A New Commitment

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November 19, 2007

Abstract

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Keywords:

1 Introduction

In economics on many occasions current outcomes depend on expectations about the future. This makes it necessary to convince markets to expect the 'good' from policymakers. Building credibility is seen as a way to help convince markets.

Credibility can be defined in different ways; one way to define it is 'keeping your word.' If you reveal what you expect from people and, moreover, if you behave according to this revelation, even if you are not believed initially, you may able to change people's expectations. In this paper we study the policies of a central bank which is setting the interest rate to minimize a loss function.

Some of the highlights of the paper are:

- We use a New Keynesian model where the central bank sets the interest rate and the private sector sets the expected values of the state variables, which are the inflation rate and the output level.

- There are two solutions to this model depending on the commitment to technology of the central bank. In the seminal paper of Kydland and Prescott (1977), it is shown that the central bank can achieve better results if it commits to a policy rather than trying to exploit the expectations of the private sector.

- In this paper the central bank reveals an inflation rate, π^c, and replaces the expected value of inflation rate with π^c in its policy function. In other words, the central bank announces π^c, saying that this is what it expects the private sector to expect for the inflation rate, and making its policy with π^c.

- The private sector uses a approximating model to set its expected inflation rate. In this approximating model the private sector conditions on the revealed inflation rate, π^c.

- Results: The expected value of the inflation rate, $\widehat{E}\pi_{t+1}$, and the actual value of the inflation rate, π_t, converge to π^c. As long as π^c is in a certain range (in between the highest and the lowest values of the inflation rate in Kydland and Prescott's model) and a convergence condition is satisfied ($\beta + \lambda\phi < 1$ which is satisfied with a reasonable set of parameters), in time, the private sector learns to expect π^c.

2 Model

We first present the model and its solutions under two separate commitment technologies. The model is a New Keynesian model[1],

$$y_t = \widehat{E}y_{t+1} - \phi\left(r_t - \widehat{E}\pi_{t+1}\right) + g_t \tag{1}$$

$$\pi_t = \lambda y_t + \beta\widehat{E}\pi_{t+1} + u_t \tag{2}$$

$$v_t = (g_t, u_t)' = Fv_{t-1} + \epsilon_t$$

where $F = \begin{bmatrix} \mu & 0 \\ 0 & \rho \end{bmatrix}$, $\epsilon_t = (\epsilon_t^g, \epsilon_t^u)'$. π_t denotes the inflation rate, $\widehat{E}$ is the private sector's expected inflation rate based on the previous period's information. $\widehat{E}$ does not necessarily represent rational expectations. y_t is the output gap. β is the discount factor. We assume that $\beta \in (0,1)$, $\lambda > 0$ and $\phi > 0$. The variables g_t and u_t represent demand and supply shocks respectively and it is assumed that $|\mu|$, $|\rho| \in [0,1)$, and $\epsilon_t^i \sim i.i.d.(0, \sigma_i^2)$, for $i = g, u$.

The objective of the central bank (CB) is to minimize its loss function

$$\min E_0 \sum_{t=0}^{\infty} \beta^t \mathcal{L}_t \tag{3}$$

where

$$\mathcal{L}_t = (\pi_t - \overline{\pi})^2 + \alpha (y_t - \overline{y})^2$$

The private sector (PS) determines the expected value of the inflation rate $\widehat{E}\pi_{t+1}$ and the expected value of the output level, $\widehat{E}y_{t+1}$.

