Tradeoffs: rate cycles, inflation and real activity
Forbes, Ha and Kose

Discussion
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The paper is based on an impressive database, including macroeconomic variables for twenty-four advanced economies from 1970 through 2024. It aims at identifying interest rate cycles by adopting a similar methodology to what has been used to date business cycles. Key to this exercise is the calculation of the "sacrifice ratio" defined as the output gap loss per inflation reduction. The ratio is meant to describe the tradeoff between inflation and real activity faced by central banks when taking interest rate decisions.

The analysis shows that the interest rate cycle associated with Covid stands out as being characterized by a very low sacrifice ratio. Faced with a large inflationary shock, central banks reacted with a sharp monetary contraction, but the economy did not suffer a large decline in cyclical activity. This fact, which contrasts with the experience of the 1970s and early 1980s, when a similar disinflation was associated with larger real activity losses, is interpreted as a sign of the higher degree of credibility that central banks have enjoyed since the nineties. The comparison with the other sub-samples, covering the "Great moderation" and the global financial crisis, is harder to interpret since movements in inflation were limited.

The message, however, is that there is no room for complacency. When modifying the sacrifice ratio to incorporate the duration and cumulative amount by which inflation deviates from target (that is, the effect on the price level), it turns out that the Covid interest rate cycle is associated with a very high sacrifice ratio. From this observation, the authors derive the main normative conclusion of the paper. Since there is evidence that people care about the price level and not just about inflation, the price level should – to some extent – be considered in the monetary policy rule. In other words, central banks should act aggressively facing large shocks.

Let me summarize the main points of my discussion:

1. Although the collection of stylized facts is always informative, the sacrifice ratio is hard to interpret since it depends on the nature of the shocks and structural relations, not just policy.
2. Although measuring output or employment losses in terms of cyclical components is in line with the large literature on Taylor rules, the notion that the output gap is the relevant metric to calculate welfare losses can be challenged since recessions often affect trend output. Most recessions have had persistent effects on economic activity.

3. Sacrifice ratios are not easily interpreted in terms of welfare losses. The relative cost of inflation and cyclical output loss depends on the nature of the shocks and the associated distortions. The equal weighting used in the calculation of the sacrifice ratio is arbitrary.
4. Finally, the question of whether considering the price level or inflation in the monetary policy rule, is the same as asking what the window size in average inflation targeting must be. In principle, the answer should be related to the cost of disinflation in terms of output loss, which in turn should depend on the nature of the shocks and the distortions. True, as the authors say, there is evidence that people care about the price level, but this cannot be the basis for normative conclusions.

## 1. What do the data say?

The main message of the paper is conveyed in three pictures:

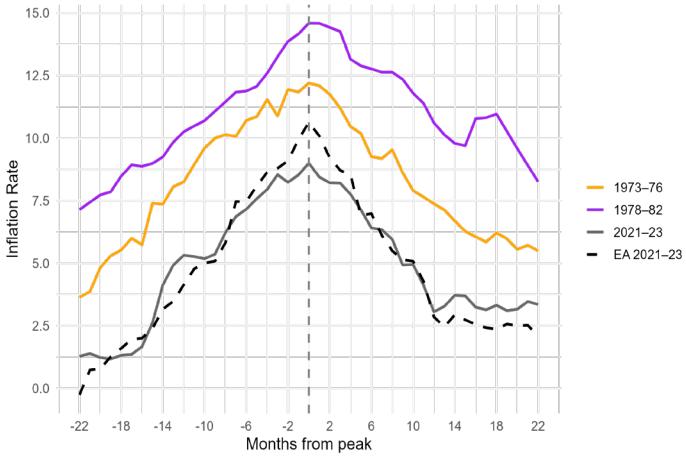
- Figure 3, which describes the median of interest rates over five periods: 1974-1984, 1985-1998, 1999-2007, 2008-2019, and 2020-2024,
- Figure 6, describing macroeconomic variables around those cycles,
- and Figure 7 reporting the associated sacrifice ratios.

The Covid related interest rate cycle features the sharpest tightening since 1970 (sharper than in the Volcker disinflation) and a very cautious easing. In that period, we also saw the largest increase in inflation pre-tightening and its fastest decline, while the cost in terms of real activity was very small.

