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A NOTE ON RULES VERSUS DISCRETION DEBATE IN THE CONDUCT OF MONETARY POLICY*

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ABSTRACT

This paper, using straightforward calculus, analyzes the relevance of commitment in monetary policy. Lucas supply function has played a central role in the rules versus discretion debate. A generalized representation of Lucas supply function is presented, in order to investigate the role of supply function in the debate. Specifically, if both unanticipated and anticipated inflation rates affect the real output the relevance of commitment in the debate depends on the coefficients of the supply function.

ÖZET

Kurallar-Bağlayıcı Olmayan Ayarlanabilir Para Politikası Tartışması Üzerine Bir Not

Modern ekonomik politika teorisi literatüründe çeşitli politika ortamlarında elde edilen sonuçların karşılaştırılması, yoğun biçimde incelenen konulardan birisidir. Bu makalede, basit matematiksel teknikler yardımıyla, bağlayıcı sabit politika lehine oluşmuş genel yargının anlamlılığı değerlendirilmektedir. Lucas arz fonksiyonunun kurallar-bağlayıcı olmayan ayarlanabilir politika tartışmasında oynadığı rolün belirlenebilmesi için genelleştirilmiş şekli kullanılmaktadır. Hem öngörülen hem de öngörülmedik enflasyon oranları 'output'u etkilediği takdirde, bağlayıcı-sabit politika

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ortamının bağlayıcı olmayan ortamdan daha iyi sonuç yaratıp yaratmadığının arz fonksiyonundaki katsayılara bağlı olduğu gösterilmektedir.

1. INTRODUCTION

The motive of engaging in discretionary monetary policy is rather simple, but consequences are not. A focal point of analysis of its social impact has been on the supply function; and few general rules advanced can be applied to two different situations: i) only unanticipated changes in nominal variables (for example the rate of inflation) affect real variables (for example real output); ii) both unanticipated and anticipated change in nominal variables (for example the rate of inflation) affect real variables (for example output rate).

Regarding the first case, discretion dominated rules in the conduct of monetary policy until 1977[1]. A new framework in the rules versus discretion debate developed from the dynamic inconsistency literature was introduced to monetary economics by Kydland and Prescott (1977) and developed further by Barro and Gordon (1983a, 1983b). This new framework completely changed the debate by showing that commitment by monetary authorities could improve the behavior of the economy.

In this paper we analyze the second case in the conduct of monetary policy. Regarding this case, the circumstances under which commitment by monetary authorities could actually improve the behavior of the economy was investigated. We address the relevance of commitment policy in the rules versus discretion debate by presenting a simple example.

2. AN EXAMPLE

Suppose the policy-maker evaluates the result of monetary policy according to a single period loss function, quadratic in the rate of inflation (π) and in the deviation of real output level (y) from a target value of the following form:[2]

$$L(.) = E\{ a\pi^2 + (y-y^*)^2\},\ a>0,\ y^*>0, \qquad (1)$$

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[1] See Fischer, (1990) for a survey.

[2] The same structure was used to define the preferences of policy-maker in the conduct of monetary policy by Kydland and Prescott (1977), Barro and Gordon (1983a, b), Canzoneri (1985), Rogoff (1985) and many others.

where E is an expectation operator, y represents real output level, where y^* its target value, and π is the rate of inflation. The policy instrument is the rate of inflation in the current period.

Following the innovative assumption introduced by Barro (1977), Mishkin (1982, 1983) and Frydman and Rapport (1987), it is assumed that the augmented Phillips Curve describes the relationship between the real output level and the rate of inflation during each period with

$$y=\bar{y} + b(\pi - \pi^e) + c\pi^e - \varepsilon,\ b>0 \text{ and } c>0. \qquad (2)$$