2.1 Optimal Policy Under Discretion

We first consider the case where the CB cannot credibly manipulate beliefs in the absence of commitment. The CB takes (PS) expectations as given in solving the optimization problem. Each period the CB chooses y and π to minimize

$$F_t = \min_{\{y_t, \pi_t\}} (\pi_t - \overline{\pi})^2 + \alpha (y_t - \overline{y})^2 + \widehat{E}F_{t+1}$$

subject to

$$\pi_t = \lambda y_t + \beta\widehat{E}\pi_{t+1} + u_t$$

[1] We use a New Keynesian model where the realization of the state variables are dependant on inflation and output expectations. The model is developed by Clarida, Gali and Gertler (1999) as a science of monetary policy. But most of the papers that work on transparency and credibility avoid this paper and use variants of the model of Cukierman and Meltzer (1986). One reason why this model was avoided is the choice variable of the central bank (or the policy maker) is different than the variable which the expectations is taken. This brings some complications but with a new approach, we try to overcome this complication.

taking as given $\widehat{E}F_{t+1}$, $\widehat{E}\pi_{t+1}$and u_t. Under discretion, future inflation and output are not affected by today's actions, and the CB cannot directly manipulate expectations. The first order condition from this minimization is

$$\lambda(\pi_t - \overline{\pi}) + \alpha(y_t - \overline{y}) = 0 \tag{4}$$

Using the optimality condition (4) in (2) we obtain a first order expectational difference equation for π_t

$$\pi_t = \frac{\lambda(\alpha\overline{y} + \lambda\overline{\pi})}{\alpha + \lambda^2} + \frac{\alpha\beta}{\alpha + \lambda^2}\widehat{E}\pi_{t+1} + \frac{\alpha}{\alpha + \lambda^2}u_t \tag{5}$$

Using equations (4) and (5) we can obtain an expression for y_t:

$$y_t = \delta_1 - \delta_2\widehat{E}\pi_{t+1} - \delta_3 u_t \tag{6}$$

where $\delta_1 = \frac{\alpha\overline{y}+\lambda\overline{\pi}}{\alpha+\lambda^2}$, $\delta_2 = \frac{\lambda\beta}{\alpha+\lambda^2}$ and $\delta_3 = \frac{\lambda}{\alpha+\lambda^2}$

Finally, combining (6) and (1) we obtain the optimal interest rate target rule of the central bank:

$$r_t = -\frac{\alpha\overline{y} + \lambda\overline{\pi}}{\phi(\alpha + \lambda^2)} + \left(\frac{\lambda\beta}{\phi(\alpha + \lambda^2)} + 1\right)\widehat{E}\pi_{t+1} + \frac{1}{\phi}\widehat{E}y_{t+1} + \frac{1}{\phi}g_t + \frac{\lambda}{\phi(\alpha + \lambda^2)}u_t \tag{7}$$

Using equations (1), (2) and (7) we can write this system in a matrix form as:

$$x_t = A + B\widehat{E}x_{t+1} + Du_t \tag{8}$$

where $x_t = (\pi_t, y_t)'$, $A = \begin{pmatrix} \lambda\delta_1 \\ \delta_1 \end{pmatrix}$, $B = \begin{pmatrix} \beta - \lambda\delta_2 & 0 \\ -\delta_2 & 0 \end{pmatrix}$, $D = \begin{pmatrix} \alpha\lambda^{-1}\delta_3 \\ -\delta_3 \end{pmatrix}$

The steady state of the model under discretion is

$$\pi^{dis} = \frac{\lambda\delta_1}{1-\beta+\lambda\delta_2} \qquad y^{dis} = \delta_1 - \frac{\lambda\delta_1\delta_2}{1-\beta+\lambda\delta_2}$$

2.2 Optimal Policy Under Commitment

We now consider the case where the central bank can credibly commit to future policies. Thus, private sector expectations are not taken as given but are instead considered as variables that can be influenced to achieve policy objectives. Optimal monetary policy in this commitment case amounts to minimization of (3) subject to (2) holding in every period. The first order conditions from this minimization problem can be rearranged to yield

$$\lambda(\pi_t - \overline{\pi}) + \alpha(y_t - y_{t-1}) = 0 \tag{9}$$

From (2) and (9) we get

$$y_t = \frac{\lambda}{\alpha + \lambda^2}\left(\overline{\pi} + \frac{\alpha}{\lambda}y_{t-1} - \beta\widehat{E}\pi_{t+1} - u_t\right)$$