To get an intuitive idea of the significance of the results presented, it is useful to focus on the US case and consider data around NBER recessions rather than interest rate cycles. As Stock and Watson have documented in a recent paper (Stock and Watson, 2025), when considering the US since 1970, the Covid recession was unique for its large depth and short duration. Not only the recovery was very fast but the recessions, unlike in previous cycles, left no scars as the US economy was back to trend after 18 months.

On the other hand, the plot of inflation around inflationary episodes shows that the post Covid disinflation stands out as being the sharpest (and this was not the case just in the US). Figure 1 compares the US and the euro area post-Covid inflation episodes with those of the US in the late seventies and early eighties.

**Figure 1: Selected inflation episodes**




Source: Fred

However, given the size of the inflationary shock, there was a large increase in the price level. Therefore, when the sacrifice ratio is defined in terms of price level rather than inflation, the Covid cycle turns out to be the worst.

## 2. The sacrifice ratio

The sacrifice ratio can be interpreted as a ratio of the average response of inflation and the output gap to a variety of shocks within the window defined by the interest rate cycle. Such response depends on the nature of the shocks and the slope of the structural relationships such as the Phillips curve and the demand curve. Arithmetically, the sacrifice ratio depends on the slope of the reduced form Phillips curve which reflects multiple causes.

The five sub-periods for which the paper presents key results are very heterogenous in the combination of shocks, structure and policy. Some are characterized by episodes of volatility in commodity prices, others by a more benign environment. At the same time, the policy framework evolved and the relative contribution of policy versus exogenous events is difficult to tell apart.

The 1974-84 cycle has seen large supply shocks, a sharp change in the monetary policy rule and, as some in the literature have argued, a steeper structural Phillips curve. In contrast, the periods 1985-1998 and 1999-2007 are the years of the “Great Moderation”, characterized by smaller shocks, stable expectations, and possibly a flatter structural Phillips curve. This was followed by the cycle corresponding to the global financial crisis, with low inflation and interest rates at the zero lower bound and then the 2020-2024 cycle with large shocks of a

special kind since the economy totally closed down for a period, fiscal policy was massively supportive, especially in the US, and energy prices spiked up.

Given these observations, we should expect that the sacrifice ratio associated to periods in which the Phillips curve was steep – 1970-84 and 2020-24 – was lower than during the two cycles occurring during the Great Moderation. Indeed, calculations in the paper of the sacrifice ratios based on unemployment and the employment gap show exactly this.

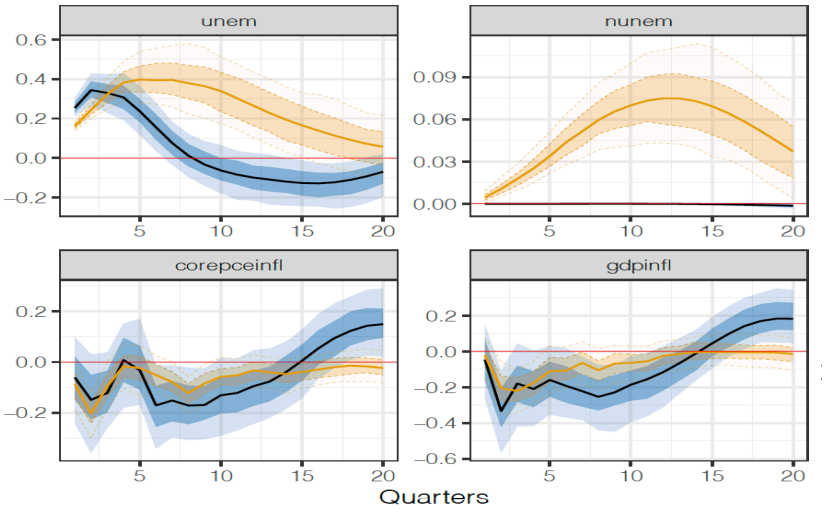
It is useful to compute sacrifice ratios conditional on different shocks. In the following I will do this on the basis of a VAR estimated over two sub-samples, pre-Covid: 1964Q1-1989Q4 and 1990q1-1919q4.

