



Disinflation in a DSGE perspective: Sacrifice ratio or welfare gain ratio?

Guido Ascari^{a,*}, Tiziano Ropele^{b,c}

^a University of Pavia, Italy

^b IfW, Germany

^c Bank of Italy, Italy

ARTICLE INFO

Article history:

Received 14 November 2010

Received in revised form

30 August 2011

Accepted 17 October 2011

Available online 6 November 2011

JEL classification:

E31

E5

Keywords:

Disinflation

Sacrifice ratio

Non-linearities

ABSTRACT

When used to examine disinflation monetary policies, the current workhorse dynamic stochastic general equilibrium model of business cycle fluctuations is able to quantitatively account for the main stylized facts in terms of recessionary effects and sacrifice ratio. We complement the transitional analysis of the short-run costs with a rigorous welfare evaluation and show that, despite the long-lasting economic downturn, disinflation entails non-zero overall welfare gains.

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1. Introduction

Disinflation is a long-standing issue in monetary economics. On the empirical side, there is ample evidence that disinflations generate short-run output losses. Indisputably, the key indicator to gauge the real costs of disinflation has been the sacrifice ratio, calculated as the ratio of the cumulative percentage output loss (i.e., the difference between actual and potential output) to the size of disinflation. Thus, the sacrifice ratio measures the real output cost per unit of permanent decrease in inflation. A host of empirical studies have estimated the costs of disinflation for various countries, using different econometric methods. In general, the findings vary greatly across countries, episodes or time periods and estimation methods. Gordon and King (1982) is an early assessment of the sacrifice ratio for the United States, based on the estimation of autoregressive Phillips curves (see, more recently, Andersen and Wascher, 1999). For euro-area countries, Cuñado and Gracia (2003) reports estimates of the sacrifice ratio ranging from 0.55 to 1.96. Ball (1994b) analyzes specific disinflationary episodes in 19 moderate-inflation OECD countries between 1960 and 1991, and comes up with estimates of the sacrifice ratio ranging from 1.8 to 3.3 (see also Mankiw, 1999; Zhang, 2005). Using the vector autoregression (VAR) methodology, Cecchetti and Rich (2001) find estimates of the sacrifice ratio between 1 and 10 for the United States, while Durand et al. (2008) studies 12 euro-area countries and reports substantially lower sacrifice ratios ranging from 0.23

* Corresponding author. Department of Economics and Quantitative Methods, University of Pavia, Via San Felice 5, 27100 Pavia, Italy. Tel.: +39 0382 986211; fax: +39 0382 304226.

E-mail address: guido.ascari@unipv.it (G. Ascari).

to 0.75. In summary, among empirical studies there seems to be little disagreement on the following facts: (i) a disinflation generates a loss in output; (ii) the value of the sacrifice ratio varies across countries and time periods, but a plausible range is between 0.23 and 3.3. Moreover, most of the disinflations analyzed in this empirical literature took place at times when inflation targeting was not in place. For example, the most analyzed disinflation episode in history is the Volcker disinflation, which is often referred to as a monetarist experiment, following the celebrated monetary policy reform in October 1979. Since then the theory and practice of monetary policy has radically changed. Nowadays, it is standard in theoretical models to assume an inflation targeting framework, where monetary policy is conducted through a simple Taylor-type nominal interest rate rule. From this point of view, [Goncalves and Carvalho \(2009\)](#) use data from 61 disinflations in OECD economies to assess whether sacrifice ratios in inflation targeting countries are lower than in nontargeting ones. Their finding is striking: while the average sacrifice ratio is about 5.6, for inflation targeting countries this number drops to 1.02. Moreover, the average duration of a disinflation in these latter countries is 11 quarters.