which combined with (1) gives the policy rule

$$r_t = -\frac{\lambda\overline{\pi}}{\phi\left(\alpha+\lambda^2\right)} - \frac{\alpha}{\phi\left(\alpha+\lambda^2\right)} y_{t-1} + \left(\frac{\lambda\beta}{\phi\left(\alpha+\lambda^2\right)} + 1\right)\widehat{E}\pi_{t+1} + \frac{1}{\phi}\widehat{E}y_{t+1} + \frac{1}{\phi}g_t + \frac{\lambda}{\phi\left(\alpha+\lambda^2\right)}u_t \tag{10}$$

Equations (1), (2) and (10) represent the economic system under commitment, given private sector expectations. We can rewrite this system in matrix form

$$x_t = A + B\widehat{E}x_{t+1} + Cx_{t-1} + Du_t \tag{11}$$

where $x_t = (\pi_t, y_t)'$ and $A = \begin{pmatrix} \frac{\lambda^2\overline{\pi}}{\alpha+\lambda^2} \\ \frac{\lambda\overline{\pi}}{\alpha+\lambda^2} \end{pmatrix}$, $B = \begin{pmatrix} \frac{\alpha\beta}{\alpha+\lambda^2} & 0 \\ \frac{-\lambda\beta}{\alpha+\lambda^2} & 0 \end{pmatrix}$, $C = \begin{pmatrix} 0 & \frac{\alpha\lambda}{\alpha+\lambda^2} \\ 0 & \frac{\alpha}{\alpha+\lambda^2} \end{pmatrix}$, $D = \begin{pmatrix} \frac{\alpha}{\alpha+\lambda^2} \\ \frac{-\lambda}{\alpha+\lambda^2} \end{pmatrix}$

The steady state values for inflation and output are

$$\pi^{com} = \overline{\pi} \quad y^{com} = \tfrac{1-\beta}{\lambda}\overline{\pi}$$

3 Dynamics

3.1 Expectational Stability

In this model the realization of the state variables depend on the expected future value of those variables. This means that we need to define how the expected value of these variables are determined. The strongest possible assumption, rational expectations, may not be reasonable for a dynamic world. We frequently observe shocks or sometimes structural changes which prevent agents from predicting the true inflation rate. A weaker assumption is to use learning models to see if agents can learn the rational expectations equilibrium over time. In the context of Evans and Honkapohja (2003) agents do not know the true parameters of the structural model but try to deduce them via regressions of past data. The current iteration of the regression is used to make decisions in each period. Next period when new information (data) is available to agents, they take another regression. If the model converges to the rational expectations equilibrium, the equilibrium is said to be e-stable (Evans and Honkapohja (2003)).

4 Model with a Revealed Commitment

There can be many ways to influence people. One way is to tell them what you expect them to do. Moreover, if you behave according to what you expect from them this should be a stronger way of influencing people. Making monetary policy requires influencing people to achieve lower inflation rates. A commitment to a certain inflation rate is an influence itself if you reveal this commitment to the PS. In this second part of the paper we would like to see the effects of a commitment to a certain inflation rate when the PS weighs the announced commitment.

We assume that the CB commits to an inflation rate, π^c, and reveals this value to the PS. In a way the CB announces its commitment to an inflation rate π^c with the expectation that the PS will believe in this announcement and expect an inflation rate of π^c. We would like to see if the CB can achieve better results with this strategy. We use the New Keynesian model presented with (1), (2) and (3). Again we solve the model under two conditions, discretion or commitment.

