Journal of Macroeconomics 40 (2014) 150–158

Contents lists available at ScienceDirect

Journal of Macroeconomics

journal homepage: www.elsevier.com/locate/jmacro

# Discretionary policy exploiting learning in a sticky-information model of the inflation-output trade-off: Bridging the gap to commitment

Christian Jensen *

*University of South Carolina, United States*

ARTICLE INFO

*Article history:*
Received 6 November 2012
Accepted 15 March 2014
Available online 3 April 2014

*JEL classification:*
E52
E61

*Keywords:*
Commitment
Discretion
Learning
Monetary policy
Sticky information

ABSTRACT

When present and past policy is used to learn about policymaking and predict future policy, central banks can exploit this to influence expectations and thereby improve policy without making any commitments. In a sticky-information model of the inflation-output trade-off, we show how the optimal discretionary policy exploiting learning converges towards the optimal commitment rule when the discounted sum of the weights the public's policy-forecasting equation puts on past policy actions converges towards unity. While learning makes the optimal present policy action depend on the policy implemented in the past, the central bank can potentially reduce this dependency by influencing expectations through the public's learning.



## 1. Introduction

In recent years, there has been increasing interest in complementing rational expectations with learning when modeling individuals' beliefs. The motivation is that a lack of knowledge and understanding of the underlying fundamentals driving a phenomenon can make individuals forecast using simpler strategies, at least while they gather information about what they are trying to predict. In particular, this applies to policy forecasts, since information about policymakers' exact objectives and proceedings is not always available to the public. An example is the Taylor-rule, which is probably the most successful description of recent monetary policy in the United States.[1] While this rule is based on knowledge of monetary policymaking, it does not reproduce the policy decision process, which is what rational expectations require. Instead, it uses past policy to obtain a description of the behavior of the federal funds rate.

There is much literature analyzing situations in which the public learns what policy is implemented from the policymakers' present and past actions. Some examples are Bullard and Mitra (2002), Carlstrom and Fuerst (2004) and Evans and Honkapohja (2001, 2003). These study how equilibrium outcomes are affected by individuals learning policy, or rational expectations equilibria, from observing a history of past realizations. Most contributions assume that the

* Address: Department of Economics, University of South Carolina, 1705 College Street, Columbia, SC 29208, United States. Tel.: +1 803 777 2786.
*E-mail address:* cjensen@alumni.cmu.edu

[1] See Judd and Rudebusch (1998), Orphanides (2003), Spencer and Huston (2002) and Taylor (1993, 1999).

http://dx.doi.org/10.1016/j.jmacro.2014.03.004
0164-0704/

implemented policy is unaffected by the learning process, but Evans and Honkapohja (2003) stretch as far as analyzing the implications on optimal policy from the public's expectations being based on learning. However, the effects only go in one direction, from expectations to policy, not from policy to expectations. But, if policymakers' present and past actions are used to learn and forecast their future actions, present policy affects expectations of future policy, and policymakers can, and should, exploit this influence to achieve their objectives better, just as they would if they could affect expectations by credibly committing to future policy. We show how the optimal discretionary policy exploiting learning converges towards the optimal commitment rule when the discounted sum of the weights the public's policy-forecasting equation puts on past policy actions converges towards unity. More generally, the discretionary policy exploiting learning is more similar to the optimal commitment plan the less policymakers discount the future, the more recent the data used to compute the forecasts, and the larger the weight put on the most recent policy actions.

We use a version of the Mankiw and Reis (2002) sticky-information price-setting model where nominal rigidities are caused by information disseminating slowly through the economy. Alternatively, the nominal rigidities can be interpreted as arising from staggered contracts, as in Fischer (1977) and Koenig (1997). We use this framework instead of the New-Keynesian sticky-price model advocated by Calvo (1983), Rotemberg (1982) and Rotemberg and Woodford (1999), because it facilitates obtaining algebraic solutions for the optimal policy exploiting learning. An additional reason for using the sticky-information framework is to diversify monetary policy analysis, which in the recent past has been dominated by the sticky-price model. Jensen (2006) studies many of the issues discussed in the present paper in the context of a New-Keynesian sticky-price model. While the sticky-information model has its shortcomings, see Woodford (2003), the same is true about the sticky-price model, see Ball (1994), Fuhrer and Moore (1995), Mankiw (2001) and Mankiw and Reis (2002). Given the lack of consensus about the precise causes of nominal rigidities, it seems we should diversify by studying alternative models.

The difference between the sticky-price and sticky-information models to a large extent winds down to whether present inflation and output depend on present expectations of future inflation, or past expectations of present inflation. In some cases, such as for standard discretionary policy, this disparity is insignificant and boils down to differences in parameter values. In other situations the expectations dynamics are essential, particularly when policymakers try to influence the public's forecasts through commitment or learning. But, even when expectations affect the optimal policy, the intuition behind the results are often the same across models, so these can be useful outside the particular framework being analyzed. The expectations dynamics do affect the computational tools required to solve for the optimal commitment policies. An additional contribution of the present paper is to provide a method to compute the fully optimal commitment solution in a sticky-information model. The methodology we apply can be used to derive optimal policy in any linear-quadratic policy problem where past expectations of present values affect present outcomes.[2]

Barro (1986) and Rogoff (1987) argue that policymakers with a reputation for implementing the policy that they preannounce can credibly commit to a plan for future policy.[3] As in our learning framework, policy affects expectations in their setup, but in a different way. In a reputational model, policymakers' past actions determine the credibility of the commitment, and only influence expectations by determining the probability the public assigns to the announced policy actually being implemented. With learning there are no announcements, but policy affects expectations because people use it to learn what policy is, and will be, implemented. In one case people learn whether or not they should trust policymakers' announcements, in the other they learn what policy is being implemented, they never trust policymakers' announcements. In a reputational model the standard discretionary policy is not implemented because it would ruin policymakers' good reputation and ability to credibly commit in the future. In our setup the standard discretionary policy is not implemented because it is not the optimal action when present policy is used to learn what policy is, and will be, employed.

The next section introduces a version of the Mankiw and Reis (2002) sticky-information model, and defines a monetary policy problem in terms of inflation and output stabilization. In section three, we decompose the optimal policy to apply policy design, a method traditionally used to derive "optimal simple rules," to solve for optimal unconstrained policies.[4] Sections four and five present and analyze the optimal discretionary and commitment policies, respectively. In section six we assume that individuals' policy forecasts are based on policymakers' present and past actions to demonstrate how this brings the optimal discretionary policy closer to the optimal commitment rule.

## 2. Model

Assuming monopolistically-competing producers go at most $N+1$ periods without updating information, and that their information acquisition follows Taylor (1980), Andrés et al. (2004) show that inflation $\pi_t$ behaves according to

$$\pi_t = \sum_{n=1}^{N} b_n E_{t-n}(\pi_t + cy_t) + ay_t + u_t \tag{1}$$

[2] The methods developed by Currie and Levine (1993) can be applied when present variables depend on present expectations of future values.

[3] See Barro (1986), Rogoff (1987) and McCallum (1990) for discussions on why a reputation might be insufficient for the policymaker to achieve the desired commitment.

[4] See Taylor (1979, 1986), Currie and Levine (1993), and Clarida et al. (1999) for examples of optimal simple rules. The term policy design was coined by Prescott (1977).