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CENTRAL BANK INDEPENDENCE

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ABSTRACT

This paper argues, first, that it is inappropriate to presume that central banks will, in the absence of any tangible precommitment technology, inevitably behave in a "discretionary" fashion that implies an inflationary bias. Furthermore, there is no necessary tradeoff between "flexibility and commitment." Second, to the extent that the absence of any precommitment technology is nevertheless a problem, it will apply to a consolidated central bank-plus-government entity as well as to the central bank alone. Thus contracts between governments and central banks do not overcome the motivation for dynamic inconsistency, they merely relocate it. Several implications are discussed.

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1. Introduction

An important body of literature has been developed over the past several years on institutional arrangements for central banks, with emphasis devoted to issues regarding the effects of central bank independence. Notable contributions to this literature have been made by a number of authors,¹ most of whom have built upon the pioneering analysis of rules vs. discretion developed by Kydland and Prescott (1977) and the insightful extension of Barro and Gordon (1983a).² In particular, the more recent studies have considered alternative arrangements, such as the appointment of a "conservative" central bank governor or the implementation of a contract between a nation's government and its central bank, that might leave the latter free to pursue activist countercyclical stabilization policy while simultaneously inducing it to avoid the inflationary bias of "discretionary" monetary policymaking as identified by Kydland and Prescott or Barro and Gordon.

Interesting and ingenious as this literature is, however, it is the contention of a recent paper of mine (McCallum, 1995) that it is significantly flawed--perhaps critically so--by two fallacies pertaining to fundamental conclusions of the analysis. The two disputed conclusions are that the absence of any precommitment technology makes it infeasible for an independent central bank to avoid an excessive inflation rate and that contracts imposed upon central banks by governments can solve the problem of dynamic inconsistency. The claim is not that the literature contains technical errors, it should be noted, but instead that it features inappropriate interpretive mappings between analytical constructs and real world institutions. Consequently, some readers might object to my use of the term "fallacies." It is my belief, however, that the more creative part of economic analysis lies in the specification of a model to satisfactorily

represent the phenomena under investigation, rather than in the manipulation of given models. And from that perspective, an inappropriate mapping between a model and reality can constitute at least as serious a mistake as an error in logic, so the strong term seems warranted--especially since the particular points at issue involve crucial features of the analysis of central bank independence. But whatever the terminology, the purposes of the present paper are to review and extend the argument of my previous piece,³ which is very brief, and to point out some practical implications.

Organizationally, Section 2 is devoted to the specification of an analytical setup, with the two fallacies then described in Sections 3 and 4. Section 5 discusses some practical implications and provides a short summary.

2. Analytical Setting

In expositing the argument, it will be useful to have at hand for easy reference a model of the type typically used in the literature. For that purpose, let us adopt a setup similar to the one expositied by Blanchard and Fischer (1989, pp. 596-614), but with a central bank objective that looks into the infinite future.⁴ Thus we assume that at time t the central bank (CB, for short) wishes to minimize

$$(1) \quad E_t(L_t + bL_{t+1} + b^2L_{t+2} + \dots)$$

where b is a discount factor ($0 < b \leq 1$) and where

$$(2) \quad L_t = w\pi_t^2 + (y_t - \bar{y})^2 \quad w > 0, k > 1$$

with π_t and y_t being inflation and output in t . The economy in question is one in which output obeys the expectational Phillips relation

$$(3) \quad y_t = \bar{y} + \beta(\pi_t - \pi_t^e + u_t),$$

where π_t^e is the expectation of π_t formed in $t-1$ by each private individual, of which there are many, and u_t is a white noise shock.⁵ Combining (2) and (3) we obtain

$$(4) \quad L_t = w\pi_t^2 + [(1-k)\bar{y} + \beta(\pi_t - \pi_t^e + u_t)]^2.$$

For simplicity we will (as usual) assume that the CB directly manipulates the inflation rate π_t and that the target value of π_t in (2) is zero. These two assumptions could be relaxed without much effect on the argument.

From the literature it is well-known that if the CB minimizes (1) on a period-by-period basis, taking π_t^e as a given (predetermined) piece of data in each period, then the chosen values of π_t will conform to

$$(5) \quad \pi_t = \frac{\beta(k-1)\bar{y}}{w+\beta^2} + \frac{\beta^2}{w+\beta^2}\pi_t^e - \frac{\beta^2}{w+\beta^2}u_t.$$

Then if individuals' expectations are formed rationally, so that $\pi_t^e = E_{t-1}\pi_t \equiv E(\pi_t|\Omega_{t-1})$ where Ω_t denotes information available in t , the equilibrium values of π_t will turn out to be

$$(6) \quad \pi_t = \frac{\beta(k-1)\bar{y}}{w} - \frac{\beta^2}{w+\beta^2}u_t,$$

so that the average inflation rate over time exceeds the target value, i.e., $E(\pi_t) = \beta(k-1)\bar{y}/w > 0$. This outcome is typically referred to as the "discretionary solution" which reflects an "inflationary bias."

