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Inflation and output volatility under asymmetric incomplete information

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ABSTRACT

The assumption of asymmetric and incomplete information in a standard New Keynesian model creates strong incentives for monetary policy transparency. We assume that the central bank has better information about its objectives than the private sector, and that the private sector has better information about shocks than the central bank. Transparency has the potential to trigger a virtuous circle in which all agents find it easier to make inferences and the economy is better stabilised. Our analysis improves upon existing work by endogenising the volatility of both output and inflation. Improved transparency most likely manifests itself in falling output volatility.

1. Introduction

Many policymakers and academics believe that transparent monetary policy regimes have a role to play in fostering macroeconomic stability. A general argument is that such regimes anchor inflation expectations around the objective of the central bank, making prices and wages less responsive to temporary shocks and allowing the central bank to ensure greater macroeconomic stability through only moderate policy actions. In contrast, poor transparency weakens the anchor on expectations and leads to a deterioration in the stochastic properties of both inflation and output. For example, Erceg and Levin (2003) show that a lack of transparency about the inflation target creates unwanted inflation persistence and increased costs of deflation in an otherwise standard DSGE model.

This paper introduces an additional channel through which transparent monetary policy promotes macroeconomic stability. The idea is that anchoring private inflation expectations to a transparent target makes it is easier for the central bank to infer the state of the economy, in which case the central bank is better informed and can fine-tune stabilisation policy to increase stability in the macroeconomic environment. In particular, we examine a situation in which the central bank is unable to observe either private inflation expectations or the natural rate of interest that summarises the shocks hitting the economy. The more well-anchored private inflation expectations are in such a world the easier it is for the central bank to infer and react to the natural rate of interest. Private agents in turn know the natural rate of interest but have to infer the inflation target of the central bank. Information in our model is *asymmetric* because the central bank and

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private agents know different things. Information is *incomplete* because neither the central bank nor private agents know everything about the state of the economy.

There are strong incentives for transparency in our model. The asymmetry and incompleteness of information means that the central bank and private agents solve different yet interrelated inference problems, in which case transparency has the potential to create a virtuous circle where all agents become better informed. Transparency makes it easier for private agents to infer the inflation target, thereby anchoring inflation expectations and making it easier for the central bank to infer the natural rate of interest. But if the central bank has better knowledge of the natural rate of interest then policy will be more predictable and private agents will find it easier to infer the inflation target. This exchange of information continues until all the gains from the complementarity of the inference processes have been exploited. A lack of transparency in monetary policy similarly triggers a vicious circle in which the difficulty faced by private agents when trying to infer the inflation target makes it harder for the central bank to infer the natural rate of interest and so on. The strong incentive for transparency we identify is different from that in imperfect common knowledge models first studied by Morris and Shin (2002) and subsequently refined by Angeletos and Pavan (2004, 2007), Hellwig (2006) and Svensson (2006). There the question is whether central bank transparency can reduce or create coordination problems. A similar concern is expressed by Eusepi and Preston (2010), in that lack of transparency may cause self-fulfilling fluctuations if a central bank is uncertain about the state of the economy and firms and households have to learn with an incomplete model. There are no coordination problems or self-fulfilling fluctuations in our model, so the strong incentive for transparency we identify must derive directly from the assumption of asymmetric incomplete information.

Our paper builds on the idea in Aoki and Kimura (2008) that a central bank finds it difficult to infer the state of the economy if private agents are uncertain about the inflation target. Their paper stresses how, in an endowment economy with flexible prices, asymmetric and incomplete information causes unwanted volatility and persistence in inflation. An important limitation of their analysis is that output is exogenous and so by construction unaffected by any inferences made by the central bank and private agents. We relax this assumption by considering a DSGE model where both inflation and output are determined endogenously, and find that asymmetric and incomplete information has first order implications for the stochastic properties of output. Moreover, the unwanted volatility in output is considerably larger than that in inflation. The DSGE model we use draws on earlier work by Erceg and Levin (2003) that shows how inflation becomes persistent if private agents have to learn the inflation target in a DGE model with staggered nominal contracts. Our contribution uses a similar framework but imposes the additional complication that inflation expectations are unobservable, which makes it more difficult for the central bank to infer the natural rate of interest.

The structure of asymmetric and incomplete information we assume implies that the central bank does not have ready access to measures of the inflation expectations of private agents. We find our assumption realistic. Whilst central banks can and do use survey data and information contained in asset prices to quantify the inflation expectations of market participants, such indicators will at best be noisy and at worst may be uncorrelated with the inflation expectations of private agents that actually drive the economy. For example, Bekaert et al. (2010) and Kozicki and Tinsley (2006) disagree in empirical studies as to whether long-run US inflation expectations were 14% or 8% in the late 1970s to early 1980s. Such large discrepancies give credence to our assumption that central banks only have limited information about the inflation expectations of private agents.

An alternative view of our contribution is that it improves our understanding of how forward-looking agents make optimal inferences when faced with only limited information about the state of the economy. The seminal papers in this literature by Pearlman (1986, 1992) and Pearlman et al. (1986) derive optimal monetary policy under incomplete (*partial* in this literature) yet symmetric information. More recent contributions by Aoki (2003) and Svensson and Woodford (2004) solve for optimal policy under asymmetric information, but assume that private agents have complete information so information is only incomplete on the part of the central bank. Whilst we do not address the question of optimal policy in this paper, our analysis allows for information sets that are both incomplete and asymmetric.

The paper is organised as follows: In Section 2 we outline our DSGE model of the economy and specify what information is held by the central bank and private agents. Section 3 describes the interrelated inference problems of the central bank and private agents, and solves for equilibrium dynamics using a variant of the method of undetermined coefficients. A quantitative assessment of the model is provided in Section 4. A final Section concludes.

2. The economic environment

A full characterisation of the economic environment requires us to specify what information different agents hold, how agents make inferences on the basis of that information, and how inferences affect aggregate outcomes in the economy. In this Section we start the process from the last of these, by first describing the DSGE model that maps inferences to outcomes. We then define information sets and add the assumption that agents have rational expectations subject to their information and knowledge of the economy.