4.1 Optimal Policy Under Discretion

We first consider the case where the central bank reveals its commitment to π^c but cannot commit to future policies. The CB takes PS expectations as given in solving the optimization problem. In fact the CB is using the same minimization problem given in section 2.1. The CB also derives the same policy function given in (7). The CB announces its commitment to an inflation rate, π^c, and makes policy as if this will be the PS's expected inflation rate. This way the CB is trying to influence PS to make them expect an inflation rate of π^c. Accordingly the policy function of the CB will be

$$r_t = -\frac{\alpha\overline{y} + \lambda\overline{\pi}}{\phi\left(\alpha + \lambda^2\right)} + \left(\frac{\lambda\beta}{\phi\left(\alpha + \lambda^2\right)} + 1\right)\pi^c + \frac{1}{\phi}\widehat{E}y_{t+1} + \frac{1}{\phi}g_t + \frac{\lambda}{\phi\left(\alpha + \lambda^2\right)}u_t \quad (12)$$

The difference of this policy function is that $\widehat{E}\pi_{t+1}$ is replaced with π^c. Using equations (1), (2) and (12) we can write this system in a matrix form as:

$$x_t = A + B\pi^c + C\widehat{E}x_{t+1} + Du_t \quad (13)$$

where $x_t = (\pi_t, y_t)'$, $A = \begin{pmatrix} \lambda\delta_1 \\ \delta_1 \end{pmatrix}$, $B = \begin{pmatrix} -\lambda\delta_2 - \lambda\phi \\ -\delta_2 - \phi \end{pmatrix}$, $C = \begin{pmatrix} \beta + \lambda\phi & 0 \\ \phi & 0 \end{pmatrix}$, $D = \begin{pmatrix} 1 - \lambda\delta_3 \\ -\delta_3 \end{pmatrix}$

The steady state of this system is where $\widehat{E}\pi_{t+1} = \pi_t = \pi^c$, $\widehat{E}y_{t+1} = y_t$ and given as

$$\pi_{rc}^{dis} = \frac{\lambda\delta_1}{1-\beta+\lambda\delta_2} \qquad y_{rc}^{dis} = \delta_1 - \frac{\lambda\delta_1\delta_2}{1-\beta+\lambda\delta_2}$$

or $\pi_{rc}^{dis} = \frac{\lambda(\alpha\overline{y}+\lambda\overline{\pi})}{\alpha(1-\beta)+\lambda^2}$ in a more explicit form. The subscript "rc" is for "revealed commitment". The steady state of this system is not different than the steady state of the section where the CB uses $\widehat{E}\pi_{t+1}$ instead of π^c in its policy function, $\pi_{rc}^{dis} = \pi^{dis}$ and $y_{rc}^{dis} = y^{dis}$.

The Choice of π^c

The CB chooses π^c in between the inflation rate under discretion and inflation rate under full commitment (commitment to the rational expectations level). We do not specify a value for π^c but only a range. Nevertheless this value is less than π^{dis}, the highest level of inflation. The CB announces its commitment to the inflation rate π^c with the expectation that the PS will believe in its commitment. We will specify the learning of the PS later in the paper.

Stages of the Game

The CB makes a commitment to an inflation rate, π^c. Then the CB announces (or reveals) it commitment to the PS. We don't specify how π^c will be chosen other than the fact that it is a value in between the inflation rate under discretion and under commitment. After observing π^c the PS builds its inflation expectations using the following equation

$$\widehat{E}x_{t+1} = \Gamma_0 + \Gamma_1 u_t + \Gamma_2 \pi^c \tag{14}$$

where the Γ values will be determined using recursive least squares. $\Gamma_0 = \begin{pmatrix} \gamma_0^\pi \\ \gamma_0^y \end{pmatrix}$, $\Gamma_1 = \begin{pmatrix} \gamma_1^\pi \\ \gamma_1^y \end{pmatrix}$, $\Gamma_2 = \begin{pmatrix} \gamma_2^\pi \\ 0 \end{pmatrix}$.

4.1.1 Learning The Inflation Rate

Assume that the PS is learning the inflation rate with (14). When substituted into (13) we get

$$x_t = A + B\pi^c + C\Gamma_0 + C\Gamma_1 u_t + C\Gamma_2 \pi^c + Du_t$$

$$x_t = A + C\Gamma_0 + (C\Gamma_1 + D)\, u_t + (B + C\Gamma_2)\, \pi^c$$

Iterate one period forward and take the expectation to get

$$\widehat{E}x_{t+1} = A + C\Gamma_0 + (C\Gamma_1 + D)\, \rho u_t + (B + C\Gamma_2)\, \pi^c \tag{15}$$

Since the CB is committed to an inflation rate we assume that this commitment continues and the PS is aware of this commitment.

