ELSEVIER

Journal of Economic Dynamics & Control
25 (2001) 911–949

JOURNAL OF
Economic
Dynamics
& Control

www.elsevier.nl/locate/econbase

Robust monetary policy with misspecified models: Does model uncertainty always call for attenuated policy?☆

Robert J. Tetlow, Peter von zur Muehlen*

Federal Reserve Board, Washington, DC 20551, USA

Abstract

This paper explores Knightian model uncertainty as a possible explanation of the considerable difference between estimated interest rate rules and optimal feedback descriptions of monetary policy. We focus on two types of uncertainty: (i) unstructured model uncertainty reflected in additive shock error processes that result from omitted-variable misspecifications, and (ii) structured model uncertainty, where one or more parameters are identified as the source of misspecification. For an estimated forward-looking model of the US economy, we find that rules that are robust against uncertainty, the nature of which is unspecifiable, or against one-time parametric shifts, are more aggressive than the optimal linear quadratic rule. However, policies designed to protect the economy against the worst-case consequences of misspecified dynamics are less aggressive and turn out to be good approximations of the estimated rule. A possible drawback of such policies is that the losses incurred from protecting against worst-case scenarios are concentrated among the same business cycle frequencies that normally occupy the attention of policymakers.

☆We thank David Reifschneider and three anonymous referees for useful guidance and especially Alexei Onatski for generously providing two prototypical Matlab programs and subsequent help in understanding the methodology. Thanks are also due to Frederico S. Finan for his usual, excellent research assistance. All remaining errors are ours. Any opinions expressed herein do not reflect those of the staff or members of the Board of Governors.

* Corresponding author. Mailstop 61 (R.J. Tetlow), Mailstop 76 (P. von zur Muehlen).

E-mail addresses: rtetlow@frb.gov (R.J. Tetlow), pmuehlen@frb.gov (P. von zur Muehlen).

0165-1889/01/$ - see front matter
PII: S0165-1889(00)00061-0

JEL classification: C6; E5

Keywords: Model uncertainty; Robust control; Monetary policy; Stackelberg games

1. Introduction

Recent articles have uncovered a puzzle in monetary policy: Interest-rate reaction functions derived from solving optimization problems call for much more aggressive responsiveness of policy instruments to output and inflation than do rules estimated with US data.[1] What explains the observed lack of aggressiveness — the *attenuation* — of policy?

Three distinct arguments have been advanced to explain the observed reluctance to act aggressively. The first is that it is simply a matter of taste: policy is slow and adjusts smoothly in response to shocks because central bankers prefer it that way, either as an inherent taste or as a device to avoid public scrutiny and criticism (see, e.g., Drazen, 2000, Chapter 10). The second argues that partial adjustment in interest rates aids policy by exploiting private agents' expectations of future short-term rates to move long-term interest rates in a way that is conducive to monetary control (see, e.g., Goodfriend, 1991; Woodford, 1999; Tetlow and von zur Muehlen, 2000).

The third contention is that attenuated policy is the optimal response of policymakers facing uncertainty in model parameters, in the nature of stochastic disturbances, in the data themselves given statistical revisions, and in the measurement of latent state variables such as potential output, the NAIRU, and the steady-state real interest rate. Blinder (1998), Estrella and Mishkin (1998), Orphanides (1998), Rudebusch (1998), Sack (1998a), Smets (1999), Orphanides et al. (2000), Sack and Wieland (2000), Wieland (1998) and Tetlow (2000) all support this general argument, following the line of research that began with Brainard (1967).[2] The present paper is concerned with this third explanation for policy attentuation. There is no unanamity on this third line of argument, however. Chow (1975) and Craine (1979) demonstrated long ago that uncertainty can lead to the opposite result of *more* aggressive policy than in the certainty equivalence case — or what we might dub as *anti-attenuation*. Söderström (1999a) provides an empirical example of such a case. Moreover, possible deficiencies in the Brainard-style story are hinted at in the range of uncertainties required in papers by Sack (1998a) and Rudebusch (1998) to come even close to

[1] The list of papers includes Rudebusch (1998), Sack (1998b), Söderström (1999b), Tetlow et al. (1999) and Tetlow and von zur Muehlen (2000).

[2] Other important early references include Aoki (1967), Johansen (1973,1978), and Craine (1979).