I replicate the VAR of Del Negro et al 2020, estimate impulse response functions and compute the associated conditional (to a demand shock) sacrifice ratio over the two samples. This is a four quarterly variables VAR including the unemployment rate and its natural value, core PCE inflation and the rate of change of the GDP deflator. The demand shock is identified by imposing a recursive Choleski ordering with unemployment ordered first. I define the conditional sacrifice ratio as the cumulative response of unemployment to the demand shock divided by the (conditional) inflation reduction from peak.

Impulse response functions to the demand shock for the two periods are reported in Figure 2. Figure 3 reports the associated conditional sacrifice ratios.

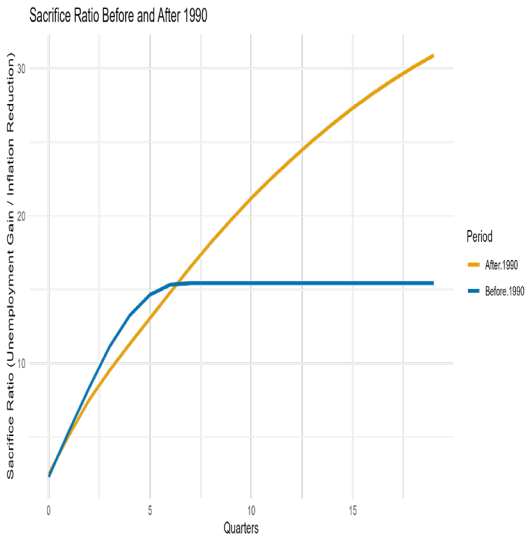
Figure 2 shows that, pre-Great Moderation, the demand shock had a smaller effect on unemployment and generated a slightly larger response of inflation. In contrast, since 1990, the response of inflation has been muted while that of unemployment more persistent. The persistence of unemployment, as shown by Figure 3, generates a larger sacrifice ratio after 1990.

**Figure 2: The effect of 1-standard deviation demand shock on inflation and unemployment**




Note: The solid lines are posterior medians, while the shaded areas correspond to 68 percent and 95 percent posterior credible regions.The samples are 1964Q1-1989Q4 in blue and 1990q1-1919q4 in orange.

**Figure 3: Conditional sacrifice ratios**




This result reflects the fact that expansions have been longer since the nineties and inflation has remained stable (until the recent episode) while the cycle has fluctuated more widely. As a consequence, we have seen a weakening of the correlation of inflation and unemployment. However, this fact is not easily interpreted as it can be explained by either a flatter structural Phillips curve or a flatter aggregate demand curve signaling aggressive anti-inflationary policy (see Del Negro et al, 2020 for an analysis).

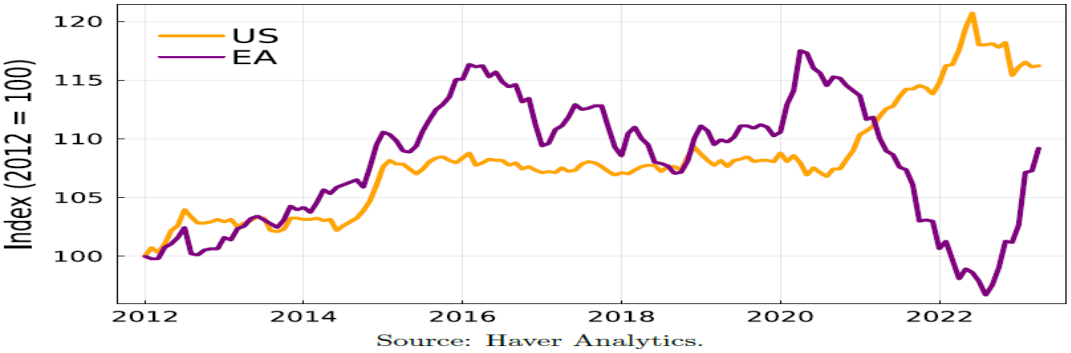
For this reason, we cannot say that the sacrifice ratio reflects different tradeoffs faced by the central banks. To get a view on this, one could compute the sacrifice ratio conditional on the monetary policy shock. This is essentially what Barnichon and Meister, 2021 have done when computing the so-called "Phillips multiplier". The Phillips multiplier is defined as the expected cumulative change in inflation caused by a monetary shock that lowers expected unemployment by 1ppt. It can be thought of as the inverse of a conditional sacrifice ratio. Barnichon and Meister show that the conditional Phillips multiplier is different than the unconditional (obtained by the OLS regression of average inflation on average unemployment), presumably because the economy is hit by multiple shocks. They also show that during the Great Moderation the sacrifice ratio conditional on the monetary shock was lower than in the preceding decades and they interpret this fact as being related to the stability of expectations. Forbes et al could consider performing a similar exercise for the Covid period to support the interpretation of their finding.