4.1.2 The E-Stability

The perceived law of motion, (14), and the actual law of motion, (15), of the expected values of the inflation rate and output level can be written explicitly in the following forms

$$\begin{aligned} \widehat{E}\pi_{t+1} &= \gamma_0^\pi + \gamma_1^\pi u_t + \gamma_2^\pi \pi^c \\ \widehat{E}y_{t+1} &= \gamma_0^y + \gamma_1^y u_t \end{aligned}$$

$$\begin{pmatrix} \widehat{E}\pi_{t+1} \\ \widehat{E}y_{t+1} \end{pmatrix} = \begin{pmatrix} \lambda\delta_1 + (\beta + \lambda\phi)\,\gamma_0^\pi \\ \delta_1 + \phi\gamma_0^\pi \end{pmatrix} + \begin{pmatrix} (\beta + \lambda\phi)\,\gamma_1^\pi + 1 - \lambda\delta_3 \\ \phi\gamma_1^\pi - \delta_3 \end{pmatrix} \rho u_t + \begin{pmatrix} -\lambda\delta_2 - \lambda\phi + (\beta + \lambda\phi)\,\gamma_2^\pi \\ -\delta_2 - \phi + \phi\gamma_2^\pi \end{pmatrix} \pi^c$$

Using the ALM and the PLM, we can get the following steady state values for coefficient vector γ^π.

$\gamma_0^{\pi} = \frac{\lambda\delta_1}{1-\beta-\lambda\phi}$
$\gamma_1^{\pi} = \frac{\rho(1-\lambda\delta_3)}{1-(\beta+\lambda\phi)\rho}$
$\gamma_2^{\pi} = \frac{-\lambda\delta_2-\lambda\phi}{1-\beta-\lambda\phi}$

The steady state of inflation rate $\widehat{E}\pi_{t+1}$ is $\frac{\lambda\delta_1}{1-\beta-\lambda\phi} + \frac{-\lambda\delta_2-\lambda\phi}{1-\beta-\lambda\phi}\pi^c$. When substituted into (13) we get the same steady state for π_t. We define this state in the following definition.

Definition 1 *The steady state of the T-map from (14) to (15) gives the learned inflation rate, π^l, and its value is derived as* $\frac{\lambda\delta_1}{1-\beta-\lambda\phi} + \frac{-\lambda\delta_2-\lambda\phi}{1-\beta-\lambda\phi}\pi^c$

