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Constructing and estimating a realistic optimizing model of monetary policy☆

Jinill Kim*

Department of Economics, University of Virginia, Charlottesville, VA 22903, USA

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Abstract

A dynamic stochastic general-equilibrium (DSGE) model with real and nominal, both price and wage, rigidities succeeds in capturing some key nominal features of U.S. business cycles. Additive technology shocks, as well as multiplicative shocks, are introduced and shown to be crucial. Monetary policy is specified as an interest rate targeting rule following developments in the structural vector autoregression (VAR) literature. The interaction between real and nominal rigidities is essential to reproduce the liquidity effect of monetary policy. The model is estimated by maximum likelihood on U.S. data, and its fit is comparable to that of an unrestricted first-order VAR. Besides producing reasonable impulse responses and second moments, this model replicates a feature of U.S. business cycles, never captured by previous research with DSGE models, that an increase

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* Tel.: + 1-804-924-7581; fax: + 1-804-982-2904.

E-mail address: jk9n@virginia.edu (J. Kim)

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in interest rates predicts a decrease in output two to six quarters in the future.

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1. Introduction

The comovement of monetary and real aggregates and the inverse relation between the movements of money growth and nominal interest rates are two prominent nominal features of business cycles in the United States and many other countries.[1] In this paper, we will try to explain these features through the two channels of monetary policy – the output effect and the liquidity effect. The output effect, defined here as the positive response of aggregate output to expansionary monetary policy, has been a key question for economists who have searched for a monetary explanation of the business cycle. The liquidity effect, defined as the decrease in interest rates in response to monetary expansion, has been an important issue in empirical macroeconomics.[2]

Stimulated by Kydland and Prescott (1982) and Long and Plosser (1983), dynamic stochastic general-equilibrium (DSGE) models have become a useful tool for macroeconomic analysis, especially for business cycle analysis. Previous work using a flexible-price competitive DSGE models have provided a reasonable description of the data on real variables. One stream of recent work incorporates outside money in a flexible-price competitive DSGE model. Money is introduced in a cash-in-advance economy by Cooley and Hansen (1989) to study the effects of inflation. Sims (1994) introduces money through a transaction-cost framework. Using a simple money-in-the-utility-function model without nominal rigidities, Benassy (1995) shows analytically that the dynamics of the real variables are exactly the same as those in a model without money. Such models do not provide a good description of the money–output correlation and cannot reproduce reasonable impulse responses to the shocks in monetary policy, because of the following generic implication. If money growth

[1] Even if the first feature is universally accepted, the presence of the second feature is somewhat controversial. It depends on the choice of monetary aggregates and trending mechanisms. See Chari et al. (1995) as an example. Cooley and Hansen (1995) summarize additional stylized facts of the nominal features.

[2] This definition of the liquidity effect as a causal relation is, of course, not universal. For example, Ohanian and Stockman (1995) use the term to refer to the statistical correlation.