



# Learnability and monetary policy: A global perspective

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## Abstract

The recent literature on monetary policy design has emphasized the importance of equilibrium determinacy and learnability in the choice of policy rules. This paper contains an analysis of the learnability of the equilibrium in a class of simple, micro-founded models in which the policy authority uses a Taylor-type monetary policy rule. Unlike previous analyses, the model economy is not linearized about a steady state—instead, a global perspective is adopted. Globally, the nonlinear model economy can possess rational expectations equilibria other than the steady state consistent with the inflation target of the monetary authorities. These include a second, low inflation ‘liquidity trap’ steady state, periodic equilibria, and sunspot equilibria. The main results in the paper characterize the conditions under which these alternative equilibria maybe stable under adaptive learning, even when the policy rule obeys the Taylor principle. The stability of multiple equilibria is associated with policy rules which are forecast-based. An important finding is that backward-looking Taylor-type policy rules can guarantee that the unique learnable equilibrium is the steady state associated with the inflation target of the monetary authority.

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## 1. Introduction

The recent literature on monetary policy rules has emphasized the impact of the choice of policy rule on the determinacy and learnability of rational expectations equilibrium—see, for instance, the discussion in [Woodford \(2003a, Sections 2.2 and 2.3\)](#). Much of this analysis has been conducted in the context of a linearization of the model economy at a steady state consistent with the inflation target of the monetary authority. The analysis has therefore been local in nature. The main idea in this paper is to refrain from linearization of the model and instead analyze learnability of all equilibria that might exist.

To carry out this objective, I consider a discrete time version of a class of nonlinear monetary models suggested by [Benhabib et al. \(2001, 2002\)](#). In these models, a Taylor-type monetary rule must be nonlinear in order to remain consistent with the zero bound on the nominal interest rate, and this implies the existence of two steady states. The first is consistent with the inflation target of the monetary authorities, while the second is a low inflation, ‘liquidity trap’ steady state. Cyclical equilibria and sunspot equilibria may also exist. The key question is then whether any of the equilibria other than the steady state consistent with the inflation target can be (locally) stable under adaptive learning.

Because the Taylor principle has been identified as an important characteristic of a policy rule seeking to induce determinacy and learnability of the inflation target rational expectations equilibrium,<sup>1</sup> the Taylor principle is imposed throughout the analysis. This means that the steady state consistent with the inflation target is locally determinate. A purely local analysis would conclude that the equilibrium was locally unique and would proceed to analyze the learnability of that equilibrium under various assumptions about the nature of the policy rule used by the monetary authority. The other equilibria that exist globally would not be part of the analysis.

The main results are as follows. The economy can converge to the liquidity trap steady state under adaptive learning. The economy can also converge to the cyclical equilibria or to the sunspot equilibria under learning. These stability results occur even in cases where the steady state consistent with the inflation target is itself stable under learning dynamics. These findings show that we cannot expect learning to isolate a particular equilibrium as the only plausible one in a global context. [McCallum \(2001, 2003, p. 1\)](#) has suggested for a local analysis that “[. . .] there is at most one rational equilibrium solution that should be regarded as plausible, the others reflecting theoretical curiosities that are not of relevance for actual economies.” But the global analysis here suggests that other equilibria maybe learnable and hence viewed as equally plausible. The finding further supports the claim in [Woodford \(2003b\)](#) that the “minimum state variable solution” criterion suggested by [McCallum \(2003\)](#) is not as effective for equilibrium selection as determinacy and learning.

While learning alone may not select a unique equilibrium, another main finding is that policy-makers can adopt policy rules that induce an unique learnable rational expectations equilibrium. The results cited in the previous paragraph occur when the policy-maker uses a forecast-based Taylor rule. If the policy-maker instead adopts a backward-looking Taylor rule, the unique learnable equilibrium is the steady state associated with the inflation target of the monetary authority. This is because the cyclical equilibria no longer exist, while both sunspot equilibria and the liquidity trap steady state become unstable under learning dynamics.

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<sup>1</sup>See [Woodford \(2001\)](#).

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