



# Disinflation effects in a medium-scale New Keynesian model: Money supply rule *versus* interest rate rule



Guido Ascari<sup>a,\*</sup>, Tiziano Ropele<sup>b</sup>

<sup>a</sup> University of Pavia, Department of Economics and Quantitative Methods, Via S. Felice 5, 27100, Pavia, Italy

<sup>b</sup> Banca d'Italia, Economic Outlook and Monetary Policy Department, Via Nazionale, 91, 00184, Rome, Italy

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## ABSTRACT

Empirical studies show that successful disinflations entail a period of output contraction. Using a medium-scale New Keynesian model, we compare the effects of disinflations of different speed and timing, implemented through either a money supply rule or an interest rate rule. In terms of transitional output loss, cold-turkey disinflations under an interest rate rule are less costly than those under a money supply rule and are accomplished more rapidly. Furthermore, gradual or anticipated disinflations deliver lower sacrifice ratios. From a welfare perspective, despite the temporary economic contraction, the transitional welfare loss is quantitatively negligible, so that disinflations are overall welfare-improving. The overall welfare gain is not affected by how the disinflation is actually implemented: what really matters is the achievement of a permanently lower inflation rate.

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## 1. Introduction

The analysis of disinflation and how to implement a permanent reduction in inflation have been topical issues in economics at least since the 1970s. Their relevance has attracted mounting interest as the monetary policy literature has largely emphasised the benefits of achieving and maintaining price stability and many central banks worldwide have committed to low inflation targets.

The empirical literature on disinflations makes it quite clear that successful disinflations are accompanied by temporary economic downturns (e.g. Gordon and King, 1982; Ball, 1994b; Cecchetti and Rich, 2001). Estimates of the so-called sacrifice ratio (SR), which measures the cumulative output loss for each percentage point of reduction in inflation, vary considerably depending on the country, the historical episode and the econometric technique used. In general, from the available empirical evidence on the real costs of disinflations, a plausible range for the SR is between 0.5 and 3. Institutional factors, such as the monetary policy framework, have been shown to affect the disinflation costs. For the famous Volcker disinflation in the United States, often referred to as a monetarist experiment, Mankiw (1999) estimates a SR of 2.8. For a broad group of inflation-targeting countries, Corbo et al. (2001) find a lower average SR, 0.6.

Most of the disinflations considered in the empirical literature took place at times when the monetarist school held sway. Indeed, the Volcker disinflation, the most closely studied episode in history, is often referred to as a monetarist experiment, after the celebrated monetary policy reform of October 1979 that abandoned federal funds targeting in favour of

\* Corresponding author. Tel.: +39 0382 986211.

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

nonborrowed reserves targeting to control the money supply.<sup>1</sup> Sims and Zha (2006) econometrically identify a Volcker reserve-targeting period that “shows clearly the targeting of monetary aggregates, rather than interest rates, in that regime” (p. 55). Since then the theory and practice of monetary policy have changed radically. Nowadays, it is standard in theoretical models to assume an inflation targeting framework, where monetary policy is conducted through a simple nominal interest rate rule. In light of these considerations, it seems important to assess the implications of these two different monetary policy frameworks for disinflation dynamics.

In discussing conditions for a successful disinflation without too much output loss, several authors have emphasised the role played by the speed and timing of disinflation. On the one hand, Taylor (1983) has argued that a gradual approach to disinflation entails less output cost since prices and wages take time to adjust after the monetary tightening. On the other hand, Sargent (1983) and Ball (1994b) have advocated a quick (“cold-turkey”) disinflation on the grounds that a rapid disinflation enhances credibility and thus the shift in expectations.