where $\bar{y}$ is natural level of real output and π^e is rational expectation of the rate of inflation. For simplicity, it is assumed that the natural output level is equal to zero (i.e., $\bar{y}=0$).[3] Thus augmented Phillips curve (supply function) becomes $y=b(\pi - \pi^e) + c\pi^e - \varepsilon$. It is also assumed that the target value of real output level is greater than the natural level of output (by assuming $y^*>0$). The difference between the target value of real output level and the market generated natural level of real output may be explained by the existence of various distortions in the labor market. These distortions in the labor market keep the real output level below the natural level.[4] The loss function $L(.)$ is consistent with the single period utility function of private agents. ε is a stochastic term with mean zero and variance σ^2. This general framework captures several special cases studied in the literature. For example if $c=0$ and $b\neq0$, then (2) is no different from the Lucas model; if $b=c\neq0$ then (2) is the same as the model presented by Frydman and Rapport (1987), where distinction between anticipated and unanticipated inflation is irrelevant in explaining aggregate output; if $c>0$ and $b>0$ then (2) turns into both unanticipated and anticipated inflation affecting aggregate output.[5]

Policy-maker has chosen a policy rule instead of a policy action since model is stochastic. A policy rule is a transformation from the policy-makers' information set to the set of possible policy actions, i.e., it is a stage-contingent strategy in game theoretic terms. The policy rule is defined as a linear function of ε since model has a quadratic form,

$$\pi(\varepsilon) = \bar{k} + k\varepsilon \qquad (3)$$

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[3]This assumption is not necessary for analysis, however it simplifies the calculations.

[4]See for example, Barro and Gordon (1983a, b), McCallum (1995), Fischer (1995a, b).

[5]See Mishkin, (1983).

We describe the optimal choice of coefficient $\bar{k}$ and k in two different policy environments: i) commitment environment in which policy-maker commits to a choice of $\bar{k}$ and k in advance; ii) discretionary environment in which the choice of $\bar{k}$ and k is made after or simultaneously with the determination of nominal wages. It is assumed that private agents are atomistic, each agent neglects any effect of his own choice on policy. Atomistic means that each agent is small enough to ignore the effect of his own choice on economy wide variables. Therefore, there is no need to make any distinction between the situation when policy is chosen after the determination of nominal wages, and the situation when the policy is chosen simultaneously in the discretionary environment.

In the discretionary environment the private information set is irrelevant, since the realization of ε is not observed. Therefore, there is no meaningful distinction between a rule and action for setting nominal wages. That is, private strategies are not stage-contingent. However, in the commitment environment the information set of the private sector includes policy-makers choice of $\bar{k}$ and k. Thus the wage strategy is contingent on the two coefficients in the commitment environment.

A. Equilibrium policy with commitment

In literature this equilibrium concept is referred to as Stackelberg equilibrium, with the policy-maker as a dominant player. In this environment, it is assumed that policy-maker commits to a rule of the form of (3) before nominal wages are set. The equilibrium is defined by two conditions: i) given any policy-maker's policy rule, the nominal wage is optimal for wage setters; ii) policy-maker's policy rule is optimal for any realization of ε given the reaction function of wage setters as being defined in (i). The equilibrium is computed by working backward as in Stackelberg game: To obtain the solution of the model under commitment first, substitute $\pi^e = \bar{k}$ into (2) and resulting value into (1) and secondly, minimize (1) with respect to $\bar{k}$ and k. The equilibrium stage-contingent inflation rate with commitment is given by

$$\pi_r(\varepsilon) = (a+c^2)^{-1} cy^* + b(a+b^2)^{-1}\varepsilon, \qquad (4)$$

where r represents "commitment". The corresponding output level is obtained by substituting (4) into (2) as

$$y_r = (a+c^2)^{-1} c^2 y^* - a(a+b^2)^{-1}\varepsilon, \qquad (5)$$

The value of the loss function under the commitment regime is as follows:

$$L_r = (a+c^2)^{-2}(ac^2+a^2)y^{*2} + (a+b^2)^{-2}(ab^2+a^2)\sigma^2. \qquad (6)$$

B. Equilibrium policy with discretion

In literature this equilibrium concept is referred to as Nash equilibrium. In this environment, it is assumed that both players select a best response to the strategy of opponent. Two conditions define the equilibrium: i) the nominal wage is optimal for wage setters given the equilibrium policy-maker's policy rule; ii) the policy rule is optimal for any ε given the equilibrium nominal wage.

