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# Uncertain potential output: implications for monetary policy

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## Abstract

A small forward-looking model of the euro-area economy is used to investigate the implications of incomplete information about potential output for the conduct of monetary policy. Three results emerge. First, under optimal monetary policy, output gap uncertainty leads to persistent deviations between the actual and the perceived output gap in response to supply and cost-push shocks. Second, in first-difference form, a simple policy rule such as the Taylor rule continues to perform relatively well as long as the output gap is optimally estimated. Third, incomplete information implies that it is optimal to appoint a more “hawkish” central bank. © 2002 Elsevier Science B.V. All rights reserved.

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## 1. Introduction

In most macro-models that are currently being used for policy analysis the degree of capacity utilisation as, for example, measured by an output gap plays an important role in the determination of inflation. Yet, there are no direct measures of the aggregate supply side of the economy or the extent to which the resources in an economy are fully used. A wide variety of both conceptual and empirical methods have been proposed to estimate potential output and make the notion of an output gap operational.<sup>1</sup> In this paper we analyse the implications of imperfect information on potential output

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<sup>1</sup> Tetlow (2000) gives a short overview of the history of the measurement of potential output.

for the conduct of monetary policy.<sup>2</sup> Only recently this issue has been studied more formally in quantitative models of optimal monetary policy. Most of this analysis takes place in a linear–quadratic framework.<sup>3</sup> Estrella and Mishkin (1999) emphasised that uncertainty about the NAIRU would not affect the optimal monetary policy in such a framework because certainty equivalence holds with respect to shocks that enter the model additively. Smets (2002) integrates the estimation of the output trend in a backward-looking policy evaluation model, and illustrates the effect of estimation errors on the choice of efficient simple policy rules. He shows that higher uncertainty leads to some policy attenuation in simple Taylor rules. These results are generally confirmed by Tetlow (2000), who extends the analysis to a forward-looking model and also examines inflation-forecast-based rules.

Using estimates of measurement error derived from real-time estimates of the output gap, Orphanides (2001) shows that such errors lead to a significant deterioration of feasible policy outcomes and cause efficient policies to be less activist. Rudebusch (2001) shows that these considerations are essential for reconciling estimated policy reaction functions and optimal policy. However, Svensson and Woodford (2000) and Swanson (2000) argue that these results are due to the fact that the central bank does not use its best estimate of the output gap. While certainty equivalence holds when the optimal policy is expressed in terms of the best estimate of the state variables of the economy, the weights put on various indicators used in deriving such an estimate will depend on how noisy these indicators are.

In this paper, we illustrate and extend these results using a simple, backward/forward looking, calibrated model of the euro area economy. We chose to look at the euro area rather than the US for two reasons. First, the European Central Bank (ECB) conducts monetary policy for an entirely new currency area, which implies that the problem of uncertainty is even more pressing than for other central banks which operate in a familiar environment. It is therefore useful to analyse these issues in a European context. Second, there has been considerable discussion on the design of a suitable monetary policy strategy for the ECB under this situation of elevated uncertainty. Our analysis can shed some light on this issue, by discussing the importance that should be given to indicator variables in monetary policy making, and by investigating the optimal degree of conservativeness of a central banker in this context.

We use the calibrated euro area model to systematically compare the monetary policy implications of two assumptions regarding the information available to the agents in the economy. Under one assumption the central bank and the private sector can perfectly derive the nature of the shocks (including those to potential output) that hit the economy. In the other case, the central bank and the other agents in the economy do

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<sup>2</sup> Recently, the problems associated with the measurement of potential output have been highlighted in the monetary policy debate in the United States. Uncertainty about the degree of capacity utilisation has been very high as the growth rate of the economy persistently exceeded previous estimates of potential growth and the unemployment rate fell through most previous estimates of the NAIRU without causing a resurgence in inflation. Similar questions also arise in the euro area, where the effects of structural reforms in labour and goods markets on the supply side of the economy are difficult to assess.

<sup>3</sup> One exception is a series of papers by Doug Laxton and co-authors who examine the effects of natural rate uncertainty in a model with a convex Phillips curve. See, for example, Laxton et al. (2001).

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