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Implications of habit formation for optimal monetary policy

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Abstract

We study the implications for optimal monetary policy of introducing habit formation in consumption into a general equilibrium model with sticky prices. Habit formation affects the model's endogenous dynamics through its effects on both aggregate demand and households' supply of output. We show that the objective of monetary policy consistent with welfare maximization includes output stabilization, as well as inflation and output gap stabilization. We find that the variance of output increases under optimal policy, even though it acquires a higher implicit weight in the welfare function. We also find that a simple interest rate rule nearly achieves the welfare-optimal allocation, regardless of the degree of habit formation. In this rule, the optimal responses to inflation and the lagged interest rate are both declining in the size of the habit, although super-inertial policies remain optimal.

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1. Introduction

This paper investigates the implications of habit formation for optimal monetary policy. It is motivated by recent studies (Edge, 2000; Fuhrer, 2000) that show including habit formation improves the degree to which small-scale business cycle

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models are able to fit certain aspects of U.S. time series.¹ For example, Fuhrer argues that it helps to explain the gradual response of output to monetary policy shocks observed in VAR studies. Despite the large number of papers that examine the desirable empirical properties of models with habit formation, only McCallum and Nelson (1999) and Fuhrer (2000) have addressed the subject of monetary policy, and neither of these authors characterizes optimal policy in a model in which agents make optimal choices about both consumption and labor supply. This paper addresses this gap in the growing literature that evaluates optimal monetary policy and simple interest rate rules within the context of small, structural models.

There is considerable empirical evidence that the autocorrelations of detrended output and inflation are large and positive, and die out slowly, in most industrialized countries (Fuhrer and Moore, 1995; Coenen and Wieland, 2000). Including habit formation improves the empirical performance of small-scale business cycle models because it introduces endogenous persistence into the structural equations, affecting in particular inflation dynamics. From the Euler equation of an optimizing household, habit formation implies that the marginal utility of current consumption depends upon both past and expected future consumption. Therefore, the IS equation derived from this Euler equation depends upon both expected future and lagged output. By contrast, the IS equation based on time-separable utility in consumption depends only upon current and forward-looking variables.

Similarly, as we will show, habit formation alters the form of the Phillips curve. Given expected future inflation, current inflation depends upon both past and expected future output gaps, in addition to the current output gap as in the standard new-Keynesian Phillips curve. This occurs because the marginal utility of income of consumers affects the optimal pricing decisions of suppliers. The reduced-form processes for output and inflation thus change for two reasons: first, because inflation depends upon the output gap, whose dynamic properties have been affected by the habit through an altered IS equation; and, second, because the valuation of revenues by suppliers also depends upon the habit in consumption, which leads to additional output gap terms appearing in the Phillips equation. Overall, a relatively large habit in consumption can lead to substantial persistence in both output and inflation.

It can be difficult to distinguish, however, whether the observed persistence in the data is derived from endogenous dynamics or exogenous shocks. Yet, optimal monetary policy may differ in important respects depending upon the source of persistence. This is suggested by the existing literature, which reaches different conclusions about the nature of desirable policies in part due to differences in the specification of endogenous dynamics. For example, in studies based on a standard sticky price model with optimizing agents, highly inertial policy is desirable and output terms get a low weight in optimal interest rate rules (e.g. Rotemberg and Woodford, 1999). Neither of these implications obtain from studies that use non-utility based models that include lagged endogenous terms (e.g. Rudebusch and

¹Habit formation has also been used to explain various anomalies in the finance literature. For example, see the discussion in Chapter 8 of Campbell et al. (1997).

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