Summary

This paper considers a New Keynesian model in which the government, unable to observe the true cost-of-living index (COLI), conducts monetary policy by instead referring to price indexes constructed using methods such as the Laspeyres index (Consumer Price Index) and the Paasche index (GDP deflator), restricting attention to goods produced over multiple periods. Under each policy regime based on these reference indexes, the equilibrium paths and the level of economic welfare, measured in terms of household utility, are numerically derived using a nonlinear solution method.

According to the simulation, first, the presence of uncertainty increases the endogeneity of price setting (rf. Khalil and Lewis (2024)). As a result, even firms with relatively low idiosyncratic productivity are more likely to survive, which exerts downward pressure on changes in incumbent firms' expenditure shares and leads to an upward bias in entry-exit dynamics. Consequently, a monetary policy that targets a measured price index tends to be more hawkish than one that refers to the true cost-of-living index. Furthermore, the Laspeyres index, which embodies a substitution bias that becomes upward biased when price adjustments driven by idiosyncratic factors intensify, exhibits an additional upward deviation, which makes the policy framework more hawkish, particularly during economic expansions when the relative burden of menu costs is lower and after the convergence of uniform price adjustments induced by aggregate TFP shifts.

Next, even if the monetary authority could observe the true rate of inflation, conducting policy based on it would, in fact, reduce welfare. This is because the jump from the prices of exiting goods to those of newly introduced goods, which is excluded from measured price indices, does not reflect future economic conditions, much like flexible prices, due to the discontinuity between the deferred prices of those two (rf. Aoki (2021)). Moreover, the performance of monetary policy is higher when the Paasche index is referenced rather than the Laspeyres index. Although reliance on the Laspeyres index, which embodies an upward substitution bias, fails to stabilize the inflation rate of goods prices covered by statistical surveys, the Paasche index is conjectured to ensure a more dovish policy stance through its downward substitution bias and to exert an accommodative influence on macroeconomic expectations, thereby mitigating persistent deflation during economic downturns.

Finally, this paper also examines the implications of adopting a weighted geometric mean of the Laspeyres index and the Paasche index (hereafter referred to as the modified Fisher index) as the policy reference index. Since the substitution bias embedded in the Laspeyres and Paasche indexes operates in opposite directions, taking a weighted average of the two allows adjustment of this bias. Numerical simulations indicate that assigning a sufficiently large weight to the Paasche index is adequate to alleviate persistent deflation during economic downturns. Moreover, when the Paasche weight is set at 0.6, welfare is found to improve relative to the case in which the Paasche index alone is used as the reference, although the difference in performance is slight.