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# Prices and unit labor costs: a new test of price stickiness ☆

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**Abstract**

This paper investigates the predictions of a simple optimizing model of nominal price rigidity for the dynamics of inflation. Taking as given the paths of nominal labor compensation and labor productivity to approximate the evolution of marginal costs, I determine the path of prices predicted by the solution of the firms' optimal pricing problem. Model parameters are chosen to maximize the fit with the data. I find evidence of a significant degree of price stickiness and substantial support for the forward-looking model of price setting. The results are robust to the use of alternative forecasting models for the path of unit labor costs, alternative measures of marginal costs, and alternative specifications of the model of price staggering. © 2002 Elsevier Science B.V. All rights reserved.

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## 1. Introduction

This paper investigates the predictions of a simple model of optimal price-setting for the aggregate price level and the dynamics of inflation. The model incorporates

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nominal price rigidity, in the form of delays between price adjustments, as in the model proposed by Calvo (1983). I evaluate the model performance against a 'benchmark' model with flexible prices (the model of pricing assumed in standard real business cycle models), by studying how much the model's deviations from the assumptions of the benchmark model improve the fit with US data.

While much recent evaluation of optimizing models with nominal price rigidity, following the lead of the RBC literature, has been conducted within a similar framework of general equilibrium models,[1] I propose here a different approach. I test the validity of the sticky price hypothesis by testing implications that depend only upon the firm's optimal pricing problem. The advantage of this approach is that it doesn't involve other maintained hypotheses about the structure of the economy—for example, about household preferences or about wage- setting—in addition to the assumed model of pricing and supply behavior by firms. This makes it easier to pin down which aspect of the model specification is responsible for its failure to match the data.

Moreover, rather than specifying the stochastic properties of the ultimate sources of randomness in the economy, I instead take as given the evolution of a number of state variables, and determine what path of prices is predicted by the evolution of these other variables, under the model of price determination considered. In this way I do not need to specify the source of the shock that determines deviations from a steady state equilibrium; the obvious advantage of proceeding in this way is that the results I obtain do not depend on some (more or less) arbitrary identification procedure to extract structural shocks from the residuals of an estimated time series model.

My empirical approach is closely related to the procedure used in a number of papers by Campbell and Shiller (for example, 1987 and 1988) to test present-value models of stock prices. As in the case of the present-value theory of stock prices, the optimizing sticky-price model that I consider here gives rise to a theoretical relationship where the evolution of one variable (the aggregate level of prices) depends on the discounted sum of expected future values of another variable (real marginal cost). I then construct the theoretical path of prices according to the model, taking as given the evolution of nominal labor compensation and labor productivity, and compare it to the data.

In the actual implementation, since prices are not a stationary series, I transform the present-value relationship into one where the price/unit labor cost ratio, which is stationary, depends upon the discounted sum of expected future growth of labor costs, which is also a stationary variable. I then use $VAR$ methodology to forecast the evolution of labor costs, and construct the path of the price/unit labor cost ratio predicted by the sticky-price model. This path depends on a number of parameters, which I estimate as those for which the model best fits the data, in terms of matching the level of the actual and predicted series. I also study the implications of the model for the path of inflation. Looking at the predictions for inflation not only provides an

[1] See, for example, King and Watson (1996), Rotemberg (1995), Christiano et al. (1997) and Rotemberg and Woodford (1997).