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Robust monetary policy with competing reference models ☆

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Abstract

The existing literature on robust monetary policy rules has largely focused on the case in which the policymaker has a single reference model while the true economy lies within a specified neighborhood of the reference model. In this paper, we show that such rules may perform very poorly in the more general case in which non-nested models represent competing perspectives about controversial issues such as expectations formation and inflation persistence. Using Bayesian and minimax strategies, we then consider whether *any* simple rule can provide robust performance across such divergent representations of the economy. We find that a robust outcome is attainable only in cases where the objective function places substantial weight on stabilizing both output and inflation; in contrast, we are unable to find a robust policy rule when the sole policy objective is to stabilize inflation. We analyze these results using a new diagnostic approach, namely, by quantifying the *fault tolerance* of each model economy with respect to deviations from optimal policy.

JEL classification: E31; E52; E58; E61

Keywords: Model uncertainty; Robust control; Optimal control; Bayesian control

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1. Introduction

Most studies of the problem of formulating monetary policy under uncertainty about the true structure of the economy, have followed Brainard (1967) in focusing on the case in which the policymaker has a single reference model and the true economy lies within a specified neighborhood of this model. In recent work, for example, Hansen and Sargent (2002) provide a rigorous treatment of robust control in the face of uncertainty about the data-generating process, or DGP, of the exogenous disturbances. Giannoni (2001, 2002) characterizes rules that are robust to uncertainty about the estimated parameters, while Onatski and Stock (2002) and Onatski and Williams (2002) analyze the robustness of simple rules when the behavioral equations of the model are subject to misspecification errors; these papers also consider uncertainty about the shock process. Finally, Svensson (1997) and Giannoni and Woodford (2003) have emphasized that the optimal targeting rule for a given model has a representation that is invariant to *known* changes in the shock process and contend that this is the primary sense in which a proposed rule should be robust.[1]

In this paper, we analyze the robustness of policy rules when non-nested models represent competing perspectives about controversial issues such as expectations formation and inflation persistence.[2] Such an approach was initially advocated by McCallum (1988) and seems consistent with the aims of Taylor (1993a), whose simple policy rule was intended to yield reasonable macroeconomic stability under a wide range of assumptions about the "true" structure of the economy.[3] One interpretation of this approach, suggested by Patrick Minford, is related to the decision-making of a policymaking committee. Each member of the committee holds to a particular view of the behavior of the economy, represented by a macro model. A robust rule is one that, although not exactly optimal for any member of the committee, yields outcomes that are acceptable to all members of the committee. A nonrobust rule, in contrast, is one that performs very poorly in at least one of the committee members' models and thus interferes with the building of a consensus view of policy.

We consider three distinct macroeconomic models, two of which have been scrutinized in the robust control literature. First is a benchmark version of the New Keynesian model (henceforth denoted the NKB, for New Keynesian Benchmark), which been studied by Hansen and Sargent (2002), Giannoni (2001, 2002), and Giannoni and Woodford (2002b); this model has purely forward-looking specifications for price setting and aggregate demand and exhibits no intrinsic persistence.[4]

[1] For further analysis and discussion of optimal targeting rules, see Svensson (2003), and Svensson and Woodford (2003a).

[2] Consideration of monetary policy under this form of model uncertainty has previously been analyzed by Karakitsos and Rustem (1984), Becker et al. (1986), Frankel and Rockett (1988), Holtham and Hughes-Hallett (1992), Christodoulakis et al. (1993), Levin et al. (1999), and Levin et al. (2003).

[3] See McCallum (1999) for a further discussion of robustness to model uncertainty.

[4] See the analysis and discussion in Clarida et al. (1999) and Woodford (2000), who also provide references to the extensive literature related to this model.