Summarizing, although the sacrifice ratio is an interesting descriptive statistic, it cannot be easily interpreted. Was the trade-off during the Covid interest rate cycle benevolent because of the nature of the shock or were the central banks benefiting from the credibility acquired in the previous decade?

The authors could exploit the cross-sectional dimension of their data to shed some light on this question. Shocks and policies differ across jurisdictions, and this could provide some identification.

For example, following Covid, the euro area, an importer of gas, was hit by a negative terms of trade shock which weakened disposable income while in the US, an energy producer, the shock was positive. This is illustrated by Figure 4.

**Figure 4: terms of trade – the US and the euro area**




Another difference is fiscal policy. The euro area experienced less robust fiscal support, especially in 2021.

Figures 5a and 5b report consumption, government expenditure, GDP and investment relative to trends for the two jurisdictions and reveal some interesting differences across the two jurisdictions.

**Figure 5a: the US**

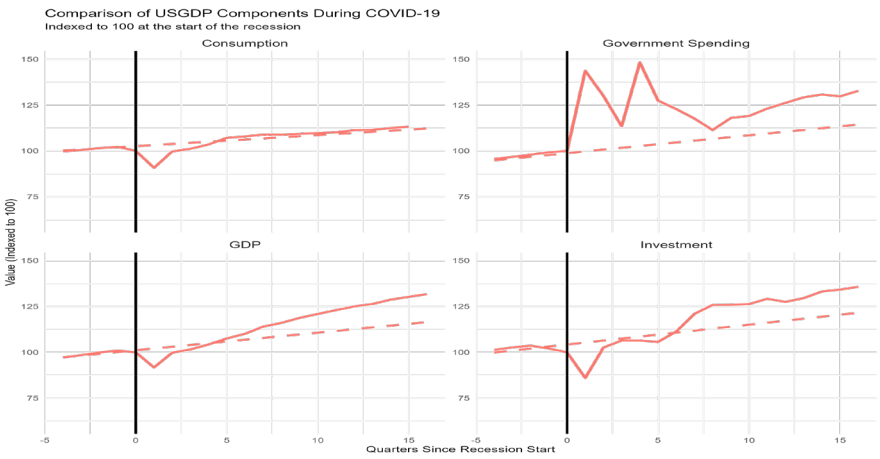
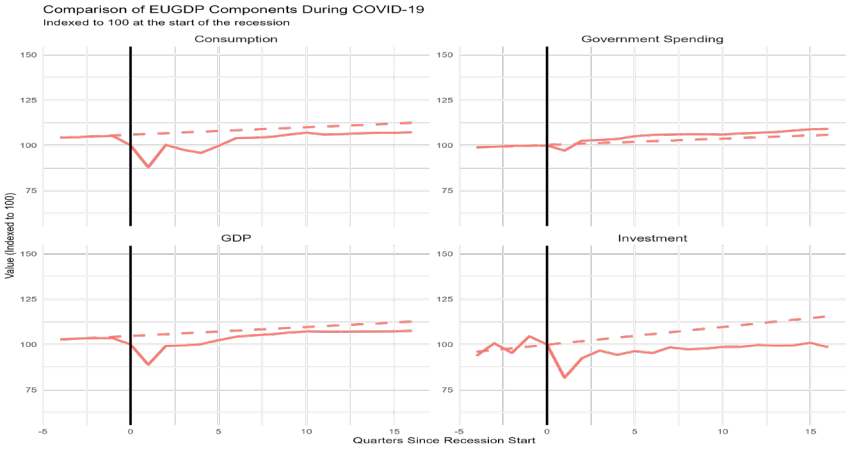


