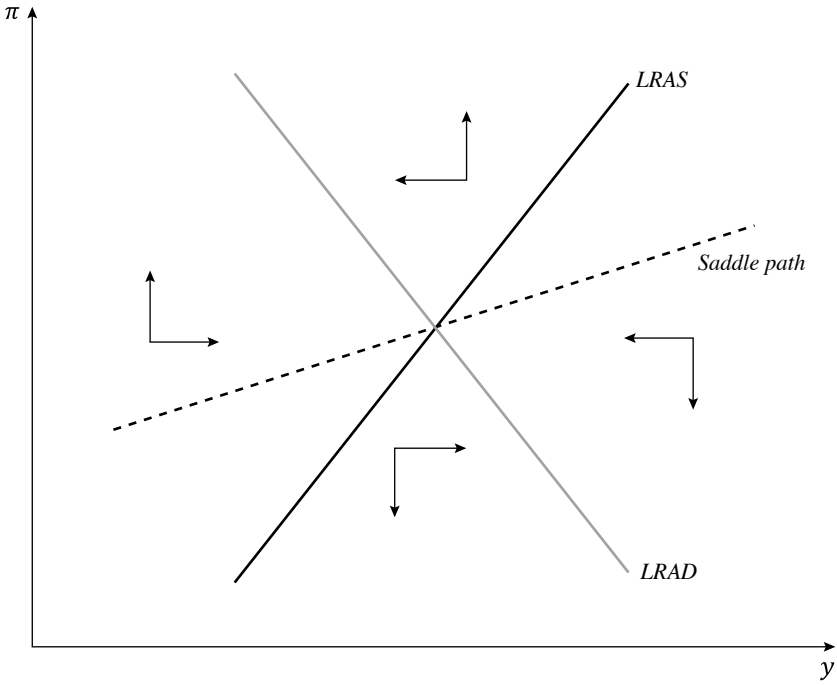
The long-run steady state of the nonlinear model can be represented as corresponding to the intersection of a long-run aggregate supply (LRAS) curve and a long-run aggregate demand (LRAD) curve. As depicted in figure 1, with inflation π on the vertical axis and real (log) output y on the

12. A similar departure is pursued in Benigno and Woodford (2005) and Halac and Yared (2022).

13. The positive relationship between monetary expansion and labor share emerges in a sticky-price and flexible-wage model. A different relationship holds if one instead considers a sticky-wage and flexible-price model; see Galí (2015) for a discussion. Yet, our main results continue to apply in that environment, with comparative statics for union profits that mirror those we show in the text for monopoly profits. These comparative statics are described in our discussion of deunionization in the next section.

14. In the competitive equilibrium of our model, monopoly profits would be zero and the labor share would be one, since the standard New Keynesian model abstracts from capital investment.

Figure 1. Long-Run Aggregate Demand and Supply



Source: Authors' illustration.

horizontal axis, the LRAS curve is upward sloping and the LRAD curve is downward sloping.

Let $\mu > 0$ denote the labor share (as determined by monetary policy) and $\gamma > 0$ the exogenous degree of monopoly power in the economy. For some function f, we can then represent the relationship underlying the upward-sloping LRAS curve by the following equation:

$$\pi = f(\underbrace{y}_{+}, \underbrace{\mu}_{+}, \underbrace{\gamma}_{+}).$$

More specifically, we show in the online appendix that applying an approximation around some low level of long-run inflation $\pi^* > 0$ under certain assumptions, this equation can be written as

$$\pi = \frac{\lambda\left(\rho + \lambda - \pi^*\right)}{\rho - \pi^*}\left(y + \frac{\varphi}{1+\varphi}\log\mu + \log\gamma\right),$$

where the value of inflation π corresponds to the deviation from its long-run value π^*, and analogously for the values of log output y, log labor share log μ, and log monopoly power log γ. Here $\lambda > 0$ denotes the average frequency with which sticky-price firms can change their prices, $\rho > 0$ is the household discount rate, and $\varphi > 1$ is the inverse elasticity of labor supply. Since π^* is low, and in particular lower than the discount rate ρ, this equation yields an LRAS curve that is upward sloping.

The LRAS equation is analogous to the well-known short-run Phillips curve but applied to an economy subject to long-run inflation. The usual logic for the short-run Phillips curve is that firms set higher prices—and therefore there is higher inflation—if firms anticipate higher marginal costs and marginal costs are increasing in real wages, which increase with output y and with the share μ of output paid to workers. Under positive long-run inflation, this relationship captures additional anticipatory effects by price-setting firms. Faced with permanently higher real wages, and therefore larger anticipated absolute changes in future nominal wages (holding fixed the level of inflation), firms face a higher risk of not being able to raise prices in the future as their marginal costs increase. Recall that in the underlying Calvo (1983) model of staggered price setting, individual firms do get to reset their prices, but the timing is uncertain. As such, when a firm gets the chance to change its price in a given period, it will increase it more aggressively in the face of higher real wages, which aggregated across firms results in higher inflation. This anticipatory effect explains why the LRAS curve becomes vertical if prices become fully flexible (or perfectly indexed to long-run inflation) as λ (the average frequency of price adjustment) goes to infinity.

The relationship underlying the downward-sloping LRAD curve is less familiar since it is unique to the nonlinear environment that our approach emphasizes. For some function g, this relationship can be represented by the following equation:

$$\pi = g(\underset{-}{y}, \underset{+}{\mu}).$$

Applying an approximation around some low level of long-run inflation $\pi^* > 0$ as above (see the online appendix for details), this equation can be written as

$$\pi = -\frac{\lambda(\lambda - \pi^*)}{\pi^*}\left(y - \frac{1}{1+\varphi}\log\mu\right).$$

The LRAD equation emerges because demand y is a negative function of inflation π and a positive function of the labor share μ. Higher inflation leads to higher price dispersion, which contributes to lower demand, with similar goods that are either overpriced or underpriced relative to the average.[15,16] A higher labor share in turn leads to higher demand. This is because the labor share is inversely related to equilibrium monopoly distortions that suppress demand; hence, the higher the labor share, the lower the monopoly distortions and the higher aggregate demand, holding all else fixed. Observe that as π^* approaches zero, the LRAD curve becomes vertical. This illustrates why the standard analysis of the New Keynesian model linearized around zero inflation ignores the effect of inflation on long-run demand.[17]

The long-run steady-state equilibrium corresponds to the intersection of the LRAS and the LRAD curves, as in figure 1. At this intersection, firms optimize prices given the equilibrium level of real wages, and households optimize consumption given the degree of price dispersion.

I.B. Central Bank Preferences

The representation of the steady state described above is general and can flexibly accommodate multiple different frameworks for central bank decision making, including full commitment to zero inflation and lack of commitment. To perform comparative statics and analyze transition dynamics, one must define what the central bank's decision-making framework implies for the equilibrium labor share μ, which is endogenous to monetary policy. As previously noted, in the New Keynesian model, a more expansionary monetary policy stimulates the demand for goods, which stimulates output (which is by assumption demand determined) and employment, thus increasing the labor share.

15. The baseline New Keynesian model abstracts away from efficient sources of price dispersion (for example, stemming from differences in productivity across firms). In the presence of such forces, price dispersion in our framework would be equivalent to dispersion in markups or tax wedges.

16. Demand can be interpreted as the demand from households purchasing from final goods firms or, alternatively, as the demand from final goods firms purchasing from intermediate goods firms.

17. The specific approximation applied above is useful to elucidate the critical nonneutrality that we emphasize outside of zero long-run inflation, but our framework is general and does not require a focus on this special case. It is also worth noting that the LRAD curve in the nonlinear environment becomes upward sloping under deflation, since greater deflation (i.e., more negative inflation) increases price dispersion.

An important case—on which we focus from here on—is one where the labor share μ is kept constant in the short run and long run, independently of economic shocks. We show in Afrouzi and others (2023) that this structure emerges endogenously in a Markov perfect competitive equilibrium in which a central bank that cannot commit makes sequential interest rate decisions. The central bank takes the price-setting process of firms as given and chooses an interest rate that addresses intra-temporal distortions (reflecting both monopoly power and price dispersion). In such an environment, the value of the equilibrium labor share is a direct function of exogenous central bank preferences.

To see this heuristically, let household preferences at any point in time be given by $U(Y) - V(L)$ for increasing functions U and V, where $Y = \exp(y)$ is output, which is equal to consumption, and L is labor, which is inversely related to leisure. The central bank's preferences can be represented by $\mu^* U(Y) - V(L)$, where $\mu^* > 0$ is an exogenous measure of central bank dovishness. In the model analyzed in Afrouzi and others (2023), labor satisfies $L = DY$, where $D \geq 1$ is the degree of price dispersion.[18] The central bank maximizes its static welfare taking the path of prices (and thus dispersion) as given, therefore setting $V'(L)/U'(Y) = \mu^*/D$. Denoting the nominal wage by W and the price level by P, households' intra-temporal optimization sets $V'(L)/U'(Y) = W/P$. Combining these optimality conditions yields

$$\frac{WL}{PY} = \frac{V'\left(L\right)L}{U'\left(Y\right)Y} = \frac{\mu^* L}{DY} = \mu^*.$$

Thus, the labor share is constant and determined by the exogenous weight the central bank places on consumption over leisure. If the central bank's preferences coincide with those of households, the equilibrium labor share is equal to one because the central bank wishes to undo all equilibrium monopoly distortions; doing so maximizes household welfare conditional on price setting. If instead the central bank has different preferences than households, as in Rogoff (1985), then the equilibrium labor share is some number different from one but still constant over time.[19] A lower labor

18. See equation (12) in Afrouzi and others (2023). Intuitively, higher dispersion implies that more labor is needed to produce a given level of output.

19. We keep the central bank's preferences fixed through time. Halac and Yared (2020) consider equilibrium dynamics when these preferences change over time and are privately known to the central bank, and they show that this can give rise to the presence of persistent high-inflation and low-inflation regimes.

share reflects a higher degree of central bank hawkishness: the central bank places less weight on reducing monopoly distortions and indirectly more weight on reducing inflation.

I.C. Comparative Statics

We illustrate the application of our framework by performing two comparative statics exercises. The first exercise involves an exogenous change in firm monopoly power, which results in *endogenous* political economy pressure on the central bank. The second exercise involves an exogenous change in central bank preferences, which results in *exogenous* political economy pressure on the central bank.

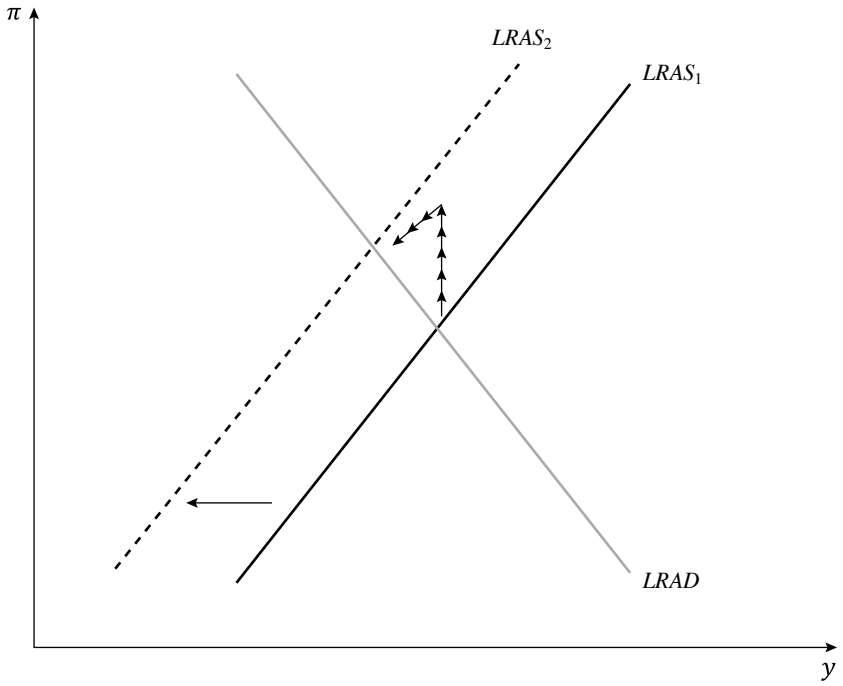
For our first exercise, consider the following change in the economic environment. Suppose that economic factors (e.g., a retreat from globalization) cause the degree of market competition to fall, so that the monopoly power of firms rises permanently. This shock would increase firm monopoly rents in a flexible-price setting. In our sticky-price environment, the shock corresponds to an increase in the parameter γ underlying the LRAS curve and can thus be represented by a leftward shift of this curve in the neighborhood of the steady state, as depicted in figure 2.[20] For every level of real wages, firms with greater monopoly power will now set higher prices, resulting in higher inflation. The economy therefore transitions to a new steady state with higher inflation. Moreover, output is lower since demand responds negatively to higher price dispersion under higher inflation.

