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Probing potential output: Monetary policy, credibility, and optimal learning under uncertainty

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Abstract

The effective conduct of monetary policy is complicated by uncertainty about the level of potential output. One possible response is for the central bank to “probe,” interpreted here as actively using its policy to learn about the level of potential output. I consider a simple calibrated model in the Canadian context and examine the relationship between credibility and optimal probing. For plausible parameter values, the optimal amount of probing is small and diminishes slightly as credibility rises. Only for unrealistically low levels of credibility or unrealistically large levels of uncertainty or volatility does the optimal policy diverge significantly from a policy that ignores learning.

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1. Introduction

The effective conduct of monetary policy is complicated by uncertainty. There are many dimensions to this uncertainty: uncertainty about shocks, model parameters, data, and the “correct” model of the economy itself (see Thiessen (1995) and Poole (1998) for discussions). At a practical level, one of the key uncertainties facing policy-makers is the level of output that can be maintained without adding to inflation pressures (referred to as the level of potential output). While policy-makers can continue

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Nomenclature

π_t	inflation
π_t^e	inflation expectations
y_t	output
y_t^*	potential output
r_t	interest rate
ϵ_t	inflation shock
η_t	potential shock
α_t	Phillips curve intercept
β	Phillips curve slope
v_t	Phillips curve error
π^*	inflation target
ω	weight on output in loss function
ρ	discount rate
λ	credibility

to refine and improve the measurement of potential output (see Kuttner (1992), Laxton and Tetlow (1992), Butler (1996), St-Amant and van Norden (1997), or Dupasquier et al. (1999) for a discussion of the various ways potential output is measured), to a considerable degree uncertainty about potential output is fundamental. Thus, the challenge for policy-makers is how to deal with this uncertainty.

Three possible responses by the central bank to uncertainty about potential output that have been examined analytically are to (i) ignore the uncertainty and follow the “certainty equivalent” policy; (ii) act “conservatively,” by which is meant moving interest rates by less than is implied by the certainty equivalent policy; or (iii) “probe” or experiment, which implies that the central bank actively uses its policy response to learn about the level of potential output.

To formalize probing within an economic model, one must understand what it means in terms of the behavior of the central bank. However, there is no consensus on this. One interpretation of probing is that it entails optimal learning, that is, following a more aggressive policy to learn about the parameters of the economy. Probing of this type results in more precise estimates, and therefore smaller policy mistakes in future periods. Building on Wieland’s (1998) analysis of this issue, I consider a simple calibrated model in the Canadian context and examine the relationship between this definition of probing and credibility.

Many inflation-targeting central banks have put significant emphasis on attaining credibility for their policy objectives in recent years (see Amano et al. (1999) for details of steps taken by the Bank of Canada, for example). These steps have increased the accountability of the central banks and that, together with the realized inflation record, has enhanced their credibility in the sense that expectations of inflation have become more firmly anchored to the inflation target (see Johnson (1997, 1998) or Perrier (1998) for evidence of this). The question addressed here is whether an

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