

## Should inequality factor into central banks' decisions?\*



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*Inequality is increasingly a policy concern. It is well known that fiscal and structural policies can mitigate inequality. However, less is known about the potential role of monetary policy. We investigate how inequality matters for the conduct of monetary policy within a Two-Agent New Keynesian model. We find some support for making consumption inequality an explicit target for monetary policy, particularly if central banks follow standard Taylor rules. Given the importance of labor income at the lower end of the income distribution, we also consider augmented Taylor rules targeting the labor share. We find that such a rule is preferable to targeting consumption inequality directly. However, when considering the optimal monetary policy, the gains from taking into account inequality are smaller.*

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Major central bankers are increasingly discussing distributional issues although inequality remains outside their mandate. At the same time, recent advances in economic theory shed new light on the interplay of monetary policy and inequality. It is now accepted within the academia and among policy makers that wealth and income inequality can affect the effectiveness of monetary policy. This is because poorer households, who tend to be more liquidity constrained than richer households, tend to increase their consumption more as incomes rise in response to an interest rate cut. Consequently, a given rate cut stimulates aggregate consumption more in an economy with a larger proportion of poorer households. Relatedly, there is evidence supporting that monetary policy itself can affect inequality.

In a recent working paper (Hansen, Lin, and Mano, 2023), we add to the fast growing literature studying the relationship between inequality and monetary policy through the lenses of structural models of the economy. Specifically, we study a tractable Dynamic Stochastic General Equilibrium (DSGE) model and use it to assess if there is a case for letting inequality factor into central banks decision making. The model builds on Bilbiie (2008) and Debortoli and Gali (2018). In this setting, a rich agent (*Ricardian*) owns all the capital and her income is thus composed of after-tax dividends and wages. In contrast, a poor agent (*Keynesian*) receives only wages and potentially a transfer from the government financed by taxes on dividends,  $(1 - \tau)d_t$ . The higher  $\tau$ , the lower the redistribution and the larger the income inequality. The fact that the Ricardian has an additional source of income (dividends) leads to income and consumption inequality in the long run, unless all dividends are taxed away. A positive productivity shock leads to higher profits and hence higher dividends, thereby exacerbating the initial income and consumption inequality. This effect is further reinforced by an assumed tech-bias in wage income: when productivity rises, Ricardian's share of total wage income goes up, while Keynesian's declines. Finally, we assume that both wages and prices are subject to nominal rigidities. The model is calibrated to US data and the mechanisms are consistent with the empirical effects of technology shocks on consumption inequality (De Giorgi and Gambetti, 2017).<sup>1</sup>

We study the implications of inequality for monetary policy in two settings. In the first setting, the central bank chooses the best possible path of interest rates with full information and caring equally about all individuals (optimal policy). In the second setting (Taylor rule), the central bank sets monetary policy according to a rule, which prescribes a given interest rate based on whether targeted quantities (such as inflation and output) deviate from desired levels. This second setting can be informative as the Taylor rule is used by some central banks as a reference point.<sup>2</sup>

In our study, we consider a utilitarian central bank, i.e. one that cares equally about each agent proportionally to their population share. To evaluate and compare policies, we therefore use the average utility as measure of welfare and follow the literature by taking a second order approximation to it. What comes out of this is a quadratic welfare function in inflation, output gap, labor share gap, and the difference in (logarithm of) consumption between Ricardian and Keynesian agents as a measure of inequality<sup>3</sup>