Despite the higher monopoly power, monopoly rents stay constant in equilibrium. The reason is that the central bank allows higher inflation in order to prevent the economy from experiencing an equilibrium increase in monopoly rents and decrease in the labor share (which is why the LRAD curve does not shift). The staggered price setting makes it possible for the central bank to lean against exogenous changes in monopoly power and to leave monopoly distortions unchanged. We show in Afrouzi and others (2023) that this is exactly what a central bank without commitment would do. Thus, in the long run, the central bank experiences endogenous political economy pressure due to the changing economic environment, and it is forced to acquiesce to higher inflation.

For our second exercise, consider the following change in the political economy environment. Suppose that the central bank becomes permanently

20. Using a framework where demand elasticities vary with the measure of different varieties, Sbordone (2010) provides a microfoundation for the change in monopoly power that would emerge from an increase in trade.

Figure 2. Effect of Increase in Monopoly Power

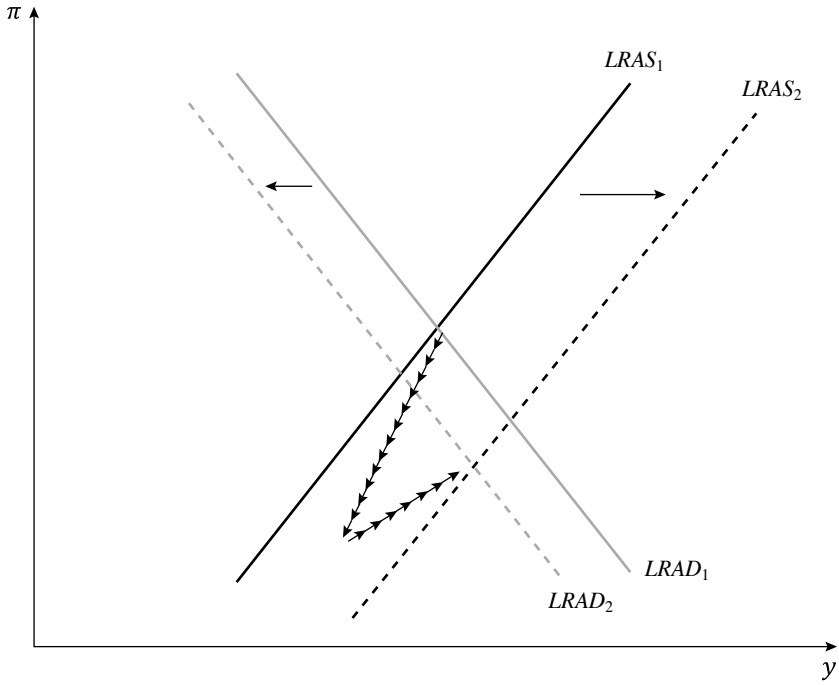


Source: Authors' illustration.

more hawkish, so that it places less weight on reducing monopoly distortions (and indirectly more weight on reducing inflation). This means that the labor share declines, and the degree of equilibrium monopoly distortions rises. As depicted in figure 3, this change can be represented by a rightward shift of the LRAS curve, since there is a lower real wage for every level of output given the lower labor share, and a leftward shift of the LRAD curve, since there are higher monopoly distortions and lower demand for every level of inflation. The economy therefore transitions to a new steady state with lower inflation. The change in output in this case is ambiguous, since it depends on whether the increase in demand due to lower price dispersion exceeds the decrease in demand due to higher monopoly distortions and a lower labor share. In figure 3, the change in output is positive.

This exercise shows that a more hawkish central bank can alter the labor share and the degree of monopoly distortions in the steady state of the economy by changing the level of inflation. At lower levels of inflation, there is

Figure 3. Effect of Increase in Central Bank Hawkishness



Source: Authors' illustration.

less price dispersion and thus less over-hiring by sticky-price firms, yielding a lower labor share and higher monopoly distortions. The example highlights the two key long-run forces in the New Keynesian model. Because it has a single instrument, the most that the central bank can do—for a given degree of price dispersion—is to change long-run demand as a means of changing aggregate (monopoly) distortions, and this is possible because prices are sticky. However, staggered price setting means that the more the central bank alleviates aggregate distortions, the higher the inflation, and the larger the induced variance in the idiosyncratic distortions (price dispersion).

Taken together, the two comparative statics exercises above elucidate what is required in the long run for credible inflation targeting, which is the optimal long-run policy under full commitment. The first comparative static shows that in the face of rising monopoly power, a central bank without commitment will experience pressure to allow higher inflation to stimulate demand to keep monopoly distortions stable. The second comparative static shows that this effect could potentially be offset by a change in exogenous

political economy pressure on the central bank, specifically by reducing the degree to which the central bank is concerned with monopoly distortions. In this scenario with two offsetting forces, inflation and price dispersion would remain stable, while output would decline since equilibrium monopoly distortions rise.

I.D. Quantitative Implications

A natural question concerns the quantitative relevance of economic and political economy factors for long-run inflation. We show next that the magnitudes in our framework are significant. Combining the equations underlying the LRAS and LRAD curves presented above, we obtain that the steady-state levels of inflation and output are given by

$$\pi = \frac{\left(\lambda - \pi^*\right)\left(\rho + \lambda - \pi^*\right)}{\rho} \log\left(\mu\gamma\right),$$

$$y = -\frac{\pi^*\left(\rho + \lambda - \pi^*\right)}{\rho\lambda} \log\left(\mu\gamma\right) + \frac{1}{1+\varphi} \log\left(\mu\right).$$

A conventional calibration sets the annual discount rate ρ to around 0.04; the average annual frequency of price changes λ to around 1.2, a 10 percent monthly frequency of price changes (e.g., Nakamura and Steinsson 2008); and the inverse elasticity of labor supply φ to 2.5 (e.g., Chetty and others 2011).

Consider an economy that begins with an inflation rate of 2 percent (i.e., with long-run inflation $\pi^* = 0.02$ and deviation $\pi = 0$). Take a deglobalization scenario in which the country trades less with the rest of the world, causing the degree of market competition to fall and thus the monopoly power of firms γ to rise. The resulting change in inflation depends on the magnitude of the change in γ, which is a function of the extent of deglobalization and the openness of the economy. Edmond, Midrigan, and Xu (2015) estimate the effect of trade openness for Taiwan, and they find that reducing the import share of GDP by 25 percent increases γ by 0.2 percent.[21] A less extreme and more realistic deglobalization scenario would entail a 10 percent decline in import share for an economy that is half as open as Taiwan (which is one of the most open economies in the world). Linear extrapolation for this case translates to a 0.04 percent increase in γ.

21. This measure comes from the change in aggregate markup from increasing the import share of GDP for Taiwan from 30 to 38 in table 3 of Edmond, Midrigan, and Xu (2015).

In our framework, applying a 0.04 percent increase in γ, with parameters taking values as described above, yields an increase in inflation of 1.4 percent and a decrease in output of 0.02 percent. Thus, in this deglobalization scenario, annual inflation rises from 2 percent to 3.4 percent, which is substantial.[22,23] The negative impact on output, in contrast, is small under this calibration, but we anticipate that introducing an input-output structure as in Afrouzi, Bhattarai, and Wu (2024) would increase the magnitude of this effect. In fact, their work shows that such an extension of the New Keynesian model increases the output cost of inflation by tenfold to twentyfold.

I.E. Transition Dynamics

Our framework can also be used to study transition dynamics. To the right of the LRAS curve in figure 1, output and therefore real wages exceed the steady-state level. This means that inflation—which captures expectations of the path of future real wages—falls in this region. The opposite is true to the left of the LRAS curve. Analogously, to the right of the LRAD curve, inflation exceeds the steady-state level. This means that dispersion—which captures the historical path of inflation—rises in this region, and therefore demand falls, since households demand fewer goods when there is rising variance in prices. The opposite is true to the left of the LRAD curve, where demand increases. These flows are depicted by the arrows in the different regions in figure 1 and putting them together allows us to define a saddle path around the steady state. As also shown in figure 1, the saddle path yields transition dynamics that admit positive co-movement between inflation and output.

Consider how an economy transitions from an initial steady state to a new higher-inflation steady state in response to a change in the economic environment. For concreteness, take our first comparative static exercise, depicted in figure 2, where firm monopoly power exogenously increases. Starting from the initial steady state, inflation must immediately jump to the new saddle path in response to the shock, and it must then fall along the saddle path toward its new steady-state level. That is, the transition must feature inflation overshooting.

The logic for overshooting is as follows. The initial jump in inflation is a direct response to the exogenous increase in monopoly power. This rise

22. In the online appendix, we show that the quantitative effects from the approximate linearized model are in line with those of the nonlinear model.

23. We note that if the frequency of price adjustment λ responds positively to equilibrium inflation (as would be the case in a menu cost model, for example), then the quantitative impact on inflation would be even larger.

in inflation, however, only leads to a gradual increase in price dispersion. Along the path toward a new higher-dispersion steady state, demand declines, and this is reflected in a downward path for output and real wages. In turn, this implies a downward path for the marginal costs faced by firms, which explains the declining level of inflation toward the new steady state. Consequently, if deglobalization leads to greater monopoly power and higher long-run inflation, the short-run spike in inflation can be much greater.

For another example, take our second comparative static exercise, where the central bank becomes permanently more hawkish, and where the long-run steady state of the economy shifts to a higher level of output, as depicted in figure 3. Starting from the initial steady state, output immediately jumps down and then rises toward its new higher steady-state level. The immediate downward jump reflects higher monopoly distortions, whereas the eventual output increase reflects lower price dispersion. The path of inflation follows by analogous reasoning to the previous example, since real wages and output rise along the equilibrium path after the initial downward jump.

The opposite transition dynamics would hold if the central bank instead became permanently more dovish. In that case, output and inflation would immediately jump upward and then decline toward a lower steady-state output and higher steady-state inflation level.

II. Historical Inflation through the Lens of the Model

We apply our framework to provide a fresh perspective on the economic and political economy forces that drove global inflation over the past four decades.

II.A. Empirical Evidence

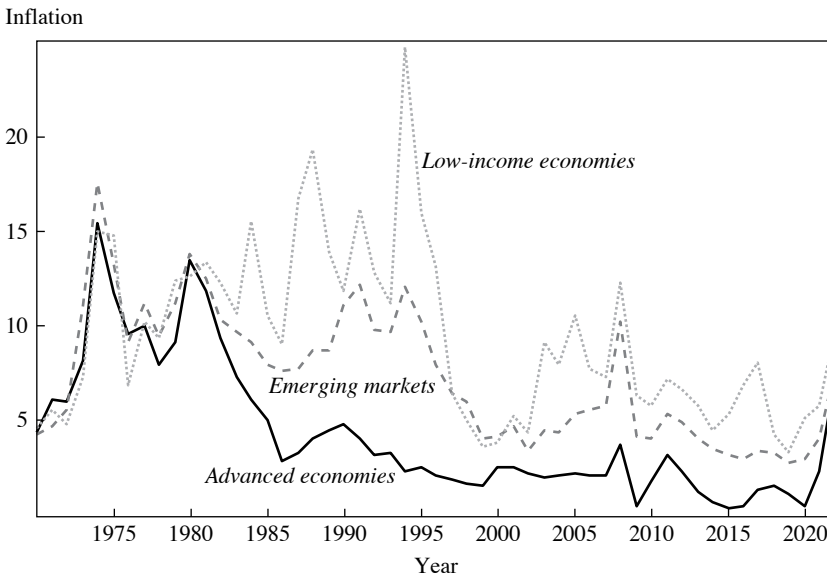
Figure 4 depicts inflation across the world for three different country groups over the period 1970–2022.[24]

The figure illustrates the global decline in inflation that peaked in advanced economies in the early 1980s, and globally in the early 1990s. The rapid decline in advanced economy inflation during the 1980s, after the high-inflation experience of the 1970s, has been widely studied in the literature (e.g., Sargent 2001; Primiceri 2006; Bianchi 2013; Nelson 2022).

Less studied, but equally salient is the global decline in inflation in the 1990s, 2000s, and 2010s. This decline had an impact on all country groups

24. The inflation rates are for a balanced panel and correspond to the median. Similar patterns are observed if we instead use an unbalanced panel or GDP-weighted measures.