On the theoretical side, however, there is a widespread view that the basic *linearized* New Keynesian DSGE model, as in [Clarida et al. \(1999\)](#), fails to replicate a costly disinflation. In a nutshell, because it is based on the [Calvo \(1983\)](#) price staggered mechanism, the basic New Keynesian DSGE model only delivers price stickiness but not inflation inertia. On the contrary, inflation is described as a forward-looking variable that can immediately adjust to a disinflation, without any output costs. [Ball \(1994a\)](#) was among the first to point out this inconsistency of standard sticky price models, in which a disinflation could be followed by a boom rather than a slump (see also [Burstein, 2006](#)). In fact, in a subsequent paper, [Ball \(1995\)](#) introduces imperfect credibility as a necessary device to explain the observed output costs of a disinflationary policy. More recently, [Erceg and Levin \(2003\)](#) and [Goodfriend and King \(2005\)](#) introduce imperfect credibility in a standard New Keynesian model to explain the famous Volcker disinflation (see also [Nicolae and Nolan, 2006](#)). [Mankiw \(2001\)](#) also forcefully expresses the view that standard sticky price models cannot deliver inflation persistence and thus justify the costs of disinflation. Indeed, this drawback was one of the main reason that led ([Mankiw and Reis, 2002](#)) to propose a different model of price stickiness based on sticky information. The literature can then rationalize output costs of a disinflation by appealing to some form of imperfect credibility/information/rationality. It is however less conclusive on the size of the recession following a disinflation episode.

The aim of this article is to give a quantitative assessment of the ability of the New Keynesian framework to match the stylized fact after a disinflation. In order to do that we need an operational model of business cycle fluctuations. In their seminal work, [Christiano et al. \(2005\)](#) (CEE, henceforth) show that a medium-scale New Keynesian model, enlarged to accommodate various nominal and real frictions, matches the business cycle fluctuations reasonably well. This model (or some slightly modified versions of it) has been widely and successfully employed both in empirical work (e.g., [Smets and Wouters, 2003](#); [Altig et al., 2011](#)) and in normative analysis (e.g., [Schmitt-Grohé and Uribe, 2006](#)).

Surprisingly, however, up to now no one has assessed the ability of the CEE model to quantitatively account for the costs of disinflation, and to address the issue of disinflation from a welfare perspective. This is what we do in this article. We address two questions

1. How successful is the current operational New Keynesian DSGE model of the business cycle at quantitatively replicating the empirical costs of disinflation and sacrifice ratio, without resorting to some form of imperfect credibility, imperfect information or irrationality in expectations?
2. How costly is a credible disinflation in terms of welfare?

Moreover, in order to tying our hands as much as possible in answering these questions, we deliberately restrain ourselves from changing any of the features of our reference model and the structural parameter values, as estimated or calibrated by CEE.¹

The answer to the first question is: quite successful. The simulation of the model indicates that a credible disinflation leads to a prolonged decline in output, and that the value of the sacrifice ratio is in line with the available empirical evidence. In particular, the results in [Goncalves and Carvalho \(2009\)](#) are important for our exercises, because we assume that the disinflation is implemented by the monetary authority through the change of the inflation target in the Taylor rule, as in a standard modelling of an inflation targeting regime. In the following section, we show that the CEE model is replicating extremely well the empirical findings in [Goncalves and Carvalho \(2009\)](#): the sacrifice ratio is around 1 and it takes around 10 quarters for output to get back to potential.

With regards to the second question, we work out a rigorous welfare evaluation of the costs of a disinflation, constructing a welfare-based sacrifice ratio. Interestingly, despite the prolonged slump in output, we show that *a disinflation implies welfare gains*. The size of these gains is very small: equal to a permanent increase in initial steady-state consumption of 0.06% each period per each point of diminished inflation. More precisely, small long-run gains outweigh even smaller short-run costs. Surprisingly enough, the short-run costs of a disinflation are negligible, despite the transitional economic downturn.

¹ A companion paper thoroughly analyzes how the different features of the CEE model, the parameter values and the monetary policy rule affect the costs of disinflation. For obvious length constraints, this kind of analysis is outside the scope of this article.

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