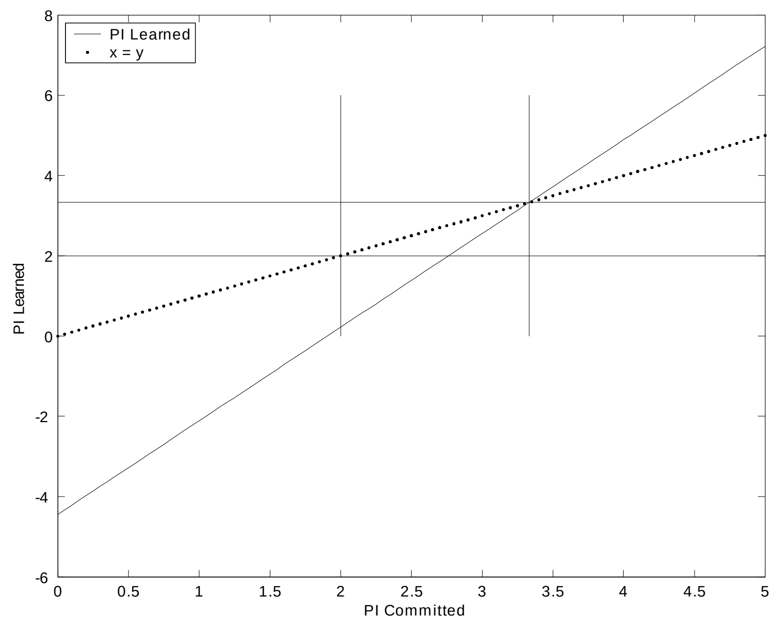

Figure 1: The graph of the learned inflation rate

It can be shown that π^l is always less than π^{dis} for all possible values of π^c in between its steady state under discretion and under commitment, π^{dis} and π^{com}. Figure 1 is the graph of π^l. The two horizontal lines are for the inflation rate under discretion, the higher one and the inflation rate under commitment, the lower one. The two vertical lines are for the values of inflation under discretion and under commitment. As it can also be seen on the graph the learned inflation rate is always under the inflation rate under discretion. This shows that with commitment and announcement the CB can achieve better results. The steady state of the system is less than the highest value of inflation does not mean that this steady state is learnable. We present this result in the next proposition.

Proposition 1 *The steady state of the T-map from (14) to (15) is E-stable provided $\beta + \lambda\phi < 1$. The central bank achieves lower inflation rate when it commits to a inflation rate (making policy with this committed inflation rate) and reveals its commitment to private sector where the private sector conditions on this committed inflation rate in their learning dynamics.*

4.2 Optimal Policy Under Commitment

We now consider the case where the central bank can credibly commit to future policies. Thus, private sector expectations are not taken as given but instead considered as variables that can be influenced to achieve policy objectives. Optimal monetary policy in this commitment case amounts to minimization of (3) subject to (2) holding in every period. The CB also derives the same policy function given in (10). The difference of this section is the CB announces its commitment to an inflation rate, π^c, and makes policy as if this will be the PS's expected inflation rate. This way the CB is trying to influence PS to make them expect an inflation rate of π^c. Accordingly the policy function of the CB will be

$$r_t = -\frac{\lambda\overline{\pi}}{\phi\left(\alpha+\lambda^2\right)} - \frac{\alpha}{\phi\left(\alpha+\lambda^2\right)} y_{t-1} + \left(1 + \frac{\lambda\beta}{\phi\left(\alpha+\lambda^2\right)}\right)\pi^c + \frac{1}{\phi}\widehat{E}y_{t+1} + \frac{1}{\phi}g_t + \frac{\lambda}{\phi\left(\alpha+\lambda^2\right)}u_t \tag{16}$$

The difference of this policy function is that $\widehat{E}\pi_{t+1}$ is replaced with π^c. Using equations (1), (2) and (16) we can write this system in a matrix form as

$$x_t = A + Bx_{t-1} + C\pi^c + D\widehat{E}\pi_{t+1} + Fu_t \tag{17}$$

where $x_t = (\pi_t, y_t)'$ and $A = \begin{pmatrix} \frac{\lambda^2\overline{\pi}}{\alpha+\lambda^2} \\ \frac{\lambda\overline{\pi}}{\alpha+\lambda^2} \end{pmatrix}$, $B = \begin{pmatrix} 0 & \frac{\alpha\lambda}{\alpha+\lambda^2} \\ 0 & \frac{\alpha}{\alpha+\lambda^2} \end{pmatrix}$, $C = \begin{pmatrix} -\lambda\phi - \frac{\beta\lambda^2}{\alpha+\lambda^2} \\ -\phi - \frac{\beta\lambda}{\alpha+\lambda^2} \end{pmatrix}$, $D = \begin{pmatrix} \beta+\lambda\phi & 0 \\ \phi & 0 \end{pmatrix}$, $F = \begin{pmatrix} \frac{\alpha}{\alpha+\lambda^2} \\ \frac{-\lambda}{\alpha+\lambda^2} \end{pmatrix}$