Figure 4. Inflation across the World



Source: Data from Ha, Kose, and Ohnsorge (2023) at https://www.worldbank.org/en/research/brief/inflation-database.

across each decade, including low-income countries, albeit their decline was not as steady and smooth as in advanced economies. Inflation in the emerging market and low-income country groups fell to around 5 percent around the turn of the century but then rose to over 10 percent even before the global financial crisis, falling again in the mid-2010s, and rising sharply again after the pandemic. The ebbs and flows in the 21st century do not necessarily reflect formal changes in central bank independence. Indeed, many low-income countries experienced only limited central bank reform. As an example, annual inflation in Uganda decreased from an average of 17.8 percent in the 1990s to an average of 6.4 and 6.6 percent in the 2000s and 2010s, respectively. During that time, various measures of central bank independence for Uganda stayed the same or even deteriorated.[25] For emerging markets, average inflation declined from 5.3 percent in the 2000s to 3.8 percent in the 2010s, and this occurred even though measures

25. This is based on the data in Romelli (2022), which measures various aspects of central bank independence, extending the work by Cukierman, Webb, and Neyapti (1992).

of central bank governance in these countries deteriorated after the global financial crisis of 2008 (e.g., Bordo and Siklos 2021).

Through the lens of our model, the long-run decline in global inflation can be viewed in part as the result of three global forces that changed endogenous political economy pressures on central banks: rising globalization, the deepening Washington Consensus, and deunionization. The decline in inflation also clearly reflects exogenous political economy pressures, as reflected by many successful central bank reforms that promoted independence and inflation targeting. We address each of these phenomena and their implications in our model separately.

II.B. Globalization

Between 1970 and 2007, global trade as a proportion of global GDP increased from 25 percent to 59 percent.[26] As is well known, the era of hyperglobalization was a consequence of containerization, which dramatically diminished the cost of shipping. It was also driven by the reduction in tariff barriers and proliferation of trade agreements and dispute resolution processes, marked by major landmarks, such as the creation of the European Union in 1993 and the accession of China into the World Trade Organization in 2001. Financial globalization, unleashed by the relaxation of capital controls, further facilitated trade globalization by allowing for trade imbalances to form, while also fostering the flow of foreign direct investment. Between 1970 and 2007, foreign direct investment as a share of global GDP increased from 0.5 percent to 5.3 percent.[27]

In our framework, the increase in global competition translates to a reduction in firm monopoly power γ. In fact, this is supported by empirical evidence; for example, Bloom, Draca, and Van Reenen (2016) find lower prices and profitability for European firms more exposed to China's entry into the World Trade Organization relative to those that were less exposed.[28] The reduction in γ in our model has the effect of shifting the

26. World Bank, "Trade (% of GDP)," https://data.worldbank.org/indicator/NE.TRD.GNFS.ZS.

27. World Bank, "Foreign Direct Investment, Net Inflows (% of GDP)," https://data.worldbank.org/indicator/BX.KLT.DINV.WD.GD.ZS.

28. Edmond, Midrigan, and Xu (2015) find similar results in a model calibrated to Taiwanese data. De Loecker and others (2016) find that trade liberalization in India led to a decrease in prices but also a further decrease in *equilibrium* marginal costs, therefore resulting in higher equilibrium markups. However, to the extent that *efficient* marginal costs are independent of trade, their findings imply a decrease in markups relative to the latter, and thus a decrease in the monopoly distortions that drive the central bank's incentive to inflate in our model.

LRAS curve to the right, which means that the economy transitions to a new steady state with lower inflation and higher output (due to lower price dispersion), holding fixed the level of central bank hawkishness. Globalization thus reduces the endogenous political economy pressure on the central bank to inflate, resulting in lower inflation.

II.C. Washington Consensus

A second force to consider is the proliferation of the Washington Consensus, a term that refers to a set of widely adopted programs of market liberalization, privatization, and fiscal discipline. This program of reforms was implemented across countries in the 1980s, 1990s, and 2000s, often with the support of international institutions.

Between 1985 and 2001, the fraction of countries classified as market-oriented increased from 30 percent to almost 80 percent (Buera, Monge-Naranjo, and Primiceri 2011). In Latin America, for example, more than eight hundred public enterprises were privatized between 1988 and 1997 (Aninat 2000). The effects of market liberalization and privatization in our framework are isomorphic to the effects of globalization that we discussed above. These reforms reduce firm monopoly power γ, which results in lower inflation and higher output, holding fixed the level of central bank hawkishness.

On the fiscal side, the process of reform led to a decline of the public debt-to-GDP ratio in emerging markets from a peak of 68 percent in 2002 to 46 percent by 2015. In low-income countries, the ratio declined from a peak of 99 percent in 1994 to 48 percent by 2015.[29] Of course, these patterns are in direct contrast to the experience of advanced economies, which witnessed a secular long-term increase in public debt from the mid-1970s onward (Yared 2019).

To evaluate the effects of reduced fiscal pressures in emerging markets and low-income countries, we can consider an extension of our framework that incorporates fiscal objectives for the central bank, as in Schreger, Yared, and Zaratiegui (2023). Their work shows that the central bank responds to diminished fiscal pressures with lower desired monetary stimulus. In particular, the lower the inherited public debt, the lower the pressure on the central bank to use inflation to devalue that debt to mitigate the economic cost of debt repayment. Moreover, the lower the deficit, the lower the pressure on the central bank to stimulate the economy to reduce the real interest

29. International Monetary Fund, "Debt (% of GDP)," https://www.imf.org/external/datamapper/DEBT1@DEBT/FAD_G20Adv/FAD_G20Emg/FAD_LIC.

rate and the cost of issuing new debt.[30] Through these two channels, lower fiscal pressures reduce the endogenous pressures on the central bank to inflate. In our model, this translates to a lower labor share μ, which has the effect of shifting the LRAS curve to the right and the LRAD curve to the left. The result is a transition to a new steady state with lower inflation and lower price dispersion.

This discussion suggests that, in principle, there is a strong political economy mechanism for fiscal policy to influence inflation through its effect on central bank incentives. While this mechanism differs from the fiscal theory of the price level—which argues for a direct effect of fiscal policy on inflation independently of monetary policy—it is consistent with the empirical correlation between deficits and inflation that supports that theory (e.g., Barro and Bianchi 2023; Cochrane 2023).[31]

II.D. Deunionization

A third important force is deunionization, particularly in advanced economies. In the United States, the fraction of households in trade unions declined from 22 percent in 1980 to 11 percent by 2010. Out of twenty-four advanced economies with available data, twenty experienced a reduction in unionization rates over this period, including countries like Germany where unionization rates have been historically high.[32]

To evaluate the effects of deunionization in our framework, we can consider an analogous model to ours but allowing for labor market power instead of firm market power. Specifically, we can take a model with sticky wages and flexible prices (instead of sticky prices and flexible wages), again accounting for nonlinearities.[33] The LRAS and LRAD curves are defined analogously to our previous analysis, with *wage* inflation (which equals price inflation) on the vertical axis and real (log) output on the horizontal axis. The LRAS curve corresponds to a steady-state wage Phillips curve. The LRAD curve corresponds to a firm labor demand curve—demand

30. While the steady-state real interest rate is exogenous in Afrouzi and others (2023), the New Keynesian overlapping generations framework of Aguiar, Amador, and Arellano (2023) has a steady-state real interest rate that is endogenous to monetary policy, with higher money growth reducing this rate and expanding fiscal capacity.

31. This mechanism is consistent with the argument in Chari, Henry, and Reyes (2021) that chronic budget deficits in Latin America were a root cause of the region's high inflation levels in the 1980s and early 1990s.

32. OECD, "How Do Collective Bargaining Systems and Workers' Voice Arrangements Compare across OECD and EU Countries?" https://www.oecd.org/employment/ictwss-database.htm.

33. See Galí (2015) for an exposition.

declines as wage inflation and wage dispersion rise. Firms make zero profits in this model, while unions make positive profits. Rather than being indexed by the level of monopoly profits, the stance of monetary policy is now indexed by the level of union profits, with a more hawkish monetary policy corresponding to higher union profits (and therefore larger equilibrium intra-temporal distortions, which imply lower equilibrium inflation, as in the sticky-price, flexible-wage model).

In this extended framework, a decrease in labor market power can be depicted as a rightward shift of the LRAS curve, since unions then set lower wages for every level of output. The result is lower wage inflation and therefore lower price inflation, together with higher output due to lower wage dispersion. Lower labor market power thus reduces the central bank's endogenous political economy pressures to inflate, resulting in lower inflation.[34]

II.E. Central Bank Reform

Central bank reforms across the world—often made in concert with international institutions—are also an important cause of the decline in global inflation. Starting in the mid-1980s, when academic research began to emphasize the potential effectiveness of central bank independence in controlling high inflation, one country after another instituted reforms. Substantially greater independence allowed central banks to adopt inflation targeting mandates, which served as a tool to further enhance their independence (e.g., Bernanke and Mishkin 1997; Bernanke and others 1999). Increased transparency has also played a central role.

Based on data on legislative reforms of central bank charters, 80 out of the 113 central banks with available data experienced an improvement in independence between 1990 and 2010 (Romelli 2022). Dincer, Eichengreen, and Geraats (2022) analyze measures of central bank transparency, and they find that in 100 out of 112 countries with available data transparency increased between 1998 and 2019. Along with these reforms, sixty central banks adopted inflation targeting.[35] Early adopters were central banks in advanced economies, like those in New Zealand, Canada, and the United Kingdom, while more recent adopters included emerging economies such as India and Russia.

34. Stansbury and Summers (2020) argue that declining worker power created disinflationary pressure in the United States over 1982–2016.

35. This includes the nineteen countries in the eurozone plus forty-one other countries classified by the International Monetary Fund (2020) as inflation targeters.

An indirect factor which interacted with these central bank reforms, particularly in advanced economies, is the emergence of the zero lower bound on interest rates, first in Japan in the late 1990s and then in advanced economies in the aftermath of the global financial crisis of 2008 (although the issue had already come into view after the bursting of the tech bubble in 2001). In equilibrium, the expectation that the central bank's hands are sometimes tied serves to lower long-run average inflation expectations.[36] From this perspective, the effect of the zero lower bound is the same as having a central bank with a more hawkish tilt, though this is only on average, since outside zero lower bound episodes, inflation will be higher than under a hawkish central bank.

Through the lens of our model, central bank reforms along with the constraints of the zero lower bound can be studied as an exogenous increase in central bank hawkishness. As previously described, this translates to a lower labor share μ in our framework, shifting the LRAS curve to the right and the LRAD curve to the left, and therefore resulting in lower inflation and lower price dispersion. Observe further that a consequence of these central bank reforms is higher monopoly distortions along with the lower labor share.

II.F. Taking Stock

We have argued that the global decline in inflation over multiple decades can be viewed as resulting from the confluence of exogenous economic and political economy forces that jointly reduced central bank pressures to pursue expansionary monetary policy. We believe that, while very important, central bank reforms on their own cannot explain many of the empirical patterns in figure 4. For example, they cannot explain why inflation declined in countries that experienced little improvement (or even a deterioration) in central bank governance, or why inflation declined in economies that were far away from the zero lower bound. It appears that global economic trends also played a key role by reducing the endogenous political economy pressures on central banks to inflate.

Our view is further supported by the significant heterogeneity in the inflation experience across countries, which cannot be explained by exogenous political economy pressures alone. As depicted in figure 4, low-income countries have on average much higher inflation rates than emerging

36. As an illustration, the Markov perfect equilibrium in a linearized economy, as in Halac and Yared (2022), with the addition of a zero lower bound would predict lower average inflation as a result of a more binding zero lower bound.

markets, which in turn have higher inflation rates than advanced economies. Of course, this reflects in part differences in central bank governance across these country groups, and it is consistent with econometric evidence that finds a negative correlation between long-run inflation and central bank independence across countries.[37] What is clear, however, is that there continues to be heterogeneity in long-run inflation rates even after controlling for central bank independence, and this remaining heterogeneity can be explained by other economic factors. For example, Campillo and Miron (1997) find that countries that are more open to trade or have lower public debts have lower inflation rates. These cross-country findings are consistent with our framework in which economic factors affect the endogenous political economy pressures experienced by central banks.[38]

III. Future Inflation through the Lens of the Model

Figure 4 shows that in the mid to late 2010s, inflation in every country group reached a forty-year trough prior to the post-pandemic inflation spike. For advanced economies, that trough occurred in 2015, with an inflation rate of 0.40 percent; for emerging markets, it occurred in 2019, with an inflation rate of 2.79 percent; for low-income countries, it occurred also in 2019, with an inflation rate of 3.35 percent.

