Changing Central Bank Pressures and Inflation[1]

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ABSTRACT

We present 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 central bank pressures that can impact 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 upwards.

INTRODUCTION

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 towards 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 U.S. 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.[6] Several

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[6] See U.S. Federal Open Market Committee (2023) and European Central Bank (2023).

emerging market central banks also project long-term inflation rates very close to their targets (which are generally higher than those of advanced economies).[7]

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 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

[7] For example, Banco Central do Brasil projects an inflation rate of 3.2 percent in 2025, just above its 3 percent inflation target (Banco Central do Brasil, 2023).

holds independently of economic parameters.[8] But what if 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 Friedman (1968) and Barro and Gordon (1983) models. 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 non-linear 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 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, imperfect central bank commitment

[8] 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.

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 allowing the central bank to have preferences that differ from those of households, as in Rogoff (1985).[9] The degree to which the central bank values household leisure over consumption reflects its anti-inflation bias. 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.

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 non-zero steady-state inflation. The long-run aggregate demand curve, which is less familiar, emerges in a non-linear 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 impact 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,

[9] 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.

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 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.[10]

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 to 3 or 4 percent can have substantial output costs.[11,12] 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

[10] 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 non-linear New Keynesian economy, even in the long run.

[11] 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.

[12] 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).

target. The same principle applies if there is overshooting in the transitions as our model suggests.

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 de-unionization, 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.[13]

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.

[13] See Karabarbounis and Neiman (2014) and De Loecker, Eeckhout, and Unger (2020).

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 a 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, 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.[14]

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.[15]

[14] The debate on monetary neutrality is far from settled. For example, see the recent work by Jordà, Singh, and Taylor (2020) and Ma and Zimmerman (2023).

[15] 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.

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, 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 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.[16] 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 the 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.[17,18] In the Barro and Gordon (1983) framework, of course, monetary

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

[17] 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 which mirror those we show in the text for monopoly profits. These comparative statics are described in our discussion of de-unionization in the next section.

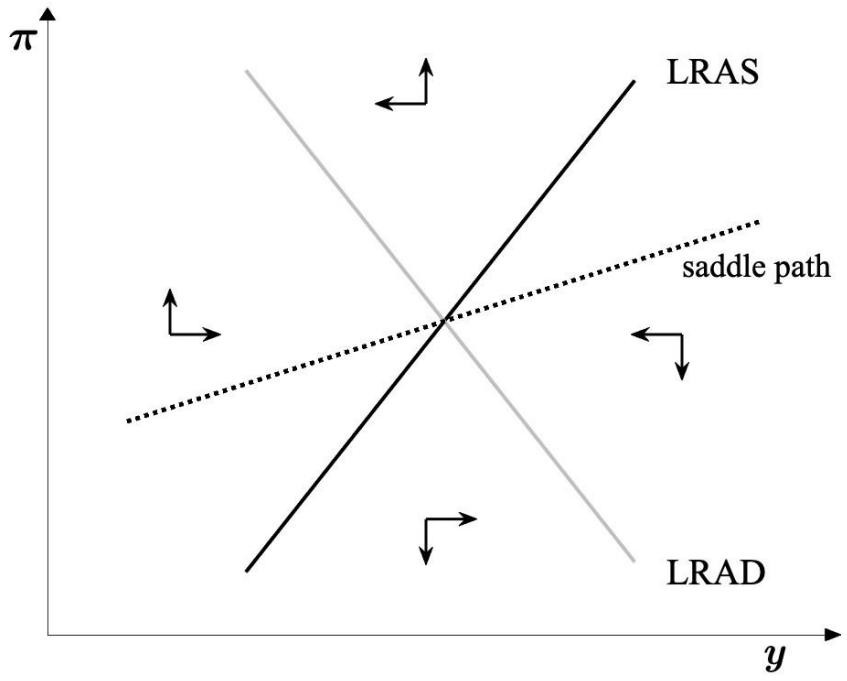
[18] In the competitive equilibrium of our model, monopoly profits would be zero and the labor share would be one since the standard New Keynesian model abstracts from capital investment.

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.

Steady-State Representation. The long-run steady state of the non-linear 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 horizontal axis, the LRAS curve is upward sloping and the LRAD curve is downward sloping.

