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Habit persistence, money growth rule and real indeterminacy

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Abstract

This paper studies the dynamic properties of a standard cash-in-advance model modified to include habit persistence over preferences. The central bank is assumed to follow an exogenous money growth rule. We show that equilibrium real indeterminacy is more likely to occur when habit persistence is high enough. We then establish that, in contrast to the standard CIA model, the implied sunspot dynamics may be non-oscillatory. This result is robust against alternative specifications provided the rigid CIA assumption is maintained.

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Introduction

The existence of nominal distortions in monetary models with exogenous money growth rule is a well-known source of potential complex dynamics and local real indeterminacy¹ (see Matsuyama, 1990, 1991; Fukuda, 1993; Woodford, 1994; Michener and Ravikumar, 1998; Matheny, 1998; Benhabib and Farmer, 2000; and Carlstrom and Fuerst, 2003, among others). Local real indeterminacy has received particular attention as in this case extrinsic uncertainty (“sunspots”) may generate aggregate fluctuations without any change in fundamentals.² Many sources of real indeterminacy have been investigated in the literature, including the specification of preferences and/or technology, the manner in which money is introduced into the model and the timing of transactions.

The main contribution of this paper is to focus on the specification of preferences. More precisely, the paper provides conditions on the elasticity of intertemporal substitution in consumption decisions for real indeterminacy to occur when the central bank follows an exogenous money growth rule. Indeed, intertemporal substitution motives are crucial to determine the dynamic properties of monetary economies as postponing consumption is a way to avoid nominal distortions. In this paper, we consider a standard cash-in-advance (CIA hereafter) monetary economy populated by infinitely lived representative agents. The only departure from the standard CIA model is that intertemporal substitution motives are weakened by including habit persistence over preferences. Habit persistence has proven to be helpful for understanding puzzles related to the permanent income model (see e.g. Deaton, 1992), solving the equity premium puzzle (see e.g. Abel, 1990; Constantinides, 1990; Campbell and Cochrane, 1999), and improving the ability of business cycle models to account for aggregate fluctuations (see Beaudry and Guay, 1996; Lettau and Uhlig, 2000; or Boldrin et al., 2001). Key to these results is that habit persistence introduces an intertemporal complementarity in consumption decisions. This is precisely the interplay between this complementarity and the intratemporal complementarity between consumption and money holdings that drives our main results.

We first show that high enough habit persistence generates real indeterminacy in our monetary economy. The main intuition underlying this result hinges on the weakening of intertemporal substitution motives implied by the presence of habit persistence. Indeed, when this mechanism is sufficiently strong, it can offset the negative effect of expected future inflation on future consumption. Further, one of the main contribution of this paper is that the implied sunspot dynamics may be non-oscillatory in contrast to the standard preference CIA model in which these dynamics are typically oscillatory (see Woodford, 1994; Farmer, 1999; and Carlstrom and Fuerst, 2003).

Second, we establish the robustness of our results against (i) the introduction of additional goods and/or asset (capital stock), and (ii) a general specification of the technology. Furthermore, we evaluate the role of the rigid CIA constraint hypothesis. To this end, we build a model with endogenous velocity in which the household can use alternative means of payment at the price of paying a transaction cost. This model highlights the role of the

¹ See Michener and Ravikumar (1998) for a survey on multiplicity of equilibria and complex dynamics in monetary models (money-in-the-utility function, overlapping generations and cash-in-advance).

² See e.g. Benhabib and Farmer (1999) for a survey on indeterminacy and sunspots in macroeconomics.

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