An important, natural question is whether global inflation in the 2020s will return to the levels of the 2010s or instead increase to the levels of the 2000s or even the 1990s. Our model tells us that the answer depends on the likely evolution of economic and political economy forces. We believe that several persistent global economic trends that accelerated during the pandemic—some of which are reversing the decades-old developments described in the previous section—will likely increase central bank pressures to inflate. This means that implementing stable and low inflation in the future may require even further strengthened central bank independence to counteract these endogenous political economy pressures. We describe the sources of the new pressures in this section.

37. See Berger, De Haan, and Eijffinger (2001) for a survey.

38. Note further that using our framework, we can study the relationship between the labor share and inflation. It is well known that the labor share has declined in many countries over decades (e.g., Karabarbounis and Neiman 2014), and there is some debate as to whether this trend reflects a rise in monopoly power (Karabarbounis and Neiman 2018; Philippon 2019; De Loecker, Eeckhout, and Unger 2020) or other factors like a decline in union power (Elsby, Hobijn, and Şahin 2013). Through the lens of our model, the decrease in the labor share and in inflation can be viewed as a joint consequence of a reduction in labor market power or an increase in central bank hawkishness.

III.A. Reversal of Globalization

The globalization trends of prior decades have been reversing since the end of the global financial crisis of 2008. Trade as a proportion of global GDP stopped increasing after hitting a peak at 61 percent in 2008, and it has since declined to 57 percent in 2021.[39] Foreign direct investment as a share of global GDP peaked at 5.3 percent in 2007 and has since declined to 2.2 percent in 2021.[40] In addition to these absolute changes, international flows have also become more fragmented. For example, trade and capital flows in the aftermath of Russia's invasion of Ukraine in 2022 have segmented along geopolitical lines, a development especially costly for Europe, which depends on geopolitically nonaligned countries for trade (Gopinath 2023). Firm-level network data further indicate that global value chains, particularly those that connect to China, have lengthened over the last two years (Qiu, Shin, and Zhang 2023), suggesting an increase in trade costs.

These developments have two main causes, which are likely to remain dominant in the future. The first cause is the application of protectionist trade policies across the world after the global financial crisis, a process that accelerated after the 2020 pandemic. This resulted in a transition from hyperglobalization prior to the global financial crisis to "slowbalization" (Aiyar and Ilyina 2023; Goldberg and Reed 2023), which occurred in large part because of a political backlash against free trade. Restrictions on international flows have been widely applied across countries and go beyond the more salient case of Brexit in 2016 or the US-China trade war beginning in 2018. The number of trade restrictions imposed annually worldwide increased from under 500 in 2010 to around 1,000 in 2018 to almost 3,000 in 2022 (International Monetary Fund 2023a). In addition, the number of countries introducing or expanding security-related screening mechanisms for foreign direct investment increased from under 10 for every year between 1995 and 2019 to 22 in 2020, 17 in 2021, and 14 in 2022 (Guazzini, Leskova, and Meloni 2023).

The second cause for these global developments is the rise in geopolitical tensions. These increased following the Russian invasion of Ukraine in 2022. In response, the United States, European Union, and their allies applied trade and financial sanctions on Russia, resulting in a rerouting of

39. World Bank, "Trade (% of GDP)," https://data.worldbank.org/indicator/NE.TRD.GNFS.ZS.

40. World Bank, "Foreign Direct Investment, Net Inflows (% of GDP)," https://data.worldbank.org/indicator/BX.KLT.DINV.WD.GD.ZS.

global flows. In addition, the Israel-Gaza war in 2023 following the Hamas attack on Israel and the expansion of the conflict to the broader region has led to attacks on commercial vessels in the Red Sea, leading to further disruptions in global trade.

This is a fast-evolving situation given the rising number of measures distorting trade and investment, and the rising geopolitical risk (Caldara and Iacoviello 2022).[41] If countries pursue protectionist policies and do not de-escalate geopolitical tensions in the coming years, then the slowdown in globalization, the rising fragmentation of global flows, and the lengthening of supply chains will also persist. The result is lower global competition and higher firm monopoly power. In our framework, this is reflected in an increase in the monopoly power parameter γ, which shifts the LRAS curve to the left (holding the level of central bank hawkishness fixed) and results in higher inflation and lower output (due to higher price dispersion).[42] Thus, through this channel, a reversal in globalization trends increases the endogenous political economy pressures on the central bank to inflate.[43]

III.B. Rising Fiscal Pressures

A second important trend is increasing global fiscal pressures. The International Monetary Fund projects higher government debt to GDP in the 2020s relative to the 2010s for all country groups: advanced economies, emerging markets, and low-income countries (International Monetary Fund 2023b). Debt overhang from pandemic-era government spending combined with high interest rates is a common driver of this trend, but it is not the only one; rising government primary deficits are also to blame. In advanced economies, the primary deficit as a percentage of GDP is projected to increase from a pre-pandemic (2014–2019) average of 1.2 percent to a post-pandemic (2023–2028) average of 2.2 percent. For emerging markets, the increase is from 2.1 percent to 2.9 percent.

The fiscal pressures for advanced economies largely reflect the acceleration of the aging of the population and the resulting expansion of entitlement spending without commensurable revenue increases (Yared 2019). In the United States, for example, the Congressional Budget Office forecasts

41. See the Global Trade Alert Database, https://www.globaltradealert.org/.

42. Note that lower global competition could also result in an increase in labor market power in a sticky-wage and flexible-price model such as the one we described in the previous section, leading to the same comparative static for inflation.

43. There is direct evidence for a long-run correlation between global geopolitical risk and global inflation that is consistent with this channel (e.g., Caldara and others 2023).

that between 2023 and 2033, Social Security spending will increase from 5.1 percent to 6.0 percent of GDP. Outlays for major health programs will increase from 5.8 percent to 6.6 percent of GDP over that time, with around 25 percent of the increase due to aging (CBO 2023). For emerging markets, the fiscal pressures reflect increasing government spending, particularly in the two largest emerging market economies, China and India.

There are reasons to think that current fiscal forecasts—which only incorporate current policies but not likely changes to future policies—may be too optimistic. For example, more than 140 countries, including the United States, countries in the European Union, China, and India, have set net zero carbon emissions targets. According to simulations by the International Monetary Fund, the government spending policies required to achieve net zero emissions midcentury would increase the forecasted government debt-to-GDP ratio by 10 to 15 percent in advanced economies and 15 percent in emerging markets (International Monetary Fund 2023b).

Similarly, economic forecasts do not adequately account for a potential continuation or escalation of geopolitical tensions, which would likely result in additional defense spending. The Congressional Budget Office forecast—which already predicts a stark trajectory for US debt—assumes that US defense spending as a share of GDP will decline from 3.2 percent in 2023 to 2.7 percent in 2033.[44] Should geopolitical tensions persist, a more realistic forecast would account for the possibility that US defense spending returns to levels closer to those reached during the Cold War, which averaged nearly 7 percent of GDP between 1960 and 1991.[45]

A further consideration for fiscal forecasts is the continuing expansion of industrial policy. These policies—which seek to reorient an economy's resources and production toward national strategic goals—are not just confined to the 2022 CHIPS and Science Act or the 2022 Inflation Reduction Act in the United States; they represent a longer-term global trend. Juhász and others (2023) analyze the text of commercial policies across the world, and they find that the share of policies that can be classified as industrial policies increased from 20 percent in the early 2010s to nearly 50 percent by 2019. Juhász, Lane, and Rodrik (2023) find that the fiscal impact of these policies can range from 0.3 to 0.7 percent of GDP annually.

As described in the previous section, increased fiscal pressures result in higher monetary stimulus: the central bank experiences pressure to use

44. This number is imputed under the Congressional Budget Office's assumption that the proportion of discretionary spending accounted for by defense remains stable at 49 percent.

45. Stockholm International Peace Research Institute, "SIPRI Military Expenditure Database," https://www.sipri.org/databases/milex.

inflation to devalue outstanding public debt and to stimulate the economy to reduce the real interest rate and the cost of issuing new debt. Through both channels, higher fiscal pressures increase the endogenous pressures on the central bank to inflate. This translates to a higher labor share μ in our model, shifting the LRAS curve to the left and the LRAD curve to the right, and thus resulting in higher inflation and higher price dispersion.[46]

III.C. Unshackling from the Zero Lower Bound

A third development having an impact on central banks is the likely upward trajectory in long-term real interest rates back to their centuries-old trend, after deviating from that trend substantially in the aftermath of the global financial crisis (Rogoff, Rossi, and Schmelzing 2022). This change would result in higher nominal interest rates (holding expected inflation constant), thus moving the economy further away from the zero lower bound. This would diminish the de facto hawkish tilt that the zero lower bound imposes on central banks, since then interest rate increases can be more easily offset by interest rate decreases on average. In our model, this translates to a higher labor share μ, shifting the LRAS curve to the left and the LRAD curve to the right, and thus resulting in higher inflation and higher price dispersion.[47]

III.D. Assessment

We have described several forces that would increase the endogenous political economy pressures on central banks to inflate in the 2020s relative to previous decades.[48] Of course, there are many reasons for why our assessment could be wrong.

First, we must accept the possibility that the economic forces we have highlighted may not persist. Perhaps global geopolitical tensions de-escalate,

46. Moreover, to the extent that these fiscal pressures come hand in hand with economic distortions that raise the market power of firms, they can increase inflation by shifting the LRAS curve even further to the left. Consistent with our analysis, Del Negro, di Giovanni, and Dogra (2023) find that green policies change the trade-offs for central banks and can increase their incentives to stimulate the economy.

47. Because they translate to higher interest costs for the government, higher long-run real interest rates also translate to higher fiscal pressures, which further increase central bank pressures to inflate.

48. We note that this list is not exhaustive, and others like Goodhart and Pradhan (2020) would point to demographic pressures as an additional force driving long-run inflation upward. Through the lens of our framework, we can articulate their conjecture as an argument that aging should raise labor scarcity and increase labor market power, thus reversing the impact of deunionization described in the previous section.

with a resumption of long-term globalization trends and a reinvigoration of the Washington Consensus. Perhaps, and more realistically, these forces do persist, but there are other forces that keep inflation from rising. One possibility is that the zero lower bound continues to constrain central banks because of other pressures—for example, demographic ones—keeping long-term real interest rates suppressed. Under this scenario, central banks would find themselves powerless to raise inflation despite endogenous political economy pressures on them to pursue expansionary monetary policy. Another possibility, as some currently argue, is that artificial intelligence and other new technologies will act as a disinflationary force (Klebnikov 2023). In our framework, such technologies would need to reduce monopoly power or alleviate fiscal pressures by boosting economic growth; of course, this force would have to be strong enough to counteract other inflationary forces we have highlighted.

Second, we must also accept the possibility that even if the economic forces driving inflation upward persist, they could be counteracted by exogenous political economy pressures. These would take the form of a renewed push for promoting central bank independence across the world, with a strengthened commitment to containing inflation as opposed to other goals. These efforts could be potentially supported by the public backlash against the inflation surge of 2022 (Stantcheva 2024). Now, a critical difference relative to the past thirty years of central bank reforms is that these efforts would need to work in opposition to, not in tandem with, the endogenous political economy pressures on central banks. Moreover, we should keep in mind that elected politicians have historically always interfered with central bank operations, and the concept of central bank independence is a relatively new one. This reality suggests that success would be more likely if central bank reforms were buttressed by efforts at putting public debts on a sustainable path, potentially through the application of stricter fiscal rules (Yared 2019; Dynan 2023). There are signs of hope: despite the rise of populist policies around the world and the rhetorical attacks on the Washington Consensus, many emerging markets have maintained the key elements of past reforms, placing a premium on macroeconomic stability; this has contributed to their surprising resilience and contained inflation in the face of the major shocks of the past decade and a half (Rogoff 2023). Through the lens of our model, monetary and fiscal reform translate to a lower labor share μ, shifting the LRAS curve to the right and the LRAD curve to the left, and thus resulting in lower inflation and lower price dispersion.

IV. Conclusion

We have presented a simple long-run aggregate demand and supply framework for studying long-run inflation and transition dynamics. Using this framework, we provided a fresh perspective on the economic and political economy forces that drove global inflation downward over the past four decades. Our analysis highlights the underlying reasons why maintaining low and stable inflation may be challenging in the coming decade, and why a strengthening of central bank independence combined with a more credible public debt policy is likely needed to offset the global economic pressures pushing long-run inflation upward. It is worth noting that if political economy pressures do result in higher average inflation, this will likely come in the form of occasional bursts of inflation, such as after the pandemic, rather than an inflation rate that continuously exceeds the target.