4.2.1 Learning the Inflation Rate

Assume that the PS is learning the inflation rate with the following structural equation

$$\widehat{E}x_{t+1} = \Gamma_0 + \Gamma_1 u_t + \Gamma_2 x_{t-1} + \Gamma_3\pi^c \tag{18}$$

where $\Gamma_0 = \begin{pmatrix} \gamma_0^\pi \\ \gamma_0^y \end{pmatrix}$, $\Gamma_1 = \begin{pmatrix} \gamma_1^\pi \\ \gamma_1^y \end{pmatrix}$, $\Gamma_2 = \begin{pmatrix} 0 & \gamma_2^\pi \\ 0 & \gamma_2^y \end{pmatrix}$, $\Gamma_3 = \begin{pmatrix} \gamma_3^\pi \\ 0 \end{pmatrix}$. This is a minimal state variable (MSV) solution since it has the minimum number of variables needed. The system (17) includes the commitment of the central bank which implies that the PS should include the commitment of the CB in their learning equation. Substituting into (17) yields

$$x_t = A + Bx_{t-1} + C\pi^c + D\Gamma_0 + D\Gamma_1 u_t + D\Gamma_2 x_{t-1} + D\Gamma_3\pi^c + Fu_t$$

$$x_t = A + D\Gamma_0 + (B + D\Gamma_2)\, x_{t-1} + (C + D\Gamma_3)\, \pi^c + (D\Gamma_1 + F)\, u_t \qquad (19)$$

Iterate one period forward and take the expectation to get

$$\widehat{E}x_{t+1} = A + D\Gamma_0 + (B + D\Gamma_2)\, x_t + (C + D\Gamma_3)\, \pi^c + (D\Gamma_1 + F)\, \rho u_t \qquad (20)$$

We should substitute the value of x_t from (19). This gives the end point of the T-map

$$\begin{aligned} \widehat{E}x_{t+1} &= A + D\Gamma_0 + (B + D\Gamma_2)\,(A + D\Gamma_0) \\ &\quad + (B + D\Gamma_2)\,(B + D\Gamma_2)\, x_{t-1} \\ &\quad + \left[(C + D\Gamma_3) + (B + D\Gamma_2)\,(C + D\Gamma_3)\right] \pi^c \\ &\quad + \left[(D\Gamma_1 + F)\, \rho + (B + D\Gamma_2)\,(D\Gamma_1 + F)\right] u_t \end{aligned}$$

$\Gamma_0 = A + D\Gamma_0 + (B + D\Gamma_2)\,(A + D\Gamma_0)$
$\Gamma_1 = (D\Gamma_1 + F)\,\rho + (B + D\Gamma_2)\,(D\Gamma_1 + F)$
$\Gamma_2 = (B + D\Gamma_2)\,(B + D\Gamma_2)$
$\Gamma_3 = (C + D\Gamma_3) + (B + D\Gamma_2)\,(C + D\Gamma_3)$

From the third equation, equation of γ_2, we get two values for γ_2. Once we get a steady state value for γ_2 we can get unique values for the other γ values. This means that there are two possible steady states for the commitment case.

5 Conclusion

Expectations of future variables are very important when making monetary policy. Probably this is the most important reason why Economics is not simply a field of engineering. You cannot engineer the economy as you engineer a building or an electrical circuit, for they are governed by known deterministic laws. Economics deals with human behavior, which is often compared with chaotic behavior. That is why considering inflation expectations is very important. In this paper we explore different ways of influencing people.

In the first part of the paper we showed that it is not possible to influence the people unless you have perfect knowledge of their behavior. But even if you do not have that perfect knowledge, which method you use matters since it takes different times to observe the convergence to the Nash equilibrium. In the second part we applied a basic human behavior to monetary policy: you reveal what you expect from people and you behave according to this revelation. We have seen that the CB can achieve lower inflation rates with this kind of commitment.

We would like to extend this work by using a Kalman filter to determine the expected inflation rate in the second part of the paper. There has been much work on central bank policies and for sure there will be much more coming. The way monetary policy is made is much different than how it was made 30 years ago and it will be different 30 years from now too.