The sacrifice ratio and core inflation

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ARTICLE INFO

ABSTRACT

The existing body of research that measures the sacrifice ratio and the determinants of the sacrifice ratio has crucially identified several disinflation episodes across many different countries, while also overwhelmingly finding evidence in favor of the "cold-turkey" approach to disinflation. However all previous studies in this topic are based exclusively on headline measures of inflation. In this paper we investigate what happens if we instead use core inflation to both identify disinflation episodes and measure the sacrifice ratio. Several important differences emerge: for example, headline inflation produces more disinflation episodes than core inflation does – something which is particularly conspicuous during the Great Recession – and episodes that are generally shorter in length. We also find that the argument in favor of the cold-turkey approach to reducing inflation disappears when combining the use of core inflation with sacrifice ratio measures that allow for varying persistent effects on output of disinflation.

1. Introduction

Monetary policymakers across the world who are responsible for controlling inflation face the tradeoff of reducing output when conducting disinflationary monetary policy. The sacrifice ratio quantifies this cost of disinflation, measuring how much real GDP is foregone in order to reduce the trend inflation rate by one percentage point. Quantifying output losses of disinflations is important because disinflation tends to be a major cause of recession in advanced economies (Ball, 1994).

The most commonly-used and widely-implemented method of measuring the sacrifice ratio is that of Ball (1994). Ball's framework was particularly seminal for establishing a way in which to select disinflation episodes, rather than estimating the sacrifice ratio from a Phillips curve.[1] His procedure allows us to separate important monetary policy-induced reductions in inflation from smaller variations that are the result of shocks. More recently, papers by Zhang (2005) and Hofstetter (2008) have built upon the Ball method of computing the sacrifice ratio. Namely, if hysteresis is present following disinflationary monetary policy, then Ball's method of computing trend output is likely to understate the magnitude of the sacrifice ratio, which is what the Zhang and Hofstetter methods seek to address.

In addition to measuring the sacrifice ratio to gauge the cost of disinflation, we also wish to explain the variation in the costs of disinflation across a sample of different episodes. The existing literature has much to say about this topic, where one of the overwhelmingly robust findings is that the sacrifice ratio is negatively and significantly related to the speed of disinflation. In other words, the quicker the disinflation, the less costly it is in terms of output losses for that particular country. This suggests that a "cold-turkey" approach to reducing the trend inflation rate in an economy might be a justifiable strategy to adopt.

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[1] The main problem with using the Phillips curve to measure the sacrifice ratio is that it constrains the inflation-output tradeoff to be the same in both periods of disinflation and rising inflation.

While the prevailing body of research on the sacrifice ratio and its determinants is substantial, an important facet concerning the measurement of the sacrifice ratio remains outstanding. Namely, sacrifice ratios are calculated by first measuring the trend inflation rate, which is almost always based upon the consumer price index for all items (CPI), also known as the "headline" inflation rate. However, monetary policymakers have long held the consensus view that when discussing changes in prices we should focus on the persistent component of overall price changes known as "core" inflation. For example, Mishkin (2007) stated that "in discussing and thinking about the conduct of monetary policy, many central bankers focus on core inflation." Further still, in 2003 – before he became Federal Reserve chairman – Ben Bernanke discussed the possibility of future "continuing disinflation" based upon his forecasts of the core personal consumption expenditures (PCE) inflation rate (Bernanke, 2003). Since monetary policymakers typically believe that core inflation is a better guide to the underlying trend of inflation, it follows that sacrifice ratios based on core inflation may be of more interest to them.

In other words, relative prices of goods such as food and energy can easily change temporarily from month-to-month or quarter-to-quarter, but this may not accurately reflect the true underlying rate of inflation. But if we use an aggregate price index such as the CPI, changes in the relative price of certain goods and services may have a large impact on our headline measure of inflation. This is extremely important when considering monetary policy decisions, since incorrect actions may be taken if policymakers are not careful. For example, if there is a temporary rise in inflation which is not indicative of the underlying trend, any monetary policy tightening may lead to an unwarranted slowdown in economic activity. For reasons such as this, macroeconomics has spent a great deal of time focusing on core inflation, which examines prices after stripping away any transitory noise that may exist in an aggregate price index such as the CPI.