Because it is based on the familiar and most widely used model of central banking, we believe that our framework is a useful first step for evaluating the causes and consequences of changes in long-run inflation. The framework clarifies that long-run inflation interacts in important ways with market power to influence aggregate (monopoly) distortions as well as idiosyncratic distortions (price dispersion) in the economy. Assessing what this observation implies more generally—that is, beyond the benchmark single-agent, one-sector, closed-economy New Keynesian model—both for central bank incentives and for the long-run real effects of monetary policy, is an important next step.

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Comments and Discussion

COMMENT BY

DONALD KOHN Afrouzi, Halac, Rogoff, and Yared have raised a critical issue for economies and central banks. They argue that the global disinflation of the 1980s through the 2010s was greatly aided by a number of favorable developments—such as the sharp rise in trade and supply chain optimization as Eastern Europe and China joined the global trading system—that increased competition and lowered costs, making it easier for central banks and governments to adopt and achieve inflation targets. But these developments will not be repeated going forward, and some have shown signs of going into reverse; the resulting rise in costs and prices implies a less favorable trade-off of disinflation with output and employment. At the same time government debt levels have risen substantially relative to GDP after falling in earlier decades, pressuring interest rates higher and making those rates more salient for government budgeting. Those trends could, in turn, reawaken the "latent inflationary bias" in political systems and put pressure on central banks to be tolerant of higher inflation than would be optimal. The authors advocate for steps to increase central bank independence in order to resist these pressures. They embed their analysis and illustrate their concerns in a modified New Keynesian model in which, unlike in the standard model, aggregate supply and demand are nonlinear and the choice of a long-run inflation target affects real output.

In my comments, I won't be giving a detailed evaluation of the model, but I will note the difficulties I had in relating it to my lived experience as a monetary policymaker. Nonetheless, I will note that I agree with the authors that the evolving macroeconomic landscape, including sharp increases in government debt relative to income as well as shifts in globalization, could

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well escalate political pressures on central bank price stability mandates. I'm highly doubtful that we could see formal legislative action to strengthen central bank independence. Still, the Federal Reserve is undertaking a five-year review of its monetary policy framework—billed as a rethink of strategy, tools, and communications—and in the context of that review I believe there are steps the Federal Reserve could take to strengthen its commitment to price stability and enhance the public's understanding of the importance of that leg of its dual mandate.

RELATING THE MODEL TO POLICYMAKING The model results, and the slopes to long-run aggregate demand and supply that give a permanent trade-off of inflation and output, hinge on the distortions from imperfectly competitive firms facing constraints on how often they can adjust prices. The central bank can reduce the degree of distortions by aiming at higher inflation, which reduces firm share of output and increases labor share but also increases price dispersion, reducing demand. A more hawkish central bank lowering its inflation target will increase distortions, lowering labor share and demand while shifting aggregate supply outward through lower real wages; the effect of lower inflation on output is ambiguous.

In practice, monetary policymaking is focused on cyclical issues—how does policy need to be adjusted to achieve price stability and, for the Federal Reserve, its other legislative goal of maximum employment. Setting the inflation target has not considered the interaction of that target with the degree of monopolistic distortions or the associated labor share of output. For central banks, and I suspect for finance ministries where they are involved in establishing the inflation target, monopolistic distortions are the responsibility of the competition authorities, not the central bank and its inflation target.

Moreover, price stability has been seen as encouraging maximum output and employment over time (abstracting from issues of the effective lower bound on interest rates)—implying no long-run trade-off. Inflation distorts market signals and makes them hard to interpret so price stability unambiguously promotes efficiency. Recall Alan Greenspan's (2001) definition of price stability as inflation low enough that households and businesses don't need to take it into account when making decisions. And anchoring long-term expectations at the price stability target gives the central bank scope to lean against shortfalls in output without risking price stability. To be sure, labor share and the effects of imperfect competition do come into monetary policy discussions, but as factors affecting the dynamics of the path to achieving or maintaining price stability, not as factors influencing the level of the final target or its effect on output.

THE CHANGING ECONOMIC LANDSCAPE AND POLITICAL PRESSURES ON PRICE STABILITY MANDATES Global inflation dropped sharply from the early 1980s until 2000. The authors acknowledge the role in this development of increasing focus on price stability by central banks, the onset of explicit numerical inflation targets in the 1990s, and the reforms of governance structures to give central banks a degree of independence from short-term political pressures to pursue those mandates.

But they also point out that a number of developments over this period smoothed the path for disinflation, which helped bolster political support for the transition toward price stability. Some of these can be thought of as favorable supply shocks that lowered costs and prices without requiring any softening of demand and output. Globalization fits into this category as trade rose dramatically, responding to the sharp reduction in costs from containerization and decreases in tariffs and other trade barriers. That development effectively increased competition (for both firms and workers) in the context of the authors' model, lowering inflation and boosting income. Competition was also enhanced by deregulation and privatization as the Washington Consensus took hold. In the United States, a technology-driven increase in productivity growth from the mid-1990s until 2005 contributed to favorable inflation-growth combinations for a time. On the demand side, declining government debt to income—in the United States a rare run of federal surpluses in the late 1990s—reduced political pressure to keep funding costs down.

I agree with the authors that, at a minimum, these favorable shocks are not going to be repeated—for example, global trade volumes have leveled out since 2008—and some look like they are going into reverse. Tariffs and *friendshoring*—industrial policies to discourage imports of certain goods and encourage domestic production—will raise costs and increase domestic investment, boosting both inflation and equilibrium real interest rates. Rates will be further pressured higher by large persistent government deficits to increase defense spending in a geopolitically risky world, fund subsidies related to decarbonization, and serve the growing needs of an aging population, crowding out some private investment.

It's not clear how important these forces will be. Some of the most fundamental influences depressing equilibrium interest rates over recent decades—an aging population and modest productivity growth (pending a verdict on the effects of AI)—have not shifted.[1] Although globalization stopped increasing in 2008, the subsequent years until 2021 were marked

1. See International Monetary Fund (2023).

by very low inflation and real interest rates at or below zero. Some of the cost increases might be best thought of as onetime price level adjustments that are unlikely to result in higher inflation so long as longer-term expectations are anchored. And the "latent inflationary bias" of politicians should be mitigated to some extent by the public's intense dislike of inflation (Stantcheva 2024).

Still, financial markets participants have marked up their estimates of future r^* to 2+ in real terms and 4+ nominally. Cost pressures imply that trade-offs are not likely to be as favorable as before, possibly raising the unemployment rate consistent with low stable inflation. Higher interest costs will add to burgeoning fiscal deficits, to the difficulty of stabilizing debt to income as r rises relative to g, and to political discomfort. And one presidential candidate in 2024 has demonstrated in the past a predilection for trying to influence monetary policy decisions. Pressures on central banks, very much including the Federal Reserve, to hold down interest rates and tolerate greater inflation could well be more intense than they have been for several decades.

STRENGTHENING THE COMMITMENT TO AND PUBLIC UNDERSTANDING OF THE PRICE STABILITY MANDATE IN THE UNITED STATES: THE OPPORTUNITY OF THE FRAMEWORK REVIEW In light of these potential pressures, the authors recommend strengthening central bank independence to help central bankers continue to pursue price stability. Legislation to this end is highly unlikely in the United States, but the Federal Reserve has an opportunity to strengthen its commitment to price stability and reinforce public understanding of why that's important. That opportunity is the review of its monetary policy framework it first undertook in 2019–2020 and has announced it would repeat every five years, so in 2024–2025 for this round.

The annual "Statement on Longer-Run Goals and Monetary Policy Strategy" of the Federal Open Market Committee (FOMC) states that this review is to encompass policy strategy, tools, and communication, though the focus in 2019–2020 was on strategy.[2] A statement on goals and strategy was first adopted in 2012. In 2020, it was modified to better deal with the experience of the 2010s, a period of low inflation, often below the 2 percent target, and low interest rates, including considerable time when the FOMC's ability to cut the target federal funds rate to raise inflation to 2 percent had been constrained by the zero lower bound (ZLB). Periods at the ZLB threatened to cause the Federal Reserve to miss both its inflation and employment

2. The statement as adopted in 2020 and carried forward through January 2024 can be found at https://www.federalreserve.gov/newsevents/pressreleases/monetary20240131b.htm.

targets to the downside over time. The strategy statement published in 2020 therefore contained several pro-inflation asymmetries to offset the ZLB effect. First, monetary policy would seek inflation slightly above the target when it had been running below target for a while—with no mention of the response to a contingency of a run of above-target inflation; and second, policy would respond to shortfalls of employment from its estimate of sustainable maximum, but not to estimated overshoots unless inflation was already running above its target—there would be no preemption of rising inflation inferred from tight labor markets.[3]

In the event, of course, much of the period since the new framework was adopted and implemented in 2020 has been marked by inflation above the 2 percent target. The Federal Reserve reacted to the high inflation perhaps a bit late, but when it moved, it moved with speed and force. Although at this writing in spring of 2024, inflation is still notably above its target, it has fallen substantially from its peak, and expectations of inflation over the longer run appear to have been anchored around the target level, perhaps reflecting both the history of low inflation in previous decades and the evidence of policy determination to return inflation to its target. Nonetheless, in light of this more recent history and of the potential for escalating political pressures, the Federal Reserve should take the opportunity of its framework review to strengthen the public understanding of its commitment to price stability and make sure its strategy addresses periods of target overshooting as well as undershooting.

A good way to begin would be a thorough background examination of the experience since 2020. In retrospect, why was inflation so high and so poorly forecast? Did operating under the 2020 framework contribute to its level and persistence? What role might have been played by the forward guidance on interest rates and by the size and structure of asset purchases? What lessons can be learned from this history that might help shape the subjects and conclusions of the 2024–2025 framework review?

That study would seem to be a natural and essential starting point. A useful supplement would be a study of the forces highlighted by the authors that might raise price pressures and interest rates. How important are these pressures likely to be? Does the new 2025 framework need to be shaped in any particular way to address these possible developments, and if so, how?

The commitment to and understanding of the price stability target can be reinforced by consideration of how price stability should be defined.

3. An analysis of the framework and the forward guidance used to implement it can be found at Eggertsson and Kohn (2023).

In 2019, the Federal Reserve took its existing 2 percent target as given, explicitly ruling out an examination of whether that was the quantitative target that best fostered the public interest. A number of academics, concerned about low nominal rates constraining the response to negative demand shocks, have advocated for higher targets; the public would prefer lower—effectively zero.[4] The 2 percent target seems to meet the Greenspanian criteria referenced above, has a history in the United States as both an implicit and explicit definition of price stability, and is widely adopted internationally. But commitment and understanding would be strengthened by a careful examination and justification of the final choice—2 percent or otherwise—rather than leaving it as an arbitrary history-determined choice.

The commitment to price stability would be further strengthened by clarification of the maximum employment goal. The current framework notes that "the maximum level of employment is a broad-based and inclusive goal that is not directly measurable and changes over time owing largely to nonmonetary factors that affect the structure and dynamics of the labor market" (Federal Reserve Board of Governors 2020, par. 3). The phrase "broad-based and inclusive" was added in the 2020 revision and taken together with the asymmetrical approach to labor markets—paying attention to shortfalls but not overshoots—may have left the impression that the employment side of the dual mandate had been elevated relative to the price stability side. Individual FOMC participants have noted that maximum employment is the highest level of employment consistent with price stability, but that is not part of the long-run goals and strategy statement.[5] Including it would reinforce the consistency of the two goals and clarify that the Federal Reserve is not shaping its policy to correct for the distortions of imperfectly competitive firms, as in the authors' paper, or for historical inequities that have disadvantaged particular demographic or income groups.

The costs and benefits of the asymmetrical approach to maximum employment need an especially rigorous examination. The benefit is that it avoids policy firming that, in hindsight, unnecessarily constrains labor market expansion. But monetary policy acts on output and inflation with a lag. Because it reacts only to shortfalls of employment from maximum, the current framework strategy would rule out moving to a restrictive policy stance on the basis that labor markets were becoming tight enough to foster

4. On the higher target, see, for example, Blanchard (2022). For the public view, see Stantcheva (2024) on public disliking inflation included in this *BPEA* volume.

5. For example, Clarida (2022).

higher, above-target inflation down the road. That's a cost. Arguably, this asymmetry could have constrained the policy tightening of the mid to late 1980s and mid-1990s that were critical to consolidating and extending the gains against the inflation of 1979–1982 and ultimately anchoring expectations around the FOMC's target.

The new strategy statement needs to be robust to a wide variety of circumstances. It should retain the ability to deal with periods of very low inflation and interest rates. But it also should address more fully than the current statement the strategy for dealing with actual or prospective substantial and persistent inflation overshoots. Stress testing the new strategy statement against an array of scenarios would give the FOMC insight into the dynamics of their strategy and should reassure the public that the Federal Reserve had thought about how it would achieve its dual mandate whatever the source and consequence of the unexpected developments that might hit the economy.

