



Inflation targeting as a signaling mechanism

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ABSTRACT

This paper theoretically investigates inflation targeting when there is asymmetric information between the Central Bank and the public. The main argument of this study is that the inflation target can be used as a signaling mechanism through which the private sector learns about the private information of the Central Bank about future inflation and output. Thus, inflation targeting increases transparency and this causes the monetary policy actions (changes in the interest rate) to be more effective. I construct a Kalman filter algorithm to analyze the information and learning dynamics between the Central Bank and a representative private-sector agent. An increase (decrease) in the interest rate and the inflation target signals that the Central Bank has private information that inflation and output will be higher (lower) in the future thus the public expect inflation to be higher (lower) in the future. The main results of the paper are as follows. First, the private-sector agents (public) revise their expectations about future inflation and output after observing the actions of the Central Bank: changes in the interest rate and the inflation target. Second, in the case of inflation targeting, the response of inflation to a monetary policy shock (change in the interest rate) is higher than it is in the case of no inflation targeting. So, when there is inflation targeting the interest rate tool of the CB is more effective in decreasing inflation.

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1. Introduction

Since its introduction in New Zealand in 1990, inflation targeting has been adopted by more than 20 countries. As explained in Svensson [28] inflation targeting has three main characteristics: (i) an explicit quantitative inflation target, (ii) a framework for policy decisions, (iii) a high degree of transparency and accountability. This paper investigates the third characteristic, transparency, in the case of asymmetric information between the Central Bank (CB) and the public (private sector). This paper theoretically investigates inflation targeting when there is asymmetric information between the CB and the public. The analysis shows that interest rate is more effective in decreasing inflation under inflation targeting when there is asymmetric information. The main argument of this study is that the inflation target can be used as a signaling mechanism through which the private sector learns about the private information of the CB about future inflation and output. Thus, inflation targeting increases transparency which causes the monetary policy actions (changes in the interest rate) to be more effective. The analysis and the results of this paper provide another mechanism to explain the success of inflation targeting. When there is asymmetric information between the CB and the public, inflation target serves as a signal that the public uses to deduce the private information of the CB about future inflation and

output. Transparency is higher in the inflation targeting case and the interest rate is more effective in decreasing inflation.

This paper takes a novel theoretical approach and shows that inflation targets affect the expectations of the private sector when there is asymmetric information between the Central Bank and the public. It has been empirically shown by Romer and Romer [23] and Sims [27] that the Federal Reserve Bank has superior information about future inflation and output.¹ Starting from these findings, I construct a model of asymmetric information and learning in order to explore the effects of monetary policy on public expectations and future inflation. In this study, monetary policy consists of both determining the interest rate and the inflation target. I use a Kalman filtering algorithm as suggested by Townsend [32] to analyze the learning dynamics and hierarchical information structure between the Fed and a representative private-sector agent. There are three stages of the learning dynamics. First, the CB

¹ Faust, Swanson, and Wright [10] find little evidence that Federal Reserve convey superior information about the state of the economy. But, they argue that "...the policy surprise conveys information not about the state of the economy, but rather about the future course of policy, for which the FOMC has a natural informational advantage". Thus, the Central Bank can still have private information which the private-sector agent would like to deduce. Since, future actions of the Central Bank will affect future inflation and output, it will also affect the expectations of the public. In a forward-looking model this will also affect the current inflation and output through the expectations of the public. I believe that findings of Romer and Romer [23] and Sims [27] and natural informational advantage of the Central Bank about its future actions provide the necessary motivation and evidence about asymmetric information between the CB and public.

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receives private signals about inflation and output, constructs its expectations and uses a forward-looking Taylor rule² to determine the interest rate and uses a forward-looking rule to determine the inflation target. Second, the private-sector agent observes the interest rate and the inflation target and revises her inflation and output expectations.³ Finally, inflation is affected because of these changes in the private-sector agent's expectations⁴ as well as the change in the interest rate. Thus, introducing asymmetric information and learning allows us to analyze the effects of the CB's actions on the expectations of the representative private-sector agent. The main idea of this study is that an increase (decrease) in the interest rate and the inflation target signals that the CB has private information that inflation and output will be higher (lower) in the future, so the public expect inflation to be higher (lower) in the future.

The inflation target has two effects in this model. First, it plays a role in the interest rate decision as it is in the monetary policy rule as shown by Svensson [28]. Second, it affects the expectations of the public and increases transparency as it signals the private information of the CB.