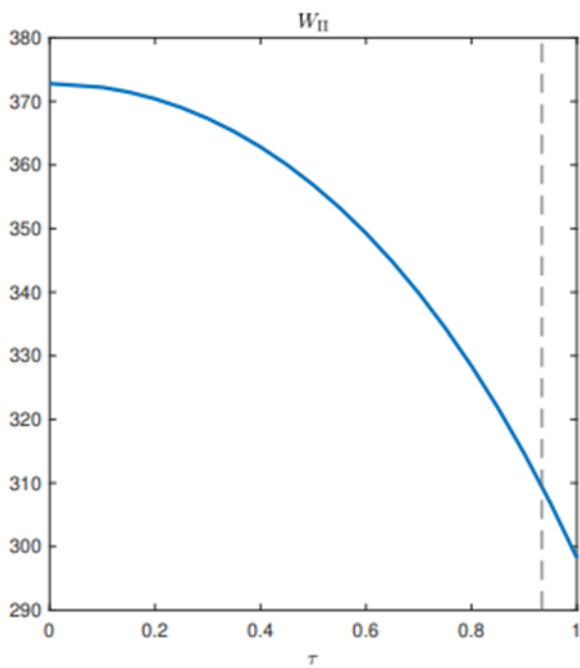
$$\text{inflation } \widehat{\Pi}_t, \text{ output gap } \widehat{Y}_t - \widehat{A}_t, \text{ labor share gap } \widehat{L}S_t - \widehat{L}S_t^*, \text{ and the difference in} \\ \text{(logarithm of) consumption between Ricardian and Keynesian agents } (\widehat{c}_{Rt} - \widehat{c}_{Kt})$$

$$W = -\frac{1}{2} E_0 \sum_{t=0}^{\infty} \beta^t \left\{ W_{\Pi} \widehat{\Pi}_t^2 + W_Y (\widehat{Y}_t - \widehat{A}_t)^2 + W_{\Delta} (\widehat{c}_{Rt} - \widehat{c}_{Kt})^2 + W_{LS} (\widehat{L}S_t - \widehat{L}S_t^*)^2 \right\} + t.i.p.$$

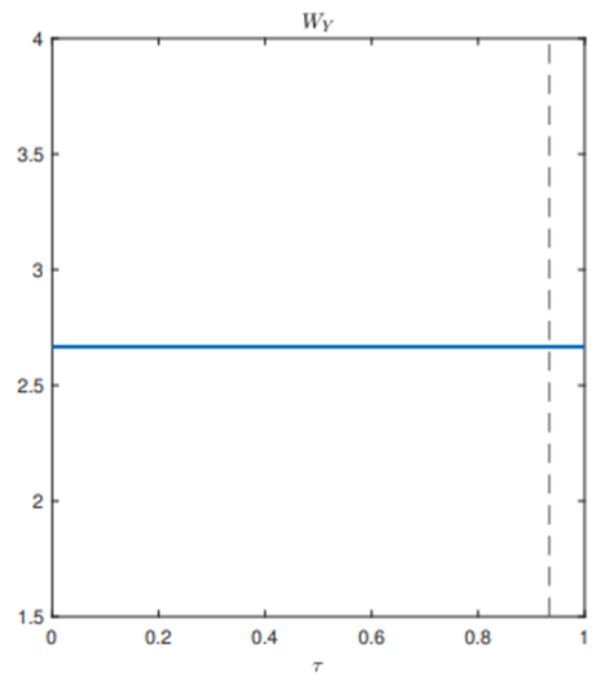
<sup>1</sup>The model assumes a simplistic wealth distribution in steady-state and no aggregate savings in equilibrium. It also abstracts from heterogeneity in the extensive margin of labor which is known to be another important driver of inequality over the cycle, although the assumption of tech-biased wage income could be thought of as capturing this channel in reduced form.

<sup>2</sup>See for instance <http://www.federalreserve.gov/monetarypolicy/files/FOMC20160603memo04.pdf>.

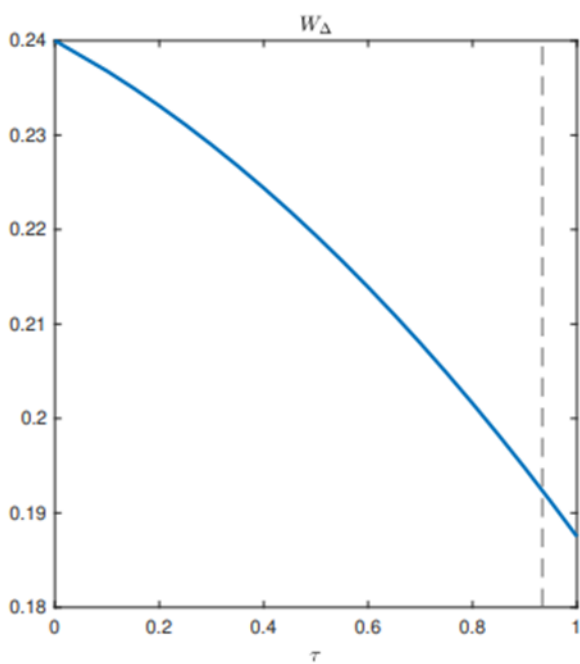
<sup>3</sup>The term t.i.p. is a collection of terms that are independent from policy and/or are determined at t=0, more details in the paper.