Finally, the framework review should encompass a review of the FOMC's tools, especially the unconventional tools used at the ZLB—asset purchases and forward guidance about asset purchases and the target interest rate. What lessons can be drawn from the use of these instruments in 2020–2022? How should they be deployed in the future to assure progress toward price stability as well as maximum employment? Such an open inquiry would reinforce the public's understanding of the Federal Reserve's commitment to price stability, whatever pressures might descend on it in the future.

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COMMENT BY

SILVANA TENREYRO This is a timely paper, studying how economic and political economy factors can interact to exert inflationary pressures on the economy. The analysis is based on a stylized model of aggregate demand and supply. The model is augmented to reflect central bank preferences that might differ from those of households, as in Rogoff (1985). Using this framework, the paper seeks to illustrate how past economic trends (e.g., globalization and deunionization) have exerted downward inflationary pressures, facilitating the task of achieving central banks' inflation targets. The analysis leads to a stark warning that a reversal of those trends might pose important challenges to central banks in the future. The key conclusion is that for inflation to remain low and stable, it is vital to maintain, and indeed reinforce, central bank independence and have in place a credible public debt policy.

The paper addresses a hugely important topic for policymakers and academics. It elegantly combines insightful ideas with model and data, leading to a new model narrative that underscores the risks to inflation and to the current monetary policy framework.

My comments zoom in on some aspects of the paper in the hope of clarifying to the broader readership its contribution to the literature and its connection with the practice of central banking.

THE MODEL The paper develops a simple model of aggregate demand and supply to carry out a positive analysis of long-run inflation. How is this model different from models used in central banks? First and foremost, the model is designed to think about political economy pressures that central banks might face in response to changes in the environment; those political pressures are not part of central bank models (rightly so).[1] However—and

1. It would be odd if, given their remits and the current institutional setting, central banks were to use a model in which, in some future, the central bank itself aimed off its own objectives or accommodated political pressures.

this is the risk highlighted by the paper—political pressures, under certain environments, might affect the behavior of central banks or, stretching a bit the model, could eventually lead to changes in mandates and policy frameworks.

Conceptually, the model seeks to capture how long-run inflation can be affected by the interaction between economic factors (e.g., the degree of monopoly power in the economy) and central banks' preferences. In the stylized model, those preferences are represented by the size of the labor income share targeted by a central bank, with a higher targeted labor share representing more "dovishness." In practice, this specification can be mapped into the more familiar "weight" that central bankers (or, perhaps more broadly, the monetary policy framework as reflected in their mandates) place on inflation stabilization versus a secondary objective of output stabilization: the more weight a central bank puts on output stabilization (over inflation), the higher the degree of dovishness.[2]

The model in this paper thus sits on a different layer of macroeconomic policy design, one that considers political economy risks. As such, it is distinct in its scope and ambition from models used by central banks; the latter are used for positive analysis to predict macroeconomic outcomes, or for normative analysis to optimize outcomes (e.g., the inflation path), given their mandates, over a finite (short- to medium-term) time horizon. By design, central bank models would not forecast future changes in inflation generated by political pressures.

To be sure, central banks can and do of course incorporate changing economic trends (e.g., deglobalization, market power, or demographics) in their models. The Bank of England, for example, adjusted the potential productivity growth trend for the UK economy after the Brexit referendum as a result of the country's expected loss in openness; similarly, most central banks adjusted trend productivity growth after the financial crisis. But central banks' models, by design, do not feature changes in political pressures that might, as the paper argues, lead to changes in long-term inflation.

A second difference between this paper's model and the models used in central banks is its simplicity, which allows for a clear comparative static analysis of the steady state. While a strength for the long-term comparative statics, for the analysis of transitional dynamics, this simplicity might be a bit more costly. The paper's transitional dynamic analysis as

2. The labor share would map into lambda in, for example, Carney's (2017) lambda speech.

well as the interpretation of particular inflationary episodes (such as the recent surge in inflation) could benefit from incorporating some of the features present in richer central bank models. Among other features, those models (1) have more realistic lead-lag structures (with the aim of matching impulse responses in the data, including the fact that monetary policy affects the economy with a significant lag); (2) encompass a number of additional frictions (e.g., financial and labor market frictions, and in some versions, present bias or other forms of bounded rationality); and (3) allow for investment/capital and more realistic open-economy dimensions.

The main modeling contribution of the paper lies in the derivation of the long-run aggregate supply (LRAS) and demand (LRAD) curves, rather than the specific shorter-term or transitional dynamics.

MODELING CHOICES The paper makes two important and realistic assumptions.

Nonzero inflation in steady state. A first assumption is that inflation can be nonzero in the steady state. This is a welcome feature of the analysis, consistent with targets of 2 percent in most advanced economies (and higher in many emerging or developing economies).

The model captures a trade-off generated by inflation: on the one hand, higher inflation helps offset the distortion from monopolistic pricing, while on the other hand, it leads to inefficient price dispersion, which causes a misallocation of resources. In highlighting that trade-off, the paper connects to the literature on optimal inflation, going back to Tobin's (1972) notion of inflation as the "grease in the wheels": with downward nominal rigidities, some inflation could be beneficial in helping adjust real wages and relative prices.[3]

The paper emphasizes that the slope of the LRAS curve is positive. This is surprising: while the short-term trade-off between inflation and the output gap is intuitive, it is less evident how the trade-off can be sustained in the long run, as forward-looking agents adjust their expectations in response to central banks' actions. In New Keynesian models with rational agents and Calvo price setting, the long-run Phillips curve is vertical or near vertical to a first-order approximation around zero steady-state inflation.[4]

3. See also Adam and Weber (2023), Adam, Alexandrov, and Weber (2023), Coibion, Gorodnichenko, and Wieland (2012), and Guerrieri and others (2021, 2023). The model could potentially be extended in the future to carry out normative analysis on the policy framework, including the derivation of optimal targets.

4. It is vertical in the limit in which the discount factor goes to one, corresponding to the parameter ρ in this paper going to zero.

On closer inspection, however, the LRAS formulation in the paper is also vertical or nearly vertical, as I explain next. To see this, note that the LRAS relation is given by the equation:

$$\pi = \frac{\lambda\left(\rho + \lambda - \pi^*\right)}{\rho - \pi^*}\left[y + \frac{\varphi}{1+\varphi}\log\mu + \log\frac{\sigma\left(\tau+1\right)}{\sigma-1}\right],$$

where the LRAS slope is given by $\frac{\lambda\left(\rho + \lambda - \pi^*\right)}{\rho - \pi^*}$; λ denotes the frequency of price adjustment; ρ is the household discount factor; and π^* is the long-run value of inflation.

The formula allows for the possibility of an exactly vertical curve or infinite slope. It also permits a backward-bending Phillips curve. More generally, for reasonable numerical values, the resulting slope of the LRAS is very large in absolute values. Let us walk through some interesting special cases.

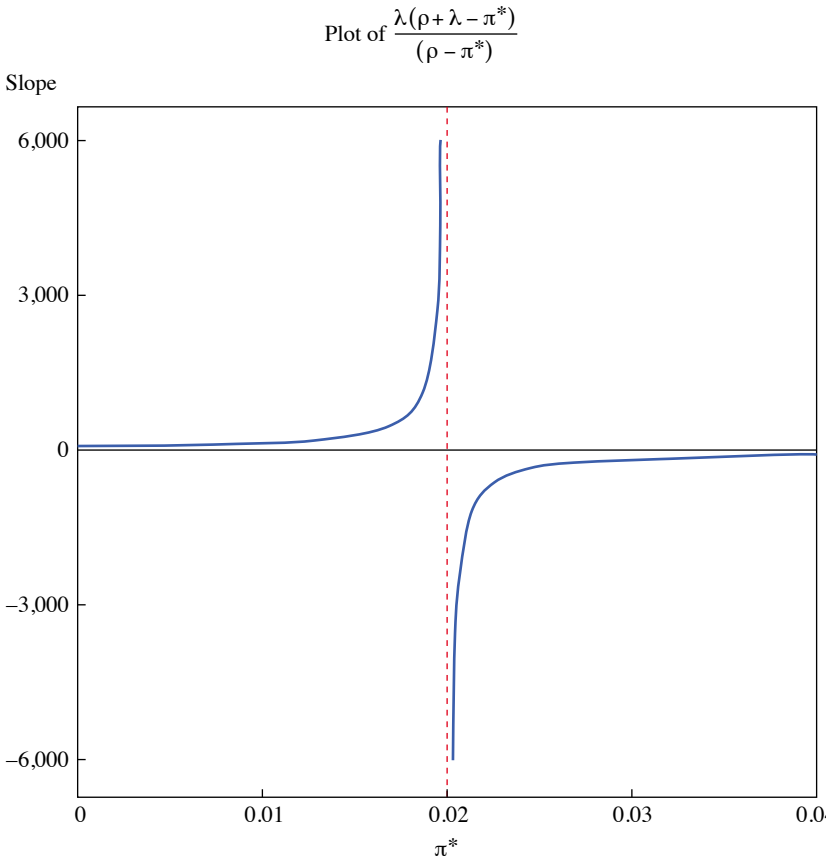
When $\pi^* = 0$, we have the more familiar expression for the LRAS or structural Phillips curve slope, $\frac{\lambda\left(\rho + \lambda\right)}{\rho}$, which converges to infinity as $\rho \to 0$. For a positive steady-state inflation, $\pi^* > 0$, the LRAS becomes vertical as $\rho \to \pi^*$. The LRAS slope turns negative when (1) $\rho < \pi^*$ and $\lambda + \rho - \pi^* > 0$ or (2) when $\rho > \pi^*$ and $\lambda + \rho - \pi^* < 0$.

More concretely, for a calibration of $\lambda = 1.2$ (as in the paper) and a discount rate of $\rho = 2\%$ (which seems reasonable), the LRAS slope becomes vertical at $\pi^* = 2\%$ and negative for $\pi^* > 2\%$, as illustrated in figure 1.

The figure, however, masks what happens away from $\pi^* = 2\%$. Even before becoming infinite, the values of the LRAS slope are also very high, as shown in table 1 for a range of selected π^* values and the same calibration of the other parameters as above. This implies that, in practice, the long-term trade-offs are not, in a quantitative sense, feasible, as the LRAS is practically inelastic. (Note that given that as the LRAS variables are expressed in log deviations from their steady states, the slope corresponds to the inverse of the LRAS elasticity, implying a near-zero long-run supply elasticity.)

Varying ρ changes the point at which the LRAS becomes exactly vertical, so the calibration of this parameter is important. However, as before, the slope of the LRAS is still very high in absolute values even when away from the asymptote. For example, for $\rho = 4\%$, which is the value preferred

Figure 1. Slope of the LRAS as a Function of Steady-State Inflation π^*



Source: Author's illustration.

Note: The figure shows the slope of the LRAS for $\lambda = 1.2$ and $\rho = 2\%$ as a function of the steady-state value of inflation, π^*. The slope passes to infinity at $\pi^* = 2\%$.

Table 1. Slope of the LRAS as a Function of Steady-State Inflation π^*

	LRAS slope	
π^* *(%)*	$\rho = 2\%$	$\rho = 4\%$
0.00	73.2	37.2
1.00	145.2	49.2
2.00	∞	73.2
3.00	–142.8	145.2
4.00	–70.8	∞
5.00	–46.8	–142.8
6.00	–34.8	–70.8

Source: Author's illustration.

Note: The table shows the slope of the LRAS curve for $\lambda = 1.2$ and $\rho = 2\%$ and $\rho = 4\%$ for selected values of steady-state inflation, π^*.

by the authors, the LRAS is decidedly inelastic even at lower values of π^*, as illustrated in table 1.