In this article we address these issues using a medium-scale New Keynesian model with nominal and real frictions à la Christiano et al. (2005). As in Ascari and Ropele (2011), where it is shown that a theoretical model of this kind successfully accounts for the main stylised facts of disinflations without resorting to imperfect credibility or irrational expectations, we develop most of our analysis focusing on fully credible disinflationary monetary policy. However, many studies stressed that credibility is an important aspect of a policy change towards disinflation. Several recent studies address this issue by assuming a learning behaviour on the part of private agents (e.g. Erceg and Levin, 2003; Goodfriend and King, 2005; Cogley et al., 2011; Barnett and Ellison, 2011). So we will also consider how credibility affects the adjustment dynamics after a disinflation and the SR.

Our main contributions are threefold. First, we examine to what extent the costs of disinflation depend on the monetary policy framework, i.e. money supply rule (MSR) versus interest rate rule (IRR), as well as on the operational procedure, i.e. cold-turkey, gradualism or anticipation. Our results show that the monetary policy strategy for disinflation significantly affects the dynamics of the model and the SR. On the transitional output costs of disinflation we find that: (i) disinflations under MSR or IRR involve a long-lasting decline in output; (ii) the theoretical SR values are in line with empirical estimates, with those under MSR generally larger than those under IRR; (iii) gradual or announced cold-turkey disinflations yield even lower SR values; and (iv) the theoretical SR values decrease with average inflation.

Second, we supplement the study of the transitional output costs of disinflation with a rigorous welfare analysis. Despite the prolonged output downturn, we find that disinflations are overall welfare-improving. The long-run welfare gain of a permanently lower inflation rate outweighs the transitional welfare cost. Still, given our benchmark calibration of the parameters, the magnitude of these welfare effects is rather small. In terms of consumption equivalent units, each percentage point of diminished inflation increases the representative household's initial steady-state consumption by about 0.07% each period. Interestingly, this finding is quite robust with regards to the practical implementation of disinflation. Although alternative disinflation strategies or procedures involve different effects on the transitional dynamics of output and on the SR, from a welfare perspective there are no sizable differences. So, at least from a welfare perspective what really matters is achieving a permanent lower inflation rate, and it matters less how this goal is achieved in practice.

Third, imperfect credibility does not alter qualitatively the results (i)–(iv) discussed above. Not surprisingly, however, imperfect credibility exacerbates the slump, lengthens the transitional dynamics and raises the SR as well as the short-run welfare costs. In other words, under imperfect credibility it takes longer to disinflate and it is more painful to do so. Moreover, backward-looking indexation of wages and prices is crucial to obtain a slump after a disinflation in the case of interest rate rule. Despite being widely employed in this class of medium-scale DSGE NK models, backward-looking indexation introduces exogenous inflation inertia that can act as a reduced-form substitute for imperfect credibility. Thus, we disentangle the role of imperfect credibility from the one of backward-looking indexation and compare the dynamics under the two assumptions in turn. Under imperfect credibility, a disinflation always yields an output slump under both policies even without backward-looking indexation. Moreover, while backward-looking indexation generates a boom after the initial slump, imperfect credibility induces a greater inertia in output, which monotonically converges to steady state from below. As a consequence, the SR are much higher under imperfect credibility (without past inflation indexation) than in the benchmark case of perfect credibility and past inflation indexation.

## 2. A brief empirical review of disinflation costs and dynamics

In this section we briefly review the basic empirical regularities that characterise disinflationary monetary policies. More specifically, we first examine the real output cost of disinflations and survey how that cost has been measured in empirical analyses. Then, we review the transmission mechanism of disinflation, stressing in particular the dynamic adjustment of output and inflation.

*Transitional costs of disinflations:* Most of the empirical studies on the costs of disinflation have used the SR indicator, calculated as the ratio of the cumulative percentage output loss to the disinflation size.

In broad terms, three approaches have been used to estimate the SR. One approach is based on estimating the slope of simple linear Phillips curve regressions. Using this strategy, Gordon and King (1982) estimate SR values ranging from 0 to 8

<sup>1</sup> The extent to which the Volcker disinflation can actually be considered as a monetarist experiment is discussed at length in Lindsey et al. (2005) (see also the other papers in the same *Fed of St. Louis Review* issue) and Goodfriend and King (2005).

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