FIGURE 1: Long-Run Aggregate Demand and Supply



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:

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

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

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

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 a 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 non-linear 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 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.[19,20] 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.[21]

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.

[19] 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.

[20] 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.

[21] The specific approximation applied above is useful to elucidate the critical non-neutrality 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 non-linear environment becomes upward sloping under deflation, since greater deflation (i.e., more negative inflation) increases price dispersion.

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.

An important case—on which we focus from hereon—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.[22] 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

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

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

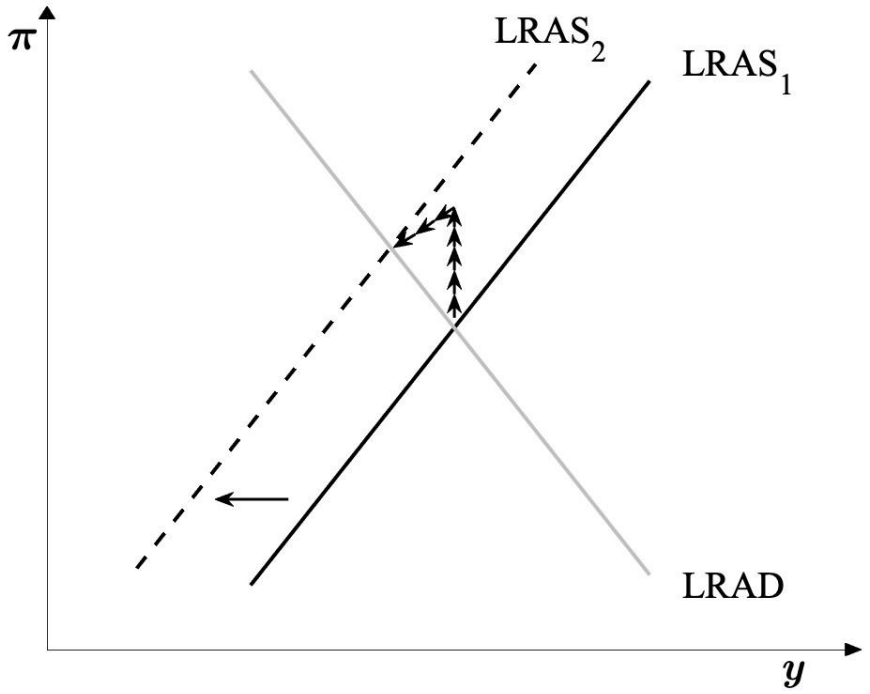
Thus, the labor share is constant and determined by the exogenous weight the central bank places on consumption over leisure. If the central bank's preferences coincide with those of households, the equilibrium labor share is equal to one because the central bank wishes to undo all equilibrium monopoly 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.[23] A lower labor 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.

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. 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.

[23] 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.