Perhaps it is fitting to address a misconception regarding New Keynesian models. In general, these models do not automatically generate a zero-inflation steady state: there is nothing in the model that ensures convergence to a zero-inflation (or 2 percent inflation) steady state; on the contrary, if the "wrong" policies are taken, inflation would end up above or below the 2 percent target in the long term.[5]

Though the paper deviates from the zero-inflation steady state, it follows closely other assumptions made in the simple New Keynesian model. In that setting, any price dispersion is inefficient, following the assumptions of symmetric preferences, concave utility over varieties, and similar technology (and common shocks) across varieties. In a richer setting with multiple sectors subject to different shocks and different degrees of price rigidities across sectors, the concept of price dispersion and its implication of efficiency is more nuanced. To be concrete, when an uneven shock (say, to gas prices) hits sectors differently (e.g., restaurants are far more affected than grocery stores), one might expect an increase in price dispersion, reflecting the uneven impact of the gas price shock. The change in price dispersion in this case can be efficient—it is the outcome of the price system doing its job. (An optimizing social planner would not want to fully stop those price signals, which facilitate the reallocation of resources in the face of shocks.) The pandemic and the energy price shocks are examples in which changes in relative prices (and dispersion) can be the efficient outcome (unlike in the simpler New Keynesian models); when combined with downward nominal rigidities, this can justify a temporary higher level of inflation.[6]

Lack of commitment. A second assumption in the paper is lack of commitment. The word *commitment* has different meanings among academics and practitioners. In the jargon of the academic literature, commitment means that the central bank decides at time zero a precise state-contingent policy path for the infinite set of future periods and states of the world. In the context of central banking, departing from the literature's definition of commitment is a realistic assumption, given that, in practice, central banks can only commit to their mandates and optimize outcomes over finite policy horizons. One could say that there is effectively discretion,

5. Another way to characterize this is that the model requires the specification of monetary policy behavior (the monetary policy rule) to be consistent with the desired long-run inflation rate. Put differently, it is the monetary policy rule that determines inflation in the long run.

6. See Guerrieri and others (2021, 2023).

or rather "limited commitment," over a rolling period of, say, three to five years. Why not longer? Because the current monetary policy board members cannot commit the decisions or votes of future board members.[7] A perhaps more fitting description is Bernanke's (2003) notion of "constrained discretion," which entails a middle ground between the academic extremes of full discretion and commitment. This notion still requires a commitment by central bankers, both through words and actions to price stability (however defined in their mandates).

In discussing commitment with a broader audience, it is hence important to emphasize the distinction between the meaning in the literature (commitment to an infinite state-contingent policy path) and the common understanding by market participants and other practitioners for which the term *commitment* is typically reserved for the mandate: are central banks committed to their mandates? This commitment to the mandate in practice is still consistent with the optimal "discretion" outcome in the literature, as long as central bankers have realistic expectations of the output potential of the economy—more on this later. Importantly, as pointed out by Giannoni (2020), the period-by-period optimization (or discretion) of a loss function (characterizing the mandate) leads to a strict Taylor-type rule (which practitioners outside academia might call "commitment").

CENTRAL BANK OBJECTIVES The paper assumes that the central banker in charge of policy seeks to optimize a social welfare function that considers all (possibly changing) distortions in the economy. In practice, central banks have much narrower mandates. Hence, a natural question is: can or do central banks aim off their narrow targets to improve social welfare?

Regarding feasibility, while it is true that objectives of full employment or output potential are not as precisely defined as inflation targets, there are two important lessons from central bank practice and theory, in particular from contributions of Barro and Gordon (1983) and Rogoff (1985), that

7. One could regard some announcements by central banks as trying to commit future members' policy actions. The key question is whether such announcements are credible, given that different decision makers may be in charge when the time comes to make good on the promise. There is an intermediate equilibrium concept of "loose commitment" (in which the policymaker operates under commitment but with a constant per period probability that previous commitments are abandoned). That may approximate central bank behavior somewhat better in certain cases. In a more complex model with endogenous state variables, the "discretionary" policymaker at date t realizes that their decisions can affect the state of the economy inherited by the date $t + 1$ policymaker and therefore takes this into account. Since the same logic holds for the policymaker at date $t + 1$, the discretionary policy problem becomes dynamic and intertemporal. However, the policymaker at t cannot directly control policy actions in future periods and can only influence those policies via the effects on the endogenous state variables.

can tackle the imprecision. The first is that central bank independence is a necessary condition for a sound conduct of monetary policy; the second is that central banks should target realistic estimates of the noninflationary (or inflation target–consistent) output potential. A central bank aiming for a higher level of activity than what would be consistent with inflation at target is bound to fail in fulfilling its inflation remit. This is well understood within the central bank community today.

In the simplest version of the New Keynesian model, it is typically assumed that the fiscal authority can correct the monopoly distortion with a labor subsidy, so that the flexible-price equilibrium level of output is efficient.[8] But realistically, absent the fiscal correction, central banks can only aim for the flexible-price equilibrium level of output, whether or not it is efficient. If a central bank aims to stimulate the economy beyond the inflation target–consistent level of output (trying to offset distortionary markups, for example), that will lead to an inflationary bias and a persistent deviation from target.[9]

The threat of an inflationary bias is the reason why there is a big effort in central banks to estimate the target-consistent output potential.[10] The inflationary bias is probably also why most central bank mandates give primacy to the inflation target over full employment, with some short-term flexibility in the face of temporary (supply) shocks.[11]

A different question is whether it pays for central bankers to deviate from their narrow targets and attempt to offset distortions, improving welfare. In advanced economies at least, deviations from targets today are costly for central bankers. Their performance is constantly scrutinized by media, parliamentary bodies, market participants, academics, and others. And there is a body of expertise ready to detect attempts at deviations.[12]

8. See Galí (2015) for a discussion of the efficient versus the distorted steady state.

9. And it is not obvious that the estimation errors should be one-sided (always estimating output potential above the true level); central banks can make mistakes, but over time, as the estimation model's performance is confronted with inflation outturns (and other outcomes), estimation and judgment would lead to convergence to the true values.

10. In the jargon of the literature, the target-consistent level of output corresponds to the flexible-price equilibrium level of output.

11. The logic to that short-term flexibility is that, given lags in transmission, monetary policy cannot offset the shock immediately (and if short-lived, the shock might disappear before policy has full effect).

12. Some would argue that it is much easier to detect and be penalized for missing the inflation target (vis-à-vis other objectives) since inflation is easier to measure than abstract concepts like the output gap or full employment. Given how much people dislike inflation, this would be a deterrent even to the most populist leaders; markets might also penalize such a move sooner or later, making it costly for politicians to attempt to change remits or institutional frameworks.

CHANGING ENVIRONMENT Of course, the main point of the paper is that the status quo could change. Political pressures may outweigh the pressure from public scrutiny and lead central bankers to aim for output above potential (in the model, a higher labor share) or a change in remits; or, perhaps, the changing environment might cause governments to remove or diminish central bank independence. This is the key question and challenge posed by the paper.

The paper is concerned specifically with changes in economic trends. It argues that globalization and the fall in union power made lives easier for central banks, effectively lessening the trade-offs between activity and inflation. In addition, lower indebtedness in the recent past (compared to now, and most notably among emerging economies) meant that there was less of an incentive to inflate away the debt.

I would also note that in the 1990s and early 2000s, there were no big negative supply shocks, a very different scenario from the 1970s and 1980s.[13] And certainly different from the early 2020s, which in a space of less than three years have witnessed a most remarkable concentration of rare events (particularly in Europe and the United Kingdom where the energy price increase alone, triggered by the Russian invasion of Ukraine, represented a shock comparable to, if not bigger than, the oil shock of the 1970s).

Despite this, central banks around the world have been focused on returning inflation to target. In the United Kingdom, consumption at the time of writing is 2 percent below what it was before the pandemic. In the euro area, consumption is just above its pre-COVID-19 level. The US economy is an exception, with consumption 11 percent above the pre-pandemic level, though still below pre-pandemic trends.[14] There is no sign that central banks in advanced economies, or indeed in many emerging economies and developing countries, have tried to push consumption or output higher.

It is important in the discussion to distinguish between changes in trends (that eventually can be foreseen) and unexpected (trade-off inducing) shocks.

13. While the financial crisis entailed a sharp loss in productivity, demand adjusted significantly, leading on net to a period of low inflation.

14. UK Office for National Statistics, "Household Final Consumption Expenditure: National Concept CVM SA–£m," https://www.ons.gov.uk/economy/nationalaccounts/satelliteaccounts/timeseries/abjr/pn2; US Bureau of Economic Analysis, "Real Personal Consumption Expenditures [PCECC96]," retrieved from FRED, Federal Reserve Bank of St. Louis, https://fred.stlouisfed.org/series/PCECC96; Eurostat, "GDP and Main Components (Output, Expenditure, and Income)," https://ec.europa.eu/eurostat/databrowser/view/namq_10_gdp__custom_8299778/default/line?lang=en.

In the first case, central banks would need to change estimates of potential (as they eventually did post-financial crisis or post-Brexit); the question in the paper is: will they? As for unexpected shocks, if it is an isolated event, the orthodox response would be to accommodate in part, making sure that inflation returns to target; but if shocks become so frequent that they change the trend in potential output, we are back to the first case—and the same question posed by the paper.

I turn now to the question of changing trends and the impact on inflation.

GLOBALIZATION AND MARKUPS While the partial equilibrium effect of globalization might be intuitive, the general equilibrium effects are less obvious. A standard conceptualization of globalization, highlighted by Goodhart and Pradhan (2020), is that globalization lowered the prices of imported goods, and to the extent that the process was gradual, it led to lower imported goods price inflation. However, in general equilibrium, this improvement in terms of trade also increased real incomes, raising private demand and pushing up services inflation. The impact on inflation is not a priori obvious.[15] Deglobalization, conversely, should reduce real incomes and eventually demand, lowering domestic inflationary pressures. Indeed, globalization peaked in 2008, but we had not seen a reversal on inflationary pressures during the 2008–2019 period. On the contrary, inflation kept undershooting targets and central banks did not need to raise rates.

The paper conceptualizes deglobalization as an increase in the level of markups, as the economy becomes less competitive. This leads to a contraction in supply, an intuitive partial equilibrium effect. Going beyond the partial equilibrium effect, in practice, this redistribution away from workers may lead to a reduction in aggregate demand if profits accrue to agents with low marginal propensity to consume. It is not a priori obvious that the net effect of these forces would be inflationary.[16] But if, as in the model, the central bank tries to keep the labor share constant (equivalent to trying to stimulate the economy over the new, lower potential level of output), that would be inflationary. The point to stress is that it is not about inflationary pressures from the trends themselves, which could be muted in general equilibrium by private demand responses; it is instead a matter of lower

15. See Ambrosino and others (2024) who show the impact of deglobalization depends on how demand responds to lower real incomes caused by higher import prices.

16. Sbordone (2007) studies the link between globalization, markups, and inflation. She shows how key theoretical channels cancel out, leading to a muted impact on inflation; her theoretical result is matched by limited inflationary effects found in the numerous empirical studies she discusses.

output and real incomes, which might lead central banks (or governments) to push for more stimulus. Though the distinction might sound academic, the key challenge is the political pressure stemming from lower potential growth.

POLITICAL PRESSURES AND THE ROLE OF RESEARCH The risk in a context of low growth potential is that governments will put pressures on central banks to stimulate output.[17] (An alternative motivation, not developed in the model, but mentioned in the paper, is that the pressure to inflate comes because of higher levels of indebtedness.) The pressure could materialize in different forms. Governments might undermine or take away central bank independence; or they could persuade central banks to aim off their inflation targets to stimulate the economy or inflate away the debt.[18] Another manifestation of the pressure could be directly through a change in remit.

On the first possibility, there is probably near consensus among economists that undermining or taking away independence, or attempting to manipulate central banks would be a disastrous outcome. On the second option, there is a debate still unsettled on the optimal inflation target (Blanchard 2022); more generally, in a flexible inflation targeting regime, more debate is needed on how to stipulate the mandate in the face of unexpected supply shocks. This paper offers a useful model to frame that debate. In that context, there is an important role for academic and policy institutions (like the Brookings Institution) to play in this debate. After all, the academic literature (Barro and Gordon 1983; Rogoff 1985; Alesina and Summers 1993) was hugely influential in leading to central bank independence.

CONCLUDING REMARK Let me conclude by emphasizing that this is an important paper, underscoring a risk to central bank independence that we all need to take seriously. I hope the paper, and the risk it highlights, will be an important input in the exchange between academics and policymakers.

17. See Drechsel (2023) for an empirical study of political pressures on the Federal Reserve Bank.

18. It is far from obvious that with so much knowledge accumulated over the years, central banks themselves would try to systematically aim off the level of output consistent with inflation at the new chosen target. But if, hypothetically, a political appointee reveals with words or actions that there is a new output objective inconsistent with the stated inflation target, that would likely trigger sharp market reactions, which would be costly to the government (especially a highly indebted one). So it becomes important to think about the sequencing that will make turning dovish a politically appealing option. This is particularly relevant in the current context. After the recent inflation overshoot and people's dissatisfaction with high inflation, the political bias will turn to run in the opposite direction, that is, against inflation. Similarly, in line with Rotemberg's (2013) theory of central bank's "penitence," central banks will be more likely to err on the side of being too hawkish.