**Figure 5b: the euro area**




Source: Eurostat for Europe
(https://ec.europa.eu/eurostat/databrowser/view/namq_10_gdp/default/table?lang=en)
For the US FRED, code: GDP, NCPHIRSAXDCUSQ, GPDI, W068RCQ027SBEA
Trends calculated over five years preceding the peak

In the US, government spending shows two large deviations from trend corresponding to the two fiscal packages of early 2021 while investment and GDP recovered fast and settled to a path above pre-Covid trend. In the euro area, on the other hand, government spending was in line with trend and the recovery was much weaker with GDP, investment and consumption remaining persistently below trend. This implies a larger sacrifice ratio in the euro area since, as we have seen in Figure 1, disinflation was similar.

Figures 6a and 6b compare nominal variables for the two jurisdictions and zoom in on the Covid period to illustrate this.

**Figure 6a: the euro area**

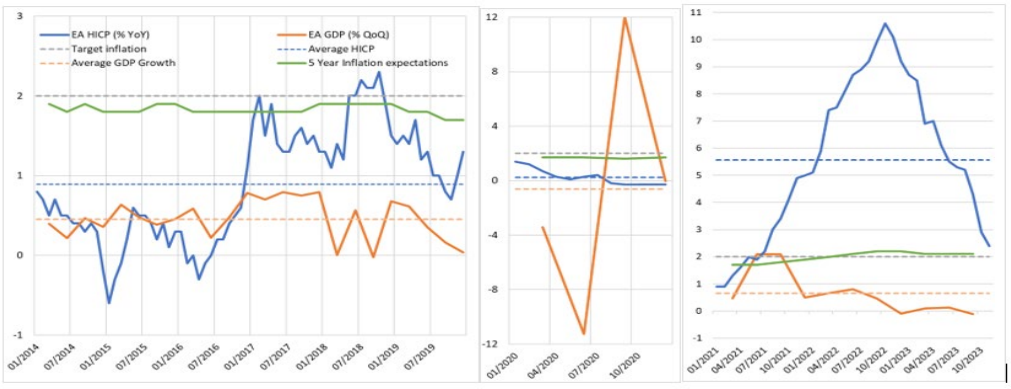
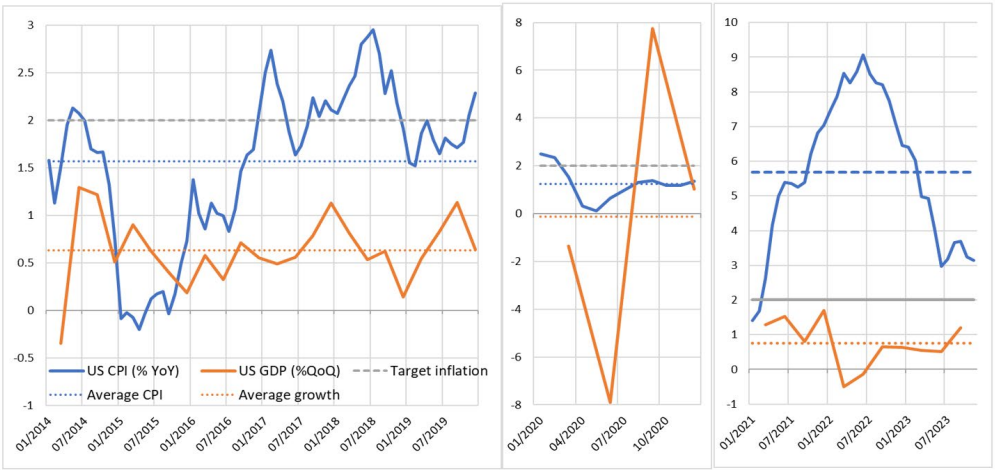


**Figure 6b: the US**




Source: Reichlin et al, 2024

The US and the euro area comparison suggests that the lower sacrifice ratio in the US may have been caused by differences both in fiscal policy and in the nature of the shocks rather than monetary policy since the monetary contractions in the US and the euro area were equally severe.