If core inflation is considered by policymakers to be a better way to estimate the underlying trend of inflation rather than headline inflation, it does not seem logical to both identify disinflation episodes and measure the sacrifice ratio using an aggregate price index alone. This paper fills this void in the literature by identifying disinflation episodes and measuring the sacrifice ratio based on core inflation for 22 OECD economies from 1982 to 2010 using both quarterly and annual data, where we implement the most widely-used measure of core inflation, namely the consumer price index less food and energy (XFE). We also estimate the headline inflation-based sacrifice ratio alongside this to compare the two approaches, which we do by implementing all three techniques of Ball (1994), Zhang (2005), and Hofstetter (2008).

It turns out that there are large and significant differences when using a measure of core inflation rather than headline inflation to identify disinflation episodes and calculate the sacrifice ratio. One of the most significant differences is in the timing of disinflation episodes. Between 1982 and 2007, both headline and core inflation produce episodes that occur at roughly the same time, but this changes dramatically post-2007. Specifically, headline inflation tells us that there were far more disinflation episodes since 2007 than core inflation would suggest (in fact, headline inflation in general produces more disinflation episodes when compared to core inflation). For example with quarterly data there are 14 disinflation episodes since 2007 when using CPI inflation, and only 4 when using XFE inflation. This tells us that the timing of disinflation episodes is markedly different, suggesting that trend inflation computed from both CPI and XFE prices are very different right before, during, and after the Great Recession. In particular we find that headline trend inflation identifies an inflation trough in 2009 for several countries, whereas core trend inflation does not. This in turn can be attributed to a transitory decrease in food and energy prices in 2009 which did not persist to the following year, yet was enough to identify a disinflation episode when using headline inflation instead of core inflation. In addition, we also find that headline inflation produces disinflation episodes that are generally shorter in length. For example, annual data tell us that on average disinflation episodes should be a year longer when using core inflation than with headline inflation.

Arguably the biggest change that we obtain from switching to core inflation when measuring the sacrifice ratio concerns its determinants. With headline inflation, the methodologies of Zhang and Hofstetter suggest that the cold-turkey approach to disinflation is viable. However, this is not true when using core inflation-based measures of the sacrifice ratio. Instead, we find that the speed of disinflation is almost never a significant determinant of the output cost of disinflation when measuring the sacrifice ratio in a way that allows for greater persistent effects. In other words, using core inflation suggests that there is little evidence that the cold-turkey approach to disinflation is best. Hence this hitherto robust determinant of the sacrifice ratio is cast into serious doubt when switching to core inflation. When examining the data further to understand what causes these competing results, we find evidence that the relative price of food and energy causes the length of disinflation episodes to be reduced with headline inflation but not with core inflation. It is plausible then, that a slow and gradual approach to reducing trend inflation may yet be the best way in which to disinflate, which would be a policy prescription that stands in sharp contrast to what has been reported in the existing sacrifice ratio literature.

The remainder of this paper is organized as follows: Section 2 reviews some of the important ways to measure the sacrifice ratio, and Section 3 summarizes the importance of focusing on core rather than headline inflation. Section 4 highlights the key differences in our new sacrifice ratio estimates, while Section 5 then discusses the determinants of the core inflation-based measures of the sacrifice ratio and its implications for policy. Finally we conclude in Section 6.

2. Measurement of sacrifice ratios

There are three methods of measuring the sacrifice ratio that we will focus on in this paper. The first of these methods is the seminal work of Ball (1994), which is also the method in which the vast majority of the existing literature measures the sacrifice ratio. Ball's framework includes both quarterly and annual frequency methods of measuring the sacrifice ratio. With