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The stabilization bias and robust monetary policy delegation

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ABSTRACT

Discretionary monetary policy suffers from a stabilization bias, whose size is known to be dependent on the degree of shock persistence. This note analyzes the size of this bias and, consequently, the rationale for delegating monetary policy to an inflation-averse central banker, when the economy faces uncertainty about the true degree of shock persistence. We show that the stabilization bias increases if uncertainty becomes larger. Hence, the degree of optimal monetary conservatism increases with the degree of uncertainty.

"Shocks can be temporary or long-lasting, and it is rarely entirely clear at the time of the shock exactly what type of shock one is facing in reality"
Freedman (Bank of Canada, 1999).
"Central bankers are given little guidance as to the nature of the stochastic disturbances that drive the business cycle on average"
Issing (European Central Bank, 2002).

1. Introduction

Since Rogoff's (1985) seminal analysis, it is now common wisdom that delegating monetary policy to a central bank which is more inflation-averse than the social planner, i.e., to a "conservative central banker", can raise welfare. In the recent generation of general equilibrium models for monetary policy analysis, the rationale for policy delegation is that monetary policy under discretion gives rise to inefficient inflation stabilization. A so-called stabilization bias emerges, which can be

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corrected by appointing a hawkish central banker, see e.g. Clarida et al. (1999).[2] Since the public knows that inflation will respond less to a cost-push shock, expected future inflation is subdued. Stabilizing inflation becomes less costly in terms of future output contraction. Note that this rationale strengthens as the persistence of the cost-push shock process increases. A larger persistence eventually translates into higher volatility and aggravates the stabilization bias.

This note analyzes the delegation decision under uncertainty about the persistence of shocks. In order to facilitate an analytical solution, the model is kept simple. The social planner is unable to formulate a probability distribution over the interval of possible realizations of the persistence of shocks. Instead, he follows a minmax strategy when deciding upon the optimal weight the central bank should attach to output fluctuations. This optimal weight is chosen such that the welfare loss that could occur due to persistence uncertainty is minimized. Throughout the paper, we refer to delegation that follows a minmax strategy as "robust delegation", since the delegation outcome is robust to uncertainty about the shock process.[3] As a central result it is shown that the stabilization bias increases when uncertainty becomes larger. This is because under the minmax paradigm, the planner should overestimate the true degree of persistence. Hence, the degree of monetary conservatism increases with the degree of uncertainty.[4]

This note is organized as follows. Section 2 derives optimal monetary policy and the size of the stabilization bias under certainty. In Section 3 we introduce uncertainty about the shock process and derive the main result. Section 4 sums up the results of this paper.

2. Optimal policy under certainty

Consider the simplest version of a New-Keynesian model. Inflation is described by a forward-looking Phillips curve (1), which represents a log-linearized equilibrium condition of a simple sticky-price general equilibrium model. Here π_t is the inflation rate, x_t the output gap, and E_t is the expectations operator. The discount factor is denoted by $\beta < 1$ and κ, the slope coefficient of the Phillips curve, is inversely related to the degree of nominal rigidities

$$\pi_t = \beta E_t \pi_{t+1} + \kappa x_t + e_t \tag{1}$$

The cost-push shock e_t exhibits some degree of persistence described by the AR(1) coefficient $0 \leqslant \rho < 1$

$$e_t = \rho e_{t-1} + \varepsilon_t \quad \text{with } \varepsilon_t \sim \mathcal{N}(0,1)$$

Monetary policy is assumed to minimize the welfare loss due to sticky prices, which is described in terms of inflation volatility and output gap volatility weighted by the parameter $\lambda > 0$

$$\min_{\pi_t, x_t} \{\pi_t^2 + \lambda x_t^2\} \tag{2}$$

Under discretionary policy, expectations are taken as given and the first order conditions of maximizing (2) subject to (1) imply

$$\kappa \pi_t + \lambda x_t = 0 \tag{3}$$

The policymaker sets the output gap such that (3) holds.[5] Hence, the persistence properties of the cost-push shock do not affect monetary policy setting. Naturally, shock persistence affects equilibrium inflation and output, which can be shown to be (see Walsh, 2003a)

$$\pi_t^{dis} = \frac{\lambda}{\lambda(1-\beta\rho)+\kappa^2} e_t \tag{4}$$

$$x_t^{dis} = -\frac{\kappa}{\lambda(1-\beta\rho)+\kappa^2} e_t \tag{5}$$

Both inflation and output gap fluctuations are stabilized less if shocks become more persistent.

The solution under discretion differs from that under commitment to a rule. Suppose the central bank can credibly commit to a non-inertial rule of the form $x_t^{rule} = b_x e_t$ and $\pi_t^{rule} = b_\pi e_t$, where b_x and b_π are coefficients to be determined. With this rule, equilibrium inflation is given by

$$\pi_t^{rule} = \frac{\lambda(1-\beta\rho)}{\lambda(1-\beta\rho)^2+\kappa^2} e_t \tag{6}$$

[2] Svensson (1997) coins the term "stabilization bias". Dennis and Söderström (2006) provide a detailed quantitative analysis of the size of the stabilization bias and the gains from commitment, respectively.

[3] See Hansen and Sargent (2008), Giannoni (2002, 2007), and Onatski and Williams (2003) for recent contributions to the minmax or "robust control" approach to monetary policy under various kinds of uncertainty.

[4] Gaspar and Vestin (2004) analyze the rationale for delegation under uncertainty in a framework in which the central bank knows the true structural relationships of the underlying model but cannot reliably observe potential output. The central finding is that the optimal degree of conservatism increases as the quality of information deteriorates.

[5] Note that the Euler equation for output is not binding for the central bank's problem. Thus, the economy is fully described by the inflation adjustment equation given by (1) and the loss function (2).