## 3. Cycles and trends

The authors use the output gap or the unemployment rate as a relevant measure for economic activity. This is justified by the intention to analyse cyclical losses and relate them to monetary policy effectiveness. However, monetary policy may have medium term effects on economic activity (see Blanchard, 2025 for a discussion). Historically, recessions have generated permanent losses of output. The Covid recession in the US is one of the few cases in which output has rapidly returned to pre-recession trend (see Stock and Watson, 2025 on this point).

Since calculations of trend and cycles are inevitably model dependent, as an alternative approach to assess the stability of trends, I have compared institutional projections of GDP with its realization. I am reporting below some examples based on the IMF WEO Spring projections. Figures 7a and 7b illustrate the cases of Japan and Italy.

**Figure 7a: Japan**

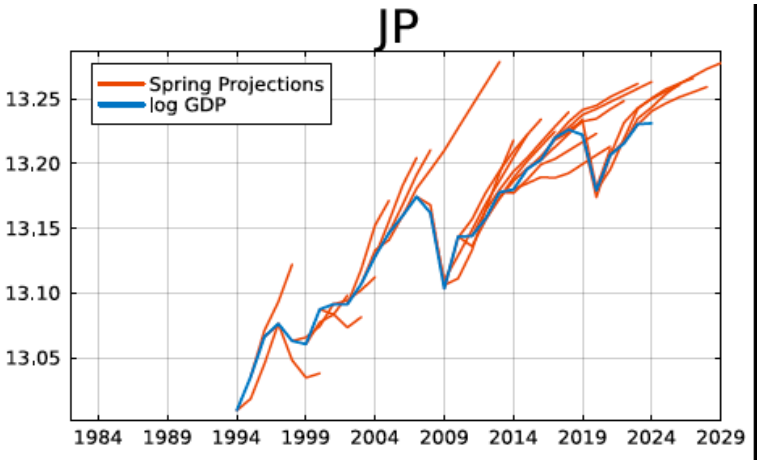
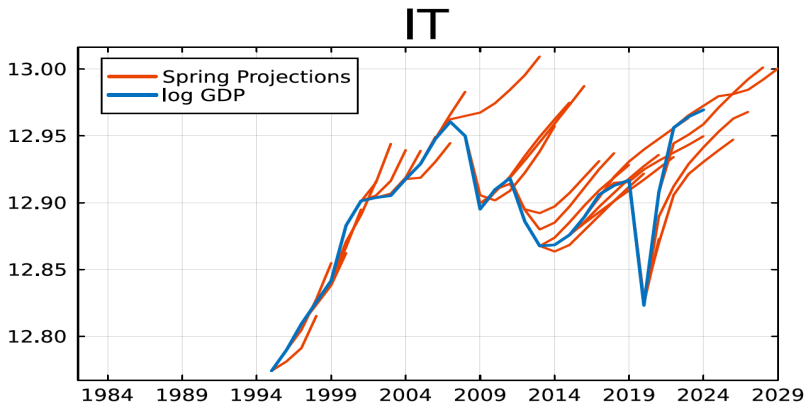



**Figure 7b: Italy**




Source: Bini, Giannone and Reichlin, 2025

The charts show that, with the exception of the post-Covid recovery in Italy, recoveries have always been weaker than expected. Since projections are based on models with mean reversion, these data suggest that, in general, the economy does not go back to trend after a recession. The implication is that a measure of the sacrifice ratio based on deviation of output from trend might be misleading.