Figure 1: Welfare weights as function of  $\tau$ 

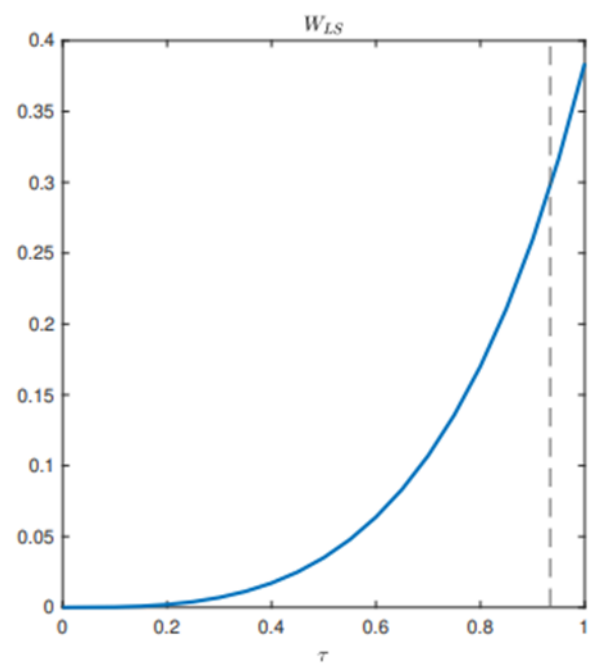
(a) Weight on Inflation Gap



(b) Weight on Output Gap



(c) Weight on Consumption Inequality Gap



(d) Weight on Labor Share Gap

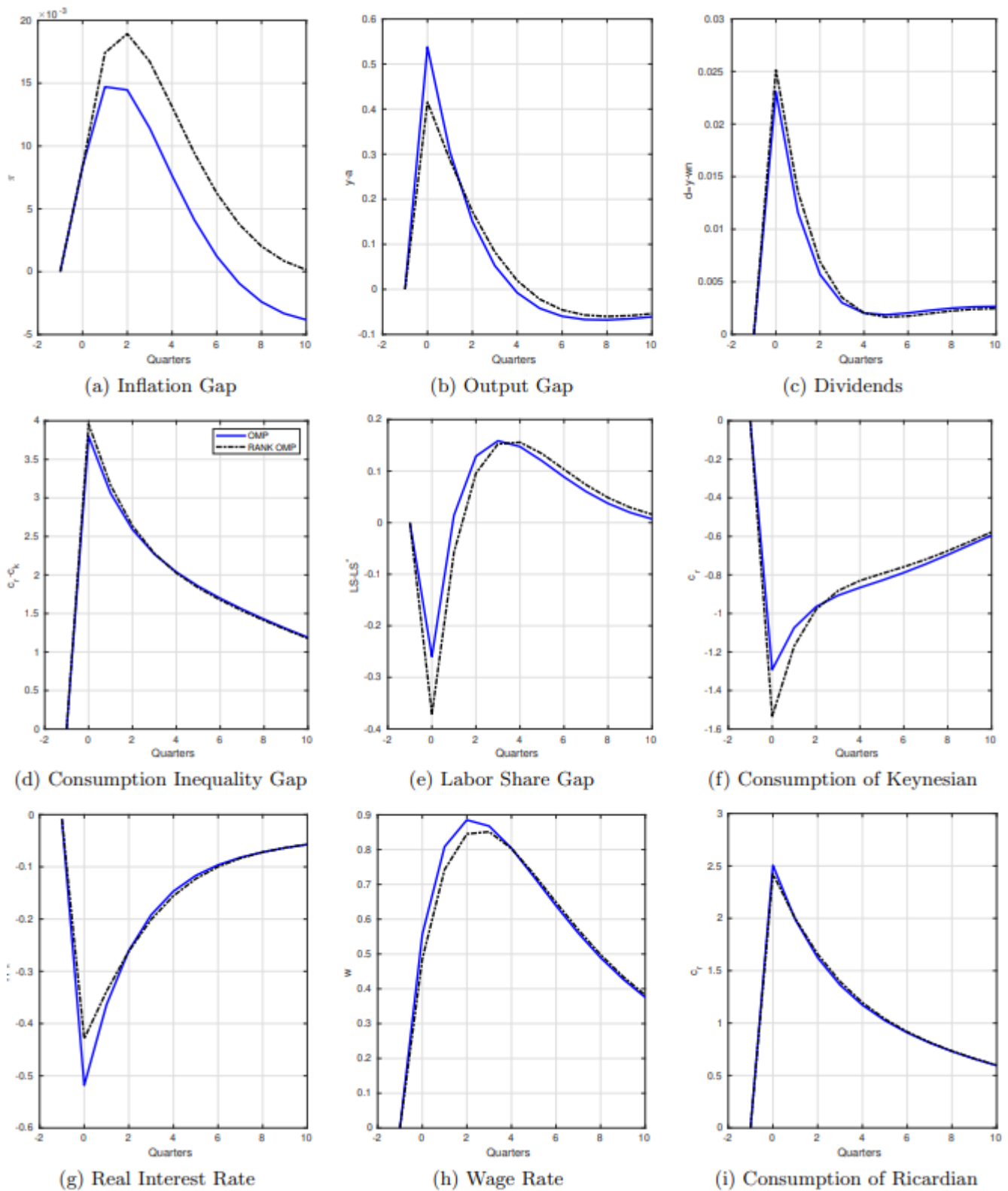
Note: The panels show the four weights as a function of the extent to which dividends are redistributed, governed by  $\tau$ . The vertical dashed line indicates the value used in the main calibration of the model.

The coefficients ( $W_{\pi}$ ,  $W_Y$ ,  $W_{\Delta}$ ,  $W_{LS}$ ) depend on the degree of economic redistribution ( $1 - \tau$ ). Figure 1 plots the weights as functions of  $\tau$ . We find that a utilitarian central bank attaches some weight to consumption inequality and the labor share. Figure 1 shows how the weights used to evaluate a monetary policy change as redistribution/taxation of firms' dividends decreases. The welfare weight on consumption inequality depends positively on the degree of redistribution in the economy. This is because a planner would place care more about fluctuations in consumption differences if the two households' consumption levels were similar to begin with. The weight on inflation fluctuations falls as  $\tau$  increases. In this case, since dividends decline with inflation volatility due to price adjustment costs borne by firms, inflation volatility also affects inequality through its unequal effects on the budget constraints, and hence consumption, of each agent. Thus, the higher the less inflation will affect the consumption of the Keynesian agents. Given the redistributive role of inflation volatility, the central bank is thus more willing to tolerate fluctuations in inflation the higher the steady-state inequality. Conversely, the weight on the labor share gap rises as  $\tau$  increases. Intuitively, the labor share affects inequality through the exposure of different households to fluctuations in income sources. In particular, a higher value of  $\tau$  means that Keynesian agents are more reliant on labor income. This implies that labor income can play a larger role in closing the inequality gap, which translates into a higher corresponding welfare weight.

Summing up, a utilitarian central bank would care less about inflation and more about the labor share the lower the initial level of redistribution. A central bank setting the monetary policy optimally will set a lower policy rate to stimulate growth and raise wages, thus reducing consumption inequality, while tolerating above-target inflation.