FIGURE 2: Effect of Increase in Monopoly Power

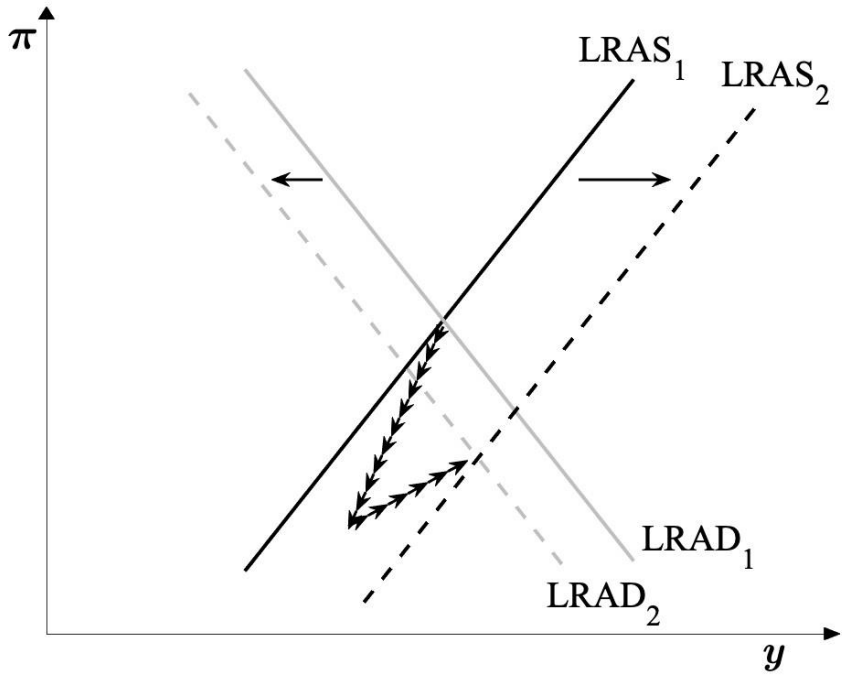


Despite the higher monopoly power, monopoly rents stay constant in equilibrium. The reason is that the central bank allows higher inflation in order to prevent the economy from experiencing an *equilibrium* increase in monopoly rents and decrease in the labor share (which is why the LRAD curve does not 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 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.

FIGURE 3: Effect of Increase in Central Bank Hawkishness



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 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.

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

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

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

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 which 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.[24] 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.

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.[25] 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 10 to 20 fold.

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

[24] 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).
[25] In the Appendix, we show that the quantitative effects from the approximate linearized model are in line with those of the non-linear model.

around the steady state. As also shown in Figure 1, the saddle path yields transition dynamics which 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 towards 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 in inflation, however, only leads to a gradual increase in price dispersion. Along the path towards 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 towards 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 towards 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.

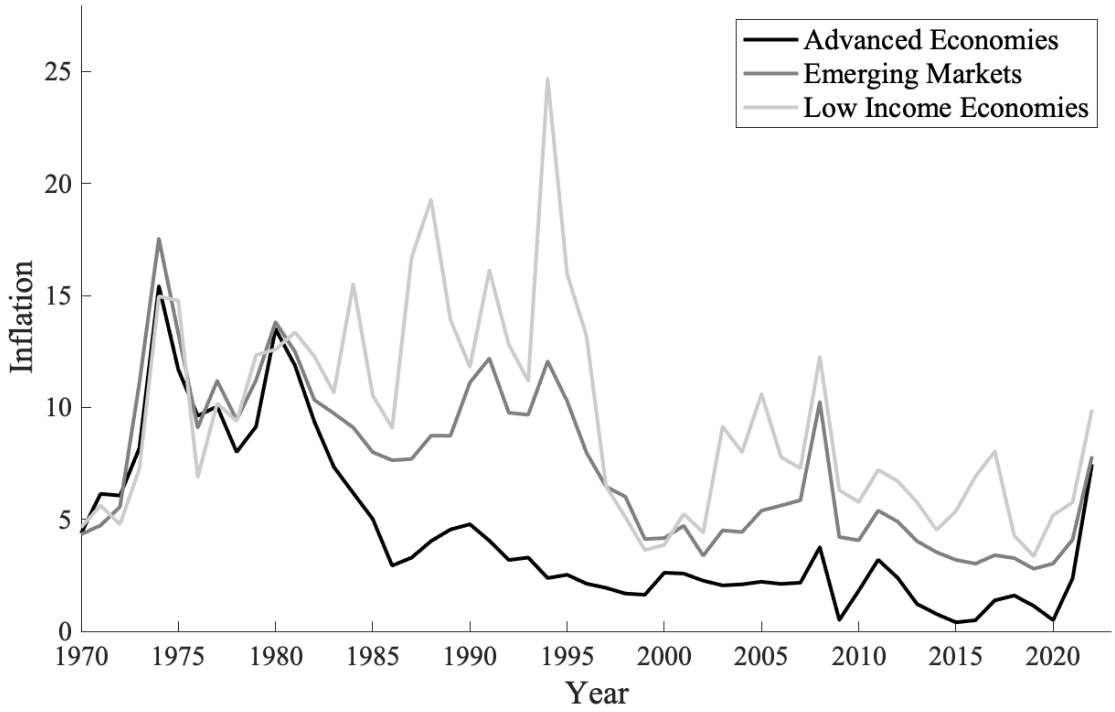
The opposite transition dynamics would hold if the central bank instead became permanently more dovish. In that case, output and inflation would immediately jump upward and then decline towards a lower steady-state output and higher steady-state inflation level.

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.

Empirical Evidence. Figure 4 depicts inflation across the world for three different country groups over the period 1970-2022.[26]

FIGURE 4: Inflation across the World



Source: Ha, Kose, and Ohnsorge (2021).

