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Inflation persistence and the real costs of disinflation in staggered prices and partial adjustment models

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Abstract

When analyzing a disinflation policy, taking explicitly into account a usually neglected expectational error inherent to the staggered structure of the Taylor model generates an inflation persistence and an output loss that do not occur in the partial adjustment model of Calvo.

Keywords: Real costs of disinflation; Inflation persistence; Staggered prices; Partial adjustment

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1. Introduction

A common view is that the Phillips curves implied by the staggered prices model of Taylor (1980) and the partial adjustment model of Calvo (1983) are similar (Roberts, 1995) and that their monetary policy implications are identical. According to this view, an unexpected but credible disinflation policy is costless (Walsh, 1998) and the inflation displays no persistence in both models. I show that this view is incorrect and heavily depends on the treatment of the structural expectation errors on the inflation rate present in the Phillips curve resulting from the staggered prices model of Taylor (Mash, 2003). Under rational expectations, these expectation errors are equal to zero on the

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average and can be neglected. However, given an unexpected and sudden disinflation policy, the behavior of the individual contracts in the Taylor model implies that this error is unambiguously positive, creating inflation persistence and a positive real cost of disinflation absent from the Calvo model.

2. Price adjustment rules

In both the Taylor and the Calvo models, each firm charges on the average the same price during N periods. However, the individual price duration depends on the model. In the staggered prices model of Taylor, each price lasts exactly N periods. The probability that a given price changes is 1 every N periods and 0 otherwise. The firms in the economy thus form N cohorts of equal size, according to the dates at which they change their prices. In the partial adjustment model of Calvo, each firm has a constant probability λ ($=1/N$) of changing its price in any given period. This probability is independent of the date of the last price change.

Let p_t^* be the price a firm would optimally charge in period t if prices were completely flexible. The firm sets the actual price x_t in order to minimize the following loss function:

$$L_t = \left[\sum_{i=0}^{k-1} E_t \left(x_t - p_{t+i}^* \right)^2 \right]$$

where k is the maximum contract length ($k=N$ in the Taylor's model, $k=\infty$ in the Calvo's model). Given the probabilities of price changes, the optimal price x_t set by a firm in the Taylor respectively Calvo case is:

$$x_t = \frac{1}{N} \sum_{i=0}^{N-1} \left(p_{t+i}^* \right), \tag{1}$$

$$x_t = \lambda \sum_{i=0}^{\infty} (1-\lambda)^i E_t p_{t+i}^*. \tag{2}$$

The aggregate price level in each model is a simple weighted average of all prices co-existing at time t, that is (respectively for Taylor and Calvo):

$$p_t = \frac{1}{N} \sum_{i=0}^{N-1} (x_{t-i}), \tag{3}$$

$$p_t = \lambda \sum_{i=0}^{\infty} (1-\lambda)^i x_{t-i}. \tag{4}$$

The optimal flexible price is given by:

$$p_t^* = p_t + \phi y_t. \tag{5}$$