We find that the weights on inequality and the labor share are generally relatively small and thus the resulting output and inflation dynamics are not that different from those that would prevail if the central bank ignored inequality. This is because in an economy with high inequality, stabilizing inequality coincides with stabilizing the labor share, since the Keynesian agents depend more on wages the greater the inequality. In this first experiment, we compare the responses to a positive TFP shock in the model with optimal policy with those obtained with a monetary policy that targets inflation and output gap only (we refer to it as the RANK Optimal policy). Figure 2 shows the impulse responses of the under the two policies. Optimal policy reduces the volatility of both consumption inequality and the labor share gap more forcefully than RANK-optimal policy (Panels d and e, respectively). In doing so, optimal policy achieves a more positive output gap (Panel b) by implementing a more aggressive monetary policy accommodation. Such policy causes a reallocation towards the Keynesian agent compared to under the RANK-optimal policy. This reallocation happens through a relatively smaller increase in dividends (Panel c), and a relatively larger increase in wages (Panel h). The differences in impulse responses are not large, and hence the welfare achieved by either of the two policies is similar (the difference is about 1.2%; see the paper for more details).

Figure 2: Impulse Response to a Positive TFP shock: Optimal vs RANK-Optimal Policy



Note: The panels show impulse response functions of inflation, output gap, dividends, consumption inequality, labor share gap, consumption of Keynesian agent, real interest rate, wage rate, and consumption of Ricardian agent, respectively, in percentage points under the fully optimal policy (blue) and the RANK-optimal policy (black dash-dotted). The y-axis measures the deviation from each variable's steady state, in percentage points.

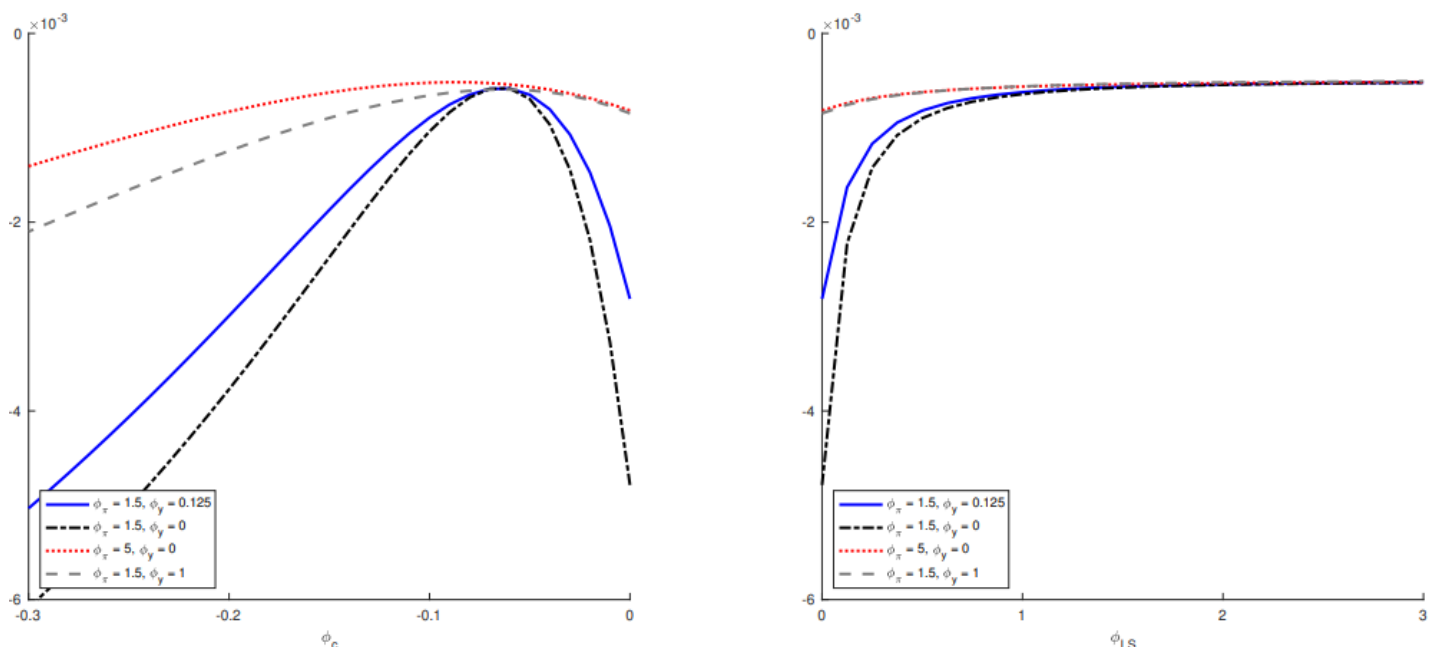
We also study a central bank setting policies following an augmented “Taylor rule”. We begin with a standard rule according to which monetary policy should set interest rates in reaction to inflation and real economic slack. We then consider alternative rules augmented with a third target, inequality or the labor share.

