Learning, monetary policy rules, and macroeconomic stability

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Abstract

Several papers have documented a regime switch in US monetary policy from 'passive' and destabilizing in the pre-1979 period to 'active' and stabilizing afterwards. These studies typically work with DSGE models with rational expectations.

This paper relaxes the assumption of rational expectations and allows for learning instead. Economic agents form expectations from simple models and update the parameters through constant-gain learning. In this setting, the paper aims to test whether monetary policy may have been a source of macroeconomic instability in the 1970s by inducing unstable learning dynamics.

The model is estimated by Bayesian methods. The constant-gain coefficient is jointly estimated with the structural and policy parameters in the system.

The results show that monetary policy was respecting the Taylor principle also in the pre-1979 period and, therefore, did not trigger macroeconomic instability.
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1. Introduction

A large literature has studied the evolution of US monetary policy over the post-war period and the effects of monetary policy on macroeconomic stability. Influential papers

by Clarida et al. (CGG, 2000) and Lubik and Schorfheide (LS, 2004) have argued that policy was substantially different in the pre-1979 period compared with the following two decades. CGG estimate a single equation – a forward-looking Taylor rule – by GMM, while LS use full-information methods to estimate a New Keynesian model with rational expectations. Both papers conclude that the estimated monetary policy rule in the pre-1979 sample fails to satisfy the so-called 'Taylor principle' and may have been a source of macroeconomic instability by allowing the existence of 'sunspot equilibria'.

This paper avoids imposing rational expectations and it introduces, instead, learning by economic agents. A recent literature[1] highlights, in fact, the strong informational requirements of economic agents under rational expectations and proposes to relax this assumption in favor of agents that form expectations from simple economic models and need to learn the true model details over time.

In a model with learning, a failure to satisfy the Taylor principle, as implied by CGG and LS's estimates, would still be a source of endogenous macroeconomic instability. But it would produce instability for a different reason. In a model with learning, in fact, a monetary policy rule that fails to satisfy the Taylor principle would prevent the learning dynamics from converging to the rational expectations equilibrium (REE) of the economy. The system may, therefore, be characterized by *unstable learning dynamics*.

This paper aims to estimate a model with learning to evaluate whether unstable learning dynamics indeed existed in the pre-1979 period. In the model I will present, the Taylor principle represents a necessary and sufficient condition for learnability of the true rational expectations solution. Therefore, the paper will focus on checking whether monetary policy satisfied the Taylor principle to derive evidence on unstable learning dynamics in the 1960s and 1970s.

Similarly to LS, I adopt full-information Bayesian methods in the estimation. But differently from them, I relax the assumption of rational expectations and allow for near-rational expectations and learning.

Under rational expectations, the papers that estimate structural models by likelihood methods typically impose restrictions in the estimation to guarantee that the parameters fall in the determinacy region, so that the models can be solved by standard procedures. This approach rules out by construction estimates of the monetary policy rule that do not respect the Taylor principle. LS are the first to provide the tools to extend the likelihood function to the indeterminacy region, thus allowing for determinacy and indeterminacy in the estimation under rational expectations. But such complications are not needed under subjective expectations and learning. My framework is, therefore, particularly suited to study the evolution of US monetary policy over time and to investigate the determinacy, indeterminacy, and learnability properties of estimated monetary policy rules, both in the pre- and post-1979 samples.

I find that monetary policy has satisfied the Taylor principle also in the pre-1979 period. The results, therefore, indicate that monetary policy was not a source of instability in the pre-Volcker sample.[2] The estimates imply that, in the case of a decreasing gain, there

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[1]See Sargent (1993, 1999), Evans and Honkapohja (2001), and Bullard (2007).

[2]The results seem consistent with the evidence from time-varying coefficients VARs. Sims and Zha (2006), Primiceri (2005), and Canova and Gambetti (2006), for example, find little evidence in support of substantial changes in policy. Sims and Zha find that the best-fitting specification has time-variation in the variances of the shocks, but not in the coefficients.