ELSEVIER Journal of Monetary Economics 46 (2000) 199–228

Journal of MONETARY ECONOMICS

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Monetary policy, parameter uncertainty and optimal learning☆

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Received 26 August 1996; received in revised form 16 August 1999; accepted 27 September 1999

Abstract

Since central banks have limited information concerning the transmission channel of monetary policy, they are faced with the difficult task of simultaneously controlling the policy target and estimating the impact of policy actions. A tradeoff between estimation and control arises because policy actions influence estimation and provide information which may improve future performance. I analyze this tradeoff in a simple model with parameter uncertainty and conduct dynamic simulations of the policymaker's decision problem in the presence of the type of uncertainties that arose in the wake of German reunification. A policy that separates learning from control may induce a persistent

☆This paper is a substantially revised version of Chapter 2 of my Ph.D. Dissertation at Stanford University. I would like to thank John B. Taylor, Kenneth Judd, John Leahy, Ronald McKinnon, Michael Horvath, Thomas Sargent, Andrew Levin, Athanasios Orphanides, Richard Porter, Thomas Cosimano, Ronald Balvers, Jürgen von Hagen, Manfred Neumann, David Wilcox and an anonymous referee of this journal for many helpful suggestions and Geoff Lanyon for research assistance. I have also benefitted from discussions with seminar participants at Stanford University, the Federal Reserve Board, the University of Bonn and the Bundesbank. All remaining errors are my own. The views expressed in this paper are solely the responsibility of the author and should not be interpreted as reflecting those of the Federal Reserve Board or of any members of the FOMC. Financial support at an early stage through a Bradley fellowship from the Center of Economic Policy Research at Stanford has been strongly appreciated. Furthermore, I would like to thank the Center for European Integration Studies at Bonn University for the hospitality extended while I was revising this paper.

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PII: S0304-3932(00)00023-4

upward bias in money growth and inflation, just as observed after unification. In contrast, the optimal learning strategy which exploits the tradeoff between control and estimation significantly improves stabilization performance and reduces the likelihood of inflationary bias. © 2000 Elsevier Science B.V. All rights reserved.

JEL classification: E52; E40; D83; C44

Keywords: Optimal control with unknown parameters; Bayesian learning; Monetary policy; Structural change; Learning by doing; Inflation targeting

1. Introduction

Monetary policy is conducted in an uncertain economic environment where little is known about the exact relationship between policy instruments such as the short-term nominal interest rate and policy targets such as the rate of inflation. In fact, macroeconomists can at best provide a rough estimate of the economy's expected response to a specific policy action. As a consequence, monetary policymakers are confronted with a complex simultaneous control and estimation problem. On the one hand, they attempt to control target variables such as inflation as best as possible based on current knowledge and information. On the other hand, they have to examine and perhaps revise their view of how the economy responds to policy actions as soon as new information becomes available and then adjust policy accordingly. This is particularly important at times when the economy is undergoing structural changes such as, for example, following German unification or the formation of the European monetary union.

Recent research on monetary policy and transition such as Bertocchi and Spagat (1993) and Balvers and Cosimano (1994) has emphasized that policymakers face a tradeoff between control and estimation whenever they are uncertain about parameters that influence policy effectiveness. This tradeoff arises because policy actions may provide new information about the relationship between policy instrument and target. In particular, it may be optimal to choose a policy setting that worsens current outcomes but yields new information that will make it possible to improve policy performance in the future. Thus, how quickly policymakers will learn about relevant parameters following structural changes such as German unification will depend, among other factors, on their own actions. For example, if the policymakers' estimates are biased and policy is set without considering how it will affect these estimates, one might well expect to observe a persistent deterioration in stabilization performance. Alternatively, if policymakers take into account the informational effects of policy actions and learn optimally, long-lasting biases in target variables should be less

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