There are studies that use information asymmetry between the Central Bank and the public to investigate the impact of monetary policy surprises. Erceg and Levin [8] formulate a dynamic general equilibrium model with staggered nominal contracts, in which households and firms use optimal filtering to disentangle persistent and transitory shifts in the monetary policy rule. Gurkaynak, Sack, and Swanson [14] present a model in which the Central Bank's inflation target is not directly observed by the private sector and must be inferred by agents on the basis of the Central Bank's actions. They argue that the subsequent adjustment of the private-sector's expectations can explain a significant response of forward rates at long horizons. Svensson and Woodford [30] constructs a model in which the private sector is assumed to have more information about the state of the economy than the policymaker. They present a general characterization of optimal filtering and control in settings of asymmetric information. Honkapohja and Mitra [17] show that when the monetary policy is formulated in terms of a target level, some forms of constant interest rate instrument rules lead to both indeterminacy of equilibria and instability under adaptive learning.

The hierarchical information structure of this paper is modeled using state-space representation as in Townsend [32]. Several studies in the literature use different modeling structures to examine information asymmetry. Hellwig and Veldkamp [16] use a game-theoretical setup to analyze the implications of this hierarchical information structure. Lorenzino [20] analyzes optimal monetary policy when private-sector's uncertainty about economic fundamentals causes fluctuations. In his setup both the Central Bank and the private sector might have imperfect information about economic fundamentals. In a related study Woodford [33] studies optimal monetary policy when the Central Bank has imperfect information about private-sector expectations. This imperfect information is present when private-sector expectations are not model-consistent and cannot be estimated precisely by the Central Bank.

² John Taylor [31] has proposed that the US monetary policy in recent years can be described by an interest rate feedback rule of the form

$$i_t = 0.04 + 1.5(\pi_t - 0.2) + 0.5(y_t - \hat{y}_t)$$

where i_t denotes the Fed's operating target for the federal funds rate, π_t is the inflation rate (measured by the GDP deflator), and y_t is the log of real GDP.

³ The updating of the expectations is a result of the model with asymmetric information and signal extraction.

⁴ Many theoretical (Calvo [3], Svensson [29]) and empirical (Mehra [21], Galí et al. [12]) studies show that expected inflation is a significant determinant of inflation.

The analysis of this paper differs significantly from the studies above in two ways. First, asymmetric information and learning are examined in the context of inflation targeting. The model displays the significant impact of asymmetric information between the CB and the public on the relation between inflation and monetary policy. Second, the source of asymmetric information in those studies is the Central Bank's inflation target. They assume that the inflation target varies over time in order to have learning dynamics in their models. In contrast in this paper, the CB is taken to possess private information about future inflation and output, supported by many empirical studies. Thus, in those studies, asymmetric information plays a different role and the CB's actions affect public expectations through a different mechanism.

The main results of the paper are as follows. First, the private-sector agents (public) revise their expectations about future inflation and output after observing the actions of the CB, changes in the interest rate and the inflation target. In the model, the investors know that the CB possesses private information and that motivates the investors to follow the CB's actions and revise their expectations. An increase (decrease) in the interest rate means that CB expects inflation and output to be higher (lower) in the future. Also, a rise (drop) in the inflation target signals that CB has private information about higher (lower) future inflation and output. Second, in the case of inflation targeting, the response of inflation to monetary policy shocks (changes in the interest rate) is higher than it is in the case of no inflation targeting. Thus, when there is inflation targeting the interest rate tool of the CB is more effective in decreasing inflation. The explanation for this difference in the response of stock returns is as follows. In the inflation targeting case, the positive effect of interest rate on the inflation expectation of the public is lower than the no inflation targeting case. This positive effect is caused by the fact that the CB increases the interest rate because it has private information that inflation and output in the future will be higher. The inflation targeting case is more transparent in the sense that there are two signals that the public can use to deduce the private information of the CB. This result indicates that the success of the inflation targeting in fighting inflation can be caused partly by the extra transparency provided by the inflation target.

The results of this study have implications about the credibility of the CBs that implement inflation targeting. Many studies like Cukierman and Meltzer [6] and Faust and Svensson [9] investigate credibility of a Central Bank. These studies conclude that credibility of a Central Bank significantly effects the policy outcomes. As Blinder [2] and Faust and Svensson [9] emphasize, there are several different definitions of credibility. Cukierman and Meltzer [6] and Faust and Svensson [9] prefer and use the definition "average credibility of announcements". In other words, the difference of the inflation target of the Central Bank and the inflation expectation of the private-sector agent define the "credibility of the CB". As Blackburn and Christensen [1] argue credibility is solely determined by how well a CB has managed to achieve its objectives in the past. The asymmetric information and signaling model developed in this paper indicate that the CB can alter its credibility in two different ways. First, by announcing its inflation target to the public and using the inflation target as a signaling mechanism the CB can impact the inflation expectations of the public. Thus, by using the inflation target as a policy mechanism to disseminate its private information and increase transparency, the CB can decrease uncertainty about future inflation. This will help the CB to achieve its target level of inflation. But the announcement of the inflation target can also diminish the credibility of the CB. By committing to an inflation target the CB becomes vulnerable to external shocks and if it cannot sustain the targeted level of inflation then the credibility of the CB will deteriorate. Demertzis and Viegli [7] support these counter impacts of inflation targeting on

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