## 4. Normative considerations

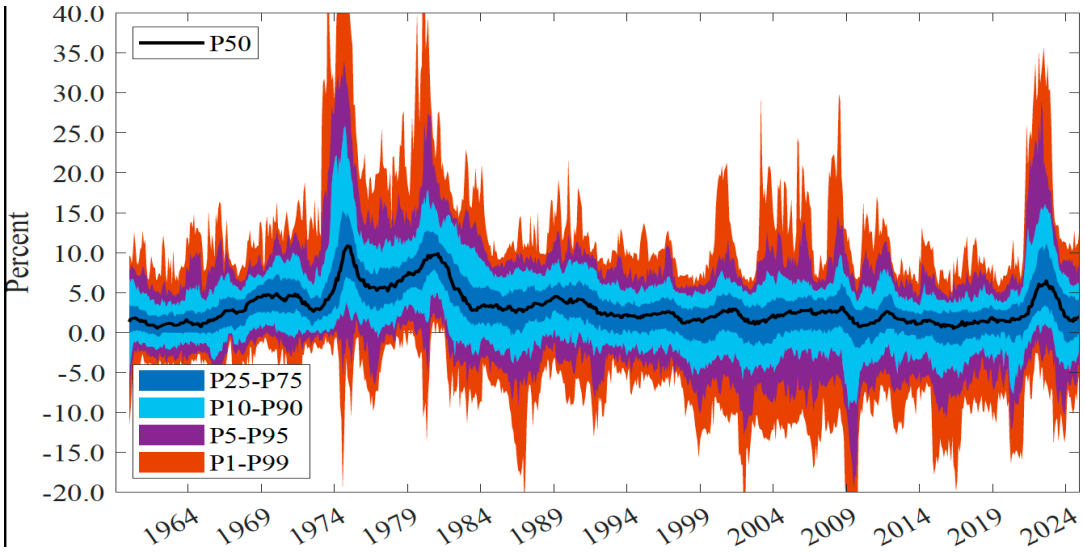
Let me conclude with two normative considerations.

First, any conclusion on what monetary policy should or should not do must rest on a measure of the welfare costs of inflation and unemployment. How do we weight the tradeoff between inflation and the output gap/unemployment when there is "no divine coincidence"?

The cost of inflation depends on the nature of distortions. Consider a shock in energy prices. As the effect of this shock propagates from manufacturing to services, in the presence of price stickiness, inflation becomes persistent. Some inflation is needed to allow relative prices to adjust. Strict inflation targeting reduces inflation but may generate too little movement in relative prices and therefore distortions in allocation. As a result, if monetary policy is too tight, welfare may drop. This is a case in which some flexibility on inflation targeting allowing for tolerance of temporary inflation is desirable (see Guerrieri et al, 2023 on this point). The desired combination of inflation and unemployment at short/medium horizon depends on how large these distortions are. A given sacrifice ratio can be "good" or "bad" depending on circumstances.

Figure 8 shows the inter-quantile range of the cross-sectoral distribution of year-on-year sectoral inflation in the US as a measure of relative price changes.

**Figure 8. Inter-quantile range cross-sectoral distribution inflation y-o-y – the US**




Source: own calculations on data from the Bureau of Economic Analysis, aggregated as in Ahn and Luciani, 2024: https://www.federalreserve.gov/econres/feds/common-and-idiosyncratic-inflation.htm

The Figure shows that the cross-sectional standard deviation of sectoral inflation increased, in particular, in relation to the oil shocks of the seventies and with the post-Covid inflation. In both cases, high inflation was associated with large relative price movements suggesting that a cautious monetary policy was desirable. This contrasts with one of the conclusions of the paper suggesting that more aggressive policy would have been more effective.

This leads me to the second consideration. A more aggressive monetary policy is advocated by the authors as a way to lower a sacrifice ratio expressed in terms of the price level rather than inflation. But on what basis should we decide whether to care more about the price level or about inflation?

Inflation targeting (IT) implies that “bygones are bygones” while in price level targeting (PLT) that “bygones are never bygones”. The Fed’s strategy of “Average Inflation Targeting” (AIT) is a hybrid between PLT and IT: the longer the window, the closer AIT is to PLT and the furthest it is from IT. In other words, PLT as AIT with an infinite window. Then my original question can be reformulated as “what is the desirable size of the window?”.

A natural response to this question is to adjust the horizon of IT in relation to the costs of disinflation. For example, supply shocks (commodities, supply constraints, reallocation) and price rigidity are likely to require large relative price movement and an inflation rate above target for longer (see my remarks earlier). This is a case for patience even if these shocks are likely to be large and imply an increase in the price level.

Forbes et al take a different, down-to-earth approach, which can be described as “do not do what people don’t like”. They argue that, as there is evidence that people care about the price level, central banks should take this into account in the monetary rule. Perhaps, but preferences are state dependent. The American public hated inflation in the late seventies, but after Volcker implemented the tightening and generated a large recession, the public mood shifted, and unemployment became enemy number one. This time we saw disinflation with no unemployment. We were perhaps lucky or very good or perhaps we could have done better but normative considerations cannot be based on surveys.

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