The equilibrium stage-contingent inflation rate with discretion is computed in few steps. First, substitute (3) into (1). Second, minimize it with respect to k and $\bar{k}$. By using rational expectations the equilibrium inflation rate under discretion is given by

$$\pi_d(\varepsilon) = (a+bc)^{-1} by^* + b(a+b^2)^{-1}\varepsilon, \qquad (7)$$

where subscript d represents "discretion" . The corresponding output level is obtained by substituting (7 into (2) as

$$y_d = (a+bc)^{-1} bcy^* + a(a+b^2)^{-1}\varepsilon, \qquad (8)$$

The value of the loss function under discretionary regime is obtained by substituting (7) and (8) into (1) as

$$L_d = (ab^2+a^2)(a+bc)^{-2}y^{*2} + (ab^2+a^2)(a+b^2)^{-2}\sigma^2. \qquad (9)$$

3. Is commitment better than discretionary?

It is difficult to enter into binding policy commitment for policy-maker in the real world environment. Contingent rule of the form (3) may be difficult to enforce, since they are contingent on private information of the government. Furthermore, in real world, the optimal contingent rule may be difficult to characterize, or may not be constant through time. For example, it is hard to know the statistical distributions of some events like wars or big movements in oil prices. In these situations, it is really hard to specify supply function. However, a choice between commitment policy and discretionary policy is ambiguous. Our aim is to find the circumstances when the policy-maker should commit:

$$\pi(\varepsilon) = (a+c^2)^{-1} cy^* + b(a+b^2)^{-1}\varepsilon, \qquad (10)$$

When $c=0$ and $b\neq 0$, the following well-known proposition is obtained.

Proposition 1 (Kydland-Prescott and Barro-Gordon): If $c=0$ and $b\neq 0$ then commitment policy is better than discretionary policy, i.e., $L_r<L_d$

Proposition 1 can be used to predict the policy-maker's policies with respect to the rate of inflation only when the unanticipated inflation rates affect the real output level. However, the applicability of Proposition 1 is still limited. When both unanticipated and anticipated inflation rates affect real output level, it is unlikely that commitment in monetary policy is better than discretion. To analyze this later case, we first assume that both unanticipated and anticipated inflation rates affect the real output level. Hence whether discretion is worse than commitment depends on the parameters *b* and *c* of the model.

Considering the situation where both unanticipated and anticipated inflation rates affect the output level if $0 \neq c < b$, we will obtain the result in Proposition 1 (i.e., $L_r < L_d$).

Proposition 2 If both unanticipated and anticipated inflation rates affect the level of real output, and $b<c$, discretionary policy is better than commitment policy in the conduct of monetary policy i.e., $L_d < L_r$

Proposition 2 indicates that the rules versus discretion debate in economic literature, which has been discussed only in situations where unanticipated inflation affects the level of real output, may be partially generalized to include situations where both unanticipated and anticipated inflation affect the real variables. In particular, consider the case where *b* and *c* are not equal to zero, both unanticipated and anticipated inflation rates affect the real output level, and $b<c$. Proposition 2 indicates that the commitment in monetary policy is worse than the discretion in monetary policy.

4. CONCLUDING REMARKS

This paper, using straightforward calculus, analyzes the rules versus discretion debate in monetary policy. In the existing literature, the common idea is that commitment could improve the behavior of the economy. This paper shows that this conclusion, in general, is not true. A modified representation of Lucas supply function to describe the economy had thus been presented. The objective of this modification is to demonstrate relevance of commitment policy in conducting monetary policy. If the supply function is not restricted to a particular class, the example presented above clearly demonstrates that the commitment policy is worse than the discretionary policy. Further, the traditional result that the commitment policy is better than the discretionary policy can be obtained under certain restrictions on the coefficients of the model.

This result adds to the rules versus discretion debate in providing general criterion when both unanticipated and anticipated inflation rates affect the real output. In particular, the present analysis, for the first time,

underlines the importance of the specification of supply function in the conduct of monetary policy.

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