



Disinflation with labor market frictions



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ABSTRACT

This paper studies disinflationary shocks in a non-linear New Keynesian model with search and matching frictions and moral hazard in the labor markets. Our focus is on understanding the wage formation process as well as welfare costs of disinflations in the presence of such labor market frictions.

The presence of imperfect information in labor markets imposes a lower bound on worker surplus that varies endogenously. Consequently equilibrium can take two forms depending on whether the no shirking condition is binding or not. We also evaluate both regimes from a welfare perspective when the economy is subject to a perfectly credible disinflationary shock.

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1. Introduction

Over the past decade the New Keynesian (NK) model has emerged as the workhorse of modern monetary economics. However, its assumption of Walrasian labor markets means that it does not address the issue of involuntary unemployment. To explain the presence of involuntary unemployment, standard models depart from the Walrasian paradigm by introducing moral hazard or search and matching frictions in the wage formation process. In this paper we incorporate both these labor market frictions into a standard New Keynesian model and study the wage formation process when the economy is subject to disinflationary shocks. Further we also evaluate the welfare costs of disinflation in the presence of these labor market frictions.

The presence of moral hazard in addition to search and matching frictions in the labor market means wages must satisfy a no-shirking condition (NSC), which places a lower bound on workers' match surplus. Our objective is then to characterize the circumstances under which this lower bound becomes binding and the threat to shirk becomes credible. In doing so we show that the wage formation process is different in high and low inflation environments. We also evaluate the welfare costs of a fully credible disinflation process in such a milieu and find it to be critically affected by the nature of the labor market frictions.

Importantly, we analyze the impact of the disinflationary shock in a non-linear NK setup. [Ascari and Merkl \(2009\)](#) point out that the analysis of the real effects of a disinflation in much of the literature is flawed because it is based on the log-linear

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formulation of the standard NK model. This is because a permanent disinflationary shock would require a movement from one steady state to a new one and therefore cannot be analyzed by log-linearizing the model around one of the two steady states.

We introduce shirking in the NK search and matching framework of [Ravenna and Walsh \(2011\)](#) by assuming that the firm's ability to monitor the effort put in by the worker is imperfect. The surplus from being employed is therefore affected by the presence of search and matching frictions and moral hazard. Hence, the equilibrium can take two forms depending on whether the no-shirking condition (NSC) is binding or not. The wage is called an efficiency wage (EW) if the NSC is binding and a Nash Bargaining wage (NB) otherwise. Importantly, the boundary between the two regimes is shown to be dependent on the inflation rate in the economy.²

We next turn to an analysis of permanent disinflationary shock. In the event of a permanent disinflationary shock the threat to shirk is non-credible and the labor market is characterized by Nash bargaining (NB) regime. To understand this, note that the long-run trade-off between steady state inflation and output is highly nonlinear in the New Keynesian framework.³ This is because two effects are at work. First, within the Calvo-type model, forward-looking firms set prices to take account of discounted expected future profits. Under a positive discount rate, current profits obtain a greater weight than future profits, and firms set a lower price than under a discount rate of zero. This feature generates a positive inflation–output relationship. Second, positive inflation increases price dispersion, which acts like a negative productivity shock. The price dispersion effect, therefore, generates a negative inflation–output trade-off, which under reasonable parameter assumptions dominates the positive time-discounting effect.

A permanent disinflationary shock therefore diminishes the price dispersion in the long run and acts as a permanent increase in labor productivity. The resulting increase in output causes an increase in the labor market tightness as firms post more vacancies and the unemployment rate falls. Indeed, in a tight labor market, turnover costs are high and workers can obtain a wage superior to the EW.

We next proceed to evaluate a credible disinflation program from a welfare perspective. Specifically we examine two cases (a) when the economy is characterized by NB wages and (b) when the economy is characterized by EW. We find that disinflation in the EW regime, leads to higher output and welfare in the long run when compared to the NB regime.

There is a large literature that has incorporated labor market frictions into NK models.⁴ The focus of these earlier contributions has ranged from exploring how search and matching frictions affect the empirical performance of the New Keynesian model to studying optimal monetary policy in the presence of these frictions. These papers however do not address the issue of either wage formation process in the presence of labor market frictions during disinflations or how the welfare costs of disinflation are affected by the presence of such frictions.

The papers closest in motivation to ours are [Ascari and Ropele \(2012\)](#) and [Rocheteau \(2001\)](#). [Rocheteau \(2001\)](#) combines the shirking and the matching approaches in an *anon-monetary model* in order to characterize the *steady state wage formation* process as a function of labor market conditions. [Ascari and Ropele \(2012\)](#) consider a medium scale non-linear NK model and focus on the welfare cost of disinflations. In an insightful paper, they show that disinflation despite its prolonged slump in output results in small welfare gains. Intuitively, permanent disinflationary shocks increase labor productivity in a non-linear NK model which causes output to rise in the long run. The long-run increase in output outweighs the short-run costs of recession resulting in an overall increase in welfare. We also study the disinflation process in a NK model. However, our work, with its explicit modelling of labor market frictions, focusses on the wage formation process as well as the welfare costs in the presence of such labor market frictions.

The rest of the paper is organized as follows. In Section 2 we present our basic model. Section 3 describes the steady state properties of the economy, Section 4 analyzes the impact of a permanent disinflationary shock to the economy, Section 5 analyzes the welfare implications of a disinflationary shock under the two labor market regimes and Section 6 concludes. Technical details of the model are provided in an Appendix.

2. The model

The model closely follows [Ravenna and Walsh \(2011\)](#). It consists of households whose utility depends on the consumption of market and home produced goods. Households and firms are risk neutral. The members of households are either employed by wholesale goods producing firms or are unemployed. In the former case they receive a market real wage w_t ; in the latter case they receive a fixed amount w^u of household production units. When choosing employment and the real wage, firms face an efficiency wage constraint, which they have to satisfy in order to avoid shirking by workers. Wholesale goods are, in turn, purchased by retail firms who sell to households. The retail goods market is characterized by monopolistic competition. In addition, retail firms have sticky prices that adjust according to a standard Calvo specification.

² [Rocheteau \(2001\)](#) carries out a related analysis in a non-monetary economy.

³ See [Ascari \(2004\)](#) and [Ascari and Merkl \(2009\)](#).

⁴ Examples include [Blanchard and Gali \(2007\)](#), [Krause and Lubik \(2007\)](#), [Faia \(2008\)](#), [Krause et al. \(2008\)](#), [Ravenna and Walsh \(2008, 2011\)](#), [Thomas \(2008\)](#), [Gertler et al. \(2008\)](#), [Gertler and Trigari \(2009\)](#), and [Trigari \(2009\)](#).

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