inflation ( $\widehat{\Pi}_t$ ) real economic slack ( $\widehat{Y}_t - \widehat{A}_t$ ), inequality ( $\widehat{c}_{Rt} - \widehat{c}_{Kt}$ ) and labor share ( $\widehat{L}S_t$ )

$$\widehat{R}_t = \begin{cases} \phi_\pi \widehat{\Pi}_t + \phi_y (\widehat{Y}_t - \widehat{A}_t) + \phi_c (\widehat{c}_{Rt} - \widehat{c}_{Kt}) \\ \text{or} \\ \phi_\pi \widehat{\Pi}_t + \phi_y (\widehat{Y}_t - \widehat{A}_t) + \phi_{LS} \widehat{L}S_t \end{cases}$$

We compare the welfare against the standard rule (i.e. where  $\phi_c = \phi_{LS} = 0$ ). Figure 3 reports the implied welfare as a function of the reaction parameters to the third targeting objective (x-axis) and under different parametrizations for the standard Taylor coefficients (different lines). The left panel refers to the rules reacting to inequality while the right panel corresponds to rules that react to the labor share. We find that augmenting the Taylor rule with a labor share objective generally improves welfare (by up to 80%). Under such a rule, the policy rate should be set lower than otherwise following a positive TFP shock. The mechanism is simple: a policy of lower interest rates leads to higher wages (and lower profits) on the margin, and thereby disproportionately benefits the Keynesian agent, who rely more on labor income. Such a policy is beneficial not only because it lowers inequality, but also because it improves inflation and output by avoiding an excessive tightening of the policy rate. Interestingly, targeting the labor share alone seems sufficient to achieve most of the welfare improvement. This policy is also easier to implement compared with a rule that targets consumption inequality, which requires more information. More generally, we find that augmented Taylor rules targeting the labor share gap also deliver higher welfare when cost-push and demand shocks are considered in addition to the technology shock. These gains are robust to the underlying magnitude of inequality. This contrasts with the gains from targeting consumption inequality, which are very sensitive to the specific amount of inequality in the economy.

**Figure 3: Welfare under Augmented Taylor rules**



Note: The figures illustrate how welfare depends on the Taylor rule parameter on consumption inequality (left chart) and labor share (right chart) with fixed parameters on inflation and the output gap. The lines represent a different configuration of parameters assigned to the output gap and inflation. The left chart shows how the welfare gains from targeting consumption inequality are very sensitive to the particular parameter on consumption inequality. On the other hand, the right chart shows how increasing the parameter on the labor share improves welfare more generally.

## Conclusions

Should inequality factor into central banks' decisions? We answer this question using a stylized Two-Agent New Keynesian Model. We find that there are economically small aggregate welfare gains in targeting consumption inequality if the central bank already implements optimal monetary policy ignoring inequality. A central bank should place a non-zero optimal social weight on the consumption inequality gap. However, the welfare gains of taking inequality explicitly into account is only about 1.2 percent of the loss under optimal monetary policy. On the other hand, if the central bank implements monetary policy through a standard Taylor rule, then augmenting it with either an inequality target or a labor share target can lead to higher welfare. Beyond targeting inflation and output gaps, the central bank can achieve higher welfare if it places a small negative weight on consumption inequality. This means that following a positive TFP shock that increases consumption inequality, the central bank should reduce the policy rate. This would reduce the welfare loss by about 79 percent compared to that of a standard Taylor rule. Interestingly, targeting the labor share appears preferable to targeting consumption inequality, as it delivers more robust improvements in welfare and is easier to implement operationally. ■

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