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).

[26] 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.

Less studied, but equally salient is the global decline in inflation in the 1990s, 2000s, and 2010s. This decline impacted all country groups 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 21st century ebbs and flows 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.[27] 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 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 which changed endogenous political economy pressures on central banks: rising globalization, the deepening Washington Consensus, and de-unionization. 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.

Globalization. Between 1970 and 2007, global trade as a proportion of global GDP increased from 25 percent to 59 percent (World Bank, 2023a). 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,

[27] 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).

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 (World Bank, 2023b).

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 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.

Washington Consensus. A second force to consider is the proliferation of the Washington Consensus, a term which 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 800 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.

[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.

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 (International Monetary Fund, 2023a). 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 is the inherited public debt, the lower is the pressure on the central bank to use inflation to devalue that debt to mitigate the economic cost of debt repayment. Moreover, the lower is the deficit, the lower is the pressure on the central bank to stimulate the economy to reduce the real interest rate and the cost of issuing new debt.[29] 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).

De-unionization. A third important force is de-unionization, particularly in advanced economies. In the United States, the fraction of households in trade unions declined from 22

[29] 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.

percent in 1980 to 11 percent by 2010. Out of 24 advanced economies with available data, 20 experienced a reduction in unionization rates over this period, including even countries like Germany where unionization rates have been historically high (OECD, 2023).

To evaluate the effects of de-unionization 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; see Galí, 2015 for an exposition), again accounting for non-linearities. 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 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.

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, 60 central banks adopted inflation targeting.[30] Early adopters were central banks in advanced economies, like those in New Zealand, Canada, and the U.K., while more recent adopters included emerging economies such as India and Russia.

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.[31] 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.

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

[30] This includes the 19 countries in the Eurozone plus 41 other countries classified by International Monetary Fund (2019) as inflation targeters.

[31] 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.

forces which 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 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 (see Berger, de Haan, and Eijffinger, 2001 for a survey). 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.[32]

[32] 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 Sahin, 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.

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 40-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 which 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.

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 (World Bank, 2023a). 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 (World Bank 2023b). 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 non-aligned countries for trade (Gopinath, 2023). Firm-level network data further indicates 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 which accelerated after the 2020 pandemic. This resulted in a

transition from "hyperglobalization" prior to the global financial crisis to "slowbalization" (see Aiyar and Ilyina, 2023, and 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 U.S.-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, 2023b). 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 (UNCTAD, 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 U.S., European Union, and their allies applied trade and financial sanctions on Russia, resulting in a re-routing of global flows. In addition, the Israel-Gaza war of 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,[33] and the rising geopolitical risk (Caldara and Iacoviello, 2022). If countries pursue protectionist policies and do not deescalate 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).[34] Thus, through

[33] See the Global Trade Alert Database, https://www.globaltradealert.org/.

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

this channel, a reversal in globalization trends increases the endogenous political economy pressures on the central bank to inflate.[35]

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, 2023c). 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 percent 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 U.S., for example, the Congressional Budget Office forecasts 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 (Congressional Budget Office, 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 U.S., 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 mid-century would

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

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, 2023c).

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 U.S. debt—assumes that U.S. defense spending as a share of GDP will decline from 3.2 percent in 2023 to 2.7 percent in 2033.[36] Should geopolitical tensions persist, a more realistic forecast would account for the possibility that U.S. defense spending returns back to levels closer to those reached during the Cold War, which averaged nearly 7 percent of GDP between 1960 and 1991 (SIPRI, 2023).

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 towards national strategic goals—are not just confined to the 2022 CHIPS and Science Act or the 2022 Inflation Reduction Act in the U.S.; 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 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.[37]

[36] 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.

[37] 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

Unshackling from the Zero Lower Bound. A third development impacting 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.[38]

Taking Stock. 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.[39] 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 deescalate, 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

with our analysis, Del Negro, di Giovanni, and Dogra (2023) find that green policies change the tradeoffs for central banks and can increase their incentives to stimulate the economy.

[38] 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.

[39] 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 de-unionization described in the previous section.

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 (see Stantcheva, 2024). Now, a critical difference relative to the past 30 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 their surprising resilience and contained inflation in the face of the major shocks of the past decade and 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.

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 upwards. 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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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.