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GENERAL DISCUSSION Robert Hall noted that a prominent feature of the paper is the departure from central bank commitment and referenced a paper by Stanley Fischer that documents how governments often successfully commit to fiscal policy, even if that policy is not optimal.[1] Hall wondered if a similar idea could apply to monetary policy. Following up on Hall's point, Maurice Obstfeld observed that the paper implicitly introduces fiscal policy as a factor pressuring the central bank, but he would also like to see the results where monetary-fiscal interaction is modeled explicitly. Obstfeld added that, even in a model without commitment, the central bank objective function implies that the monetary authority will respond to fiscal pressures. In response, Pierre Yared pointed to his work with Jesse Schreger and Emilio Zaratiegui about fiscal-monetary interaction.[2] Yared summarized two channels: first, the central bank is pressured to devalue existing government debt; and second, the central bank is pressured to reduce the cost of issuing new debt.

Jón Steinsson argued that commitment was crucial in keeping inflation expectations well anchored and the sacrifice ratio low during the COVID-19 pandemic. Because commitment has proven so important, he praised the authors for presenting a model where perfect commitment is

1. Stanley Fischer, "Dynamic Inconsistency, Cooperation and the Benevolent Dissembling Government," *Journal of Economic Dynamics and Control* 2 (1980): 93–107.

2. Jesse Schreger, Pierre Yared, and Emilio Zaratiegui, "Central Bank Credibility and Fiscal Responsibility," working paper 31246 (Cambridge, Mass.: National Bureau of Economic Research, 2023). https://www.nber.org/papers/w31246.

not taken for granted. Steinsson said assumptions of perfect commitment, often implicit in policy rules, prevent most models from having anything meaningful to say about inflation expectations or long-run inflation, which this paper overcomes. He encouraged others to follow suit in building models where the monetary authority cannot perfectly commit. Steinsson and Kenneth Rogoff both warned against an "end-of-history" bias; central bank independence—and therefore central banks' ability to credibly commit to policy—is a relatively new phenomenon, and it is not guaranteed into the future.

Athanasios Orphanides agreed with other participants that central bankers struggle in practice to perfectly commit to policy but contemplated whether the model featured too much discretion. Orphanides emphasized that constraining discretion is a useful tool for preserving price stability and asked the authors how to relate that lesson to the paper's policy advice. In particular, Orphanides was curious what lessons the paper has for central bank policy frameworks. Rogoff clarified that the model is about the world, not just the United States or a single institutional framework. Hassan Afrouzi also noted it is unclear whether the Federal Reserve's maximum employment mandate assumes flexible prices or includes inflationary distortions like those in the paper. To provide better policy guidance, Afrouzi advocated for thinking through which distortions should be included or excluded when assessing the monetary policy framework.

Steven Davis observed that a useful next step in the literature could be using text-based approaches to parse exactly which forces central bankers are responding to and tailoring future models to those forces. Davis also encouraged building on the textual analysis in Charles Weise's 2012 paper following a similar remark from discussant Silvana Tenreyro.[3]

Obstfeld inquired whether assuming a constant frequency of price changes is reasonable in a model where trend inflation can change over time and asked how the model would behave if that parameter was endogenous. Afrouzi responded that, if they assumed higher inflation leads to more price flexibility, it would increase the sacrifice ratio and reinforce the idea that central banks should be wary of inflationary pressures.

Andrew Atkeson talked about how term structure models struggle to reconcile movements in long-term interest rates and related that literature to the paper. Atkeson discussed the paper by Sharon Kozicki and

3. Charles L. Weise, "Political Pressures on Monetary Policy during the US Great Inflation," *American Economic Journal: Macroeconomics* 4, no. 2 (2012): 33–64.

P. A. Tinsley,[4] which tried to explain long rates through movements in the Federal Reserve's long-run inflation target, and the paper by Stein and Hanson,[5] which explained long rates through changes in the term premia. Atkeson wondered if a political economy model, like the one presented by the authors, could explain movements in long rates or underlying inflation compensation. Conversely, Atkeson pointed out that rising long-term inflation compensation could provide a warning of falling central bank credibility.

Jonathan Pingle asked the authors how to think about the magnitude of possible effects in the context of advanced economy central banks. He noted that the paper places a heavy emphasis on the inflationary effects of deglobalization, although estimates of the disinflationary effects of globalization have been on the order of 0.2 points per year for a decade, so a similarly sized reversal may not change central bank behavior.

David Romer remarked that he found certain aspects of the model unintuitive. First, Romer questioned the upward-sloping long-run aggregate supply (LRAS) curve and how to interpret it in a model where monetary policy is neutral in the long run. Romer agreed with discussant Donald Kohn that most central bankers do not conceptualize the LRAS curve as upward sloping. Romer also questioned how the long-run aggregate demand (LRAD) curve works through price dispersion. He argued that the LRAD curve seemed to work through supply effects because the consumption bundle value of a given amount of labor is determined by the level of inflation. Romer suggested that the simpler model presented in a paper by Rogoff might suffice to capture much of the essence of the ideas in the present paper.[6] Rogoff observed that one crucial difference between this work and his 1985 paper is the transition dynamics: the new model allows significant but temporary overshoots and undershoots when shifting to a new steady state.

Afrouzi noted that the upward-sloping LRAS curve arises from how firms think about incorporating inflationary pressures into current prices. When inflation is higher, firms weigh how much they want to adjust current prices. As long as they don't fully adjust current prices, the LRAS curve will slope upward. Afrouzi agreed with Romer's consumption bundle intuition

4. Sharon Kozicki and P. A. Tinsley, "Shifting Endpoints in the Term Structure of Interest Rates," *Journal of Monetary Economics* 47, no. 3 (2001): 615–52.

5. Samuel G. Hanson and Jeremy C. Stein, "Monetary Policy and Long-Term Real Rates," *Journal of Financial Economics* 115, no. 3 (2015): 429–48.

6. Kenneth Rogoff, "The Optimal Degree of Commitment to an Intermediate Monetary Target," *Quarterly Journal of Economics* 100, no. 4 (1985): 1169–89.

of LRAD, but he clarified how it comes into the model. Afrouzi said that economic resources are fixed, so given the distribution of prices, households determine how much they want to demand. Only later does the model aggregate those choices with the supply side, determining output. How much output comes from those fixed resources is interpreted as productivity.

Obstfeld discussed the channels through which globalization or deglobalization could affect inflation. Obstfeld observed that, in the short run, most research emphasizes the role of import prices. Longer term, he highlighted the work of Charles Goodhart and Manoj Pradhan who emphasized the role of China, India, and the former Soviet Bloc entering the world economy and greatly increasing the effective labor force, putting downward pressure on wages and inflation.[7] Goodhart and Pradhan contend that these forces will reverse, which Obstfeld argued is a useful lens to view the inflationary pressures in this paper. He also pointed to a paper by Argia Sbordone as a useful reference for thinking about globalization in open models.[8]

7. Charles Goodhart and Manoj Pradhan, *The Great Demographic Reversal: Ageing Societies, Waning Inequality, and an Inflation Revival* (London: Palgrave Macmillan, 2020).

8. Argia M. Sbordone, "Globalization and Inflation Dynamics: The Impact of Increased Competition," in *International Dimensions of Monetary Policy,* ed. Jordi Galí and Mark J. Gertler (Chicago: University of Chicago Press, 2010): 547–79.

APPENDIX

The framework we have presented is based on the model analyzed in Afrouzi and others (2023). Let τ represent the exogenous labor wedge (taking the form of a proportional positive or negative tax on labor), $\sigma > 1$ represent the elasticity of substitution across varieties, and D_t denote price dispersion in period t. Then monopoly power is $\gamma = \frac{\sigma(1+\tau)}{\sigma-1}$, and log output is $y_t = \frac{1}{1+\varphi}\log \mu_t - \log D_t$. Equations (30)-(31) in Afrouzi and others (2023) give the dynamics of price dispersion and inflation in the continuous-time limit of their model, taking the labor share to be equal to 1. The analogs of those equations for a labor share μ_t that may differ from 1 are given by

$$\dot{D}_t = \lambda\left(1 - \frac{\sigma-1}{\lambda}\pi_t\right)^{\frac{\sigma}{\sigma-1}} + (\sigma\pi_t - \lambda)D_t,$$

$$\dot{\pi_t} = -\lambda\gamma\left(1 - \frac{\sigma-1}{\lambda}\pi_t\right)^{\frac{\sigma}{\sigma-1}}\frac{\mu_t\delta_t}{D_t} + (\delta_t - \pi_t)[\lambda - (\sigma-1)\pi_t],$$

where δ_t is an auxiliary variable introduced in Afrouzi and others (2023) with dynamics given by

$$\dot{\delta_t} = \delta_t^2 + [(\sigma - 1\,)\pi_t - (\rho + \lambda)]\delta_t.$$

We focus on a special case of this model: the limit as the elasticity σ approaches 1 while τ adjusts so that monopoly power γ is held constant. In this limit, we have

$$\dot{\delta_t} = \delta_t^2 - (\rho + \lambda)\,\delta_t.$$

We can show that since δ_t is a jump variable (and we assume convergence to a steady state), we must have $\delta_t = \rho + \lambda$ for all t. Additionally, observe that the limit of $\left(1 - \frac{\sigma-1}{\lambda}\pi_t\right)^{\frac{\sigma}{\sigma-1}}$ as σ approaches 1 is equal to $\exp\left(-\frac{\pi_t}{\lambda}\right)$. Hence, we obtain that in this limit,

$$\dot{D}_t = \lambda\exp\left(-\frac{\pi_t}{\lambda}\right) + (\pi_t - \lambda)D_t,$$

$$\dot{\pi_t} = -\lambda(\rho + \lambda)\gamma\exp\left(-\frac{\pi_t}{\lambda}\right)\frac{\mu_t}{D_t} + (\rho + \lambda - \pi_t)\lambda.$$

If the central bank sets a constant labor share $\mu_t = \mu$ for all t, then (recalling that $y_t = \frac{1}{1+\varphi}\log \mu_t - \log D_t$) we have $\dot{y}_t = \frac{\dot{Y}_t}{Y_t} = -\frac{\dot{D}_t}{D_t}$. Hence, we can write

$$\dot{y}_t = -\lambda\, \mu^{-\frac{1}{1+\varphi}} \exp\left(-\frac{\pi_t}{\lambda} + y_t\right) + \lambda - \pi_t,$$

$$\dot{\pi}_t = -\lambda(\rho+\lambda)\gamma \exp\left(-\frac{\pi_t}{\lambda} + y_t\right) \mu^{\frac{\varphi}{1+\varphi}} + \lambda(\rho + \lambda - \pi_t).$$

In steady state, under $\dot{\pi}_t = \dot{y}_t = 0$ for all t, these equations yield

$$y = \frac{\pi}{\lambda} + \log\left(1 - \frac{\pi}{\lambda}\right) + \frac{1}{1+\varphi}\log \mu,$$

$$y = \frac{\pi}{\lambda} + \log\left(1 - \frac{\pi}{\rho+\lambda}\right) - \frac{\varphi}{1+\varphi}\log \mu - \log \gamma.$$

The first equation is the non-linear LRAD curve and the second equation is the non-linear LRAS curve. The LRAD and LRAS curves described in the text correspond to a first-order approximation of these equations in the neighborhood of a small and positive value of long-run inflation π^*. (Recall that the values of π, y, $\log\ \mu$, and $\log\ \gamma$ in the text correspond to deviations from long-run values.)

The long-run steady state equilibrium described in the text is given by the solution to the system of the two approximate equations. That solution corresponds to the first-order approximation of the solution to the non-linear system in Afrouzi and others (2023) under the above parametric assumptions, where equilibrium inflation and output are given by

$$\pi = \lambda \frac{(\mu\gamma - 1)(\lambda + \rho)}{\mu\gamma(\lambda+\rho) - \lambda},$$

$$y = 1 + \log\left(\frac{\rho}{\mu\gamma(\lambda+\rho) - \lambda}\right) - \left(\frac{\rho}{\mu\gamma(\lambda+\rho) - \lambda}\right) + \frac{1}{1+\varphi}\log \mu.$$

We can verify that the quantitative effects discussed in the text based on the approximate linearized model are in line with those implied by the non-linear model. In particular, take a labor share of $\mu = 0.83$, in line with average markups of 1.2 in Karabarbounis and Neiman (2018), and set the value of monopoly power γ so that steady-state inflation is 0.02. Then a 0.04 percent increase in

γ increases inflation from 2 percent to 3.4 percent, which is what we found in the linearized approximation. Moreover, the change in γ reduces output $Y = \exp(y)$ by 0.027 percent, which is close to the reduction of 0.02 percent that we found in the linearized approximation.