By contrast, instead of choosing π_t values on a period-by-period or discretionary basis, the CB might base its choices of π_t on a policy rule chosen in advance for application in a large number of periods for which

expectations π_t^e have not yet been formed.⁶ In the present setting, the CB's problem could in this case be modeled as finding values for the ϕ_j coefficients in the policy rule

$$(7) \quad \pi_t = \phi_0 + \phi_1 \pi_t^e + \phi_2 u_t,$$

which relates π_t to the system's only relevant state variables, so as to minimize the unconditional expectation of (1). With rational expectations, $\pi_t - \pi_t^e = \phi_2 u_t$ and analytically the problem is to minimize

$$(8) \quad E \left\{ w(\phi_0^2 + \phi_1^2 \pi_t^{e2} + \phi_2^2 u_t^2 + 2\phi_0 \phi_1 \pi_t^e + 2\phi_0 \phi_2 u_t + 2\phi_1 \phi_2 \pi_t^e u_t) \right. \\ \left. (1-k)^2 \bar{y}^2 + 2(1-k)\bar{y}\beta(\phi_2+1)u_t + \beta^2[(\phi_2+1)u_t]^2 + \text{analogous terms for} \right. \\ \left. \text{future periods} \right\}.$$

To find the optimal ϕ_j coefficients, we apply the E operator (yielding $Eu_t = 0$ and $Eu_t^2 = \sigma_u^2$) and then set partial derivatives with respect to ϕ_0 , ϕ_1 , and ϕ_2 equal to zero. Thus we have:

$$(9) \quad 2w(\phi_0 + \phi_1 E\pi_t^e) + b2w(\phi_0 + \phi_1 E\pi_{t+1}^e) + \dots = 0,$$

$$(10) \quad 2w(\phi_1 E\pi_t^{e2} + \phi_0 E\pi_t^e + \phi_2 E\pi_t^e u_t) + \\ b2w(\phi_1 E\pi_{t+1}^{e2} + \phi_0 E\pi_{t+1}^e + \phi_2 E\pi_{t+1}^e u_{t+1}) + \dots = 0,$$

$$(11) \quad 2w(\phi_2 \sigma_u^2 + \phi_1 E\pi_t^e u_t) + 2\beta^2(\phi_2+1)\sigma_u^2 + b2w(\phi_2 \sigma_u^2 + \phi_1 E\pi_{t+1}^e u_{t+1}) + \\ b2\beta^2(\phi_2+1)\sigma_u^2 + \dots = 0.$$

These conditions must be satisfied for all realizations of π_t^e and u_t , in order for (7) to be a solution. Thus from (9) we see that $\phi_0 = 0$ and $\phi_1 = 0$

are implied. These values are also implied by (10), which does not imply $\phi_2 = 0$ since $E\pi_t^e u_t = 0$, which is true because u_t is uncorrelated with π_t^e . But (11) implies also that

$$(12) \quad [2w\phi_2 + 2\beta^2(\phi_2+1)] [1 + b + b^2 + \dots] = 0,$$

and therefore, that $\phi_2 = -\beta^2/(w + \beta^2)$. Thus the CB's choice for π_t in each period satisfies

$$(13) \quad \pi_t = - \frac{\beta^2}{w + \beta^2} u_t,$$

and this same expression also describes equilibrium outcomes. Consequently, with $\pi_t - \pi_t^e$ and output being the same in both cases, the outcomes will be superior on average (over extended spans of time) if the second type of behavior--with its average inflation rate of zero--is adopted. That solution depicts behavior according to a policy rule.⁷ Alternative terminology is that this second type of behavior reflects commitment on the part of the CB.

In the literature, however, it is almost always assumed that if the CB is not externally constrained to do otherwise, it will generate π_t values as specified by the discretionary formula (6). Attention is focused, then, on alternative arrangements that might be attractive under that presumption, such as appointing CB governors with personal preferences for a large value of w [as in Rogoff (1985)] or devising contracts between the CB and the government that would induce the former to behave more nearly as depicted by formula (13) [as in Walsh (1995) or Persson and Tabellini (1993)].⁸ In addition, there are various analytical results concerning the interaction of monetary and fiscal policies that are based on the presumption that CB behavior conforms to (5) rather than (13)--see Alesina and Tabellini (1987)

and DeBelle and Fischer (1995), for example. This presumption that (5) prevails is of course based on the dynamic inconsistency of π_t values that would be chosen in advance, in conformity with (13), and those that are preferable, conditional upon realized values of π_t^e , when period t is at hand. In the language of the relevant literature there is no "precommitment technology" available to the unconstrained central bank.⁹

3. First Fallacy

In McCallum (1995) I have argued, however, that it is unjustified to presume that an unconstrained but independent CB will inevitably behave as in (5), rather than (13), the latter of which directs the CB to ignore existing expectations and set π_t to zero unless a nonzero shock occurs. Behavior of this second, committed type would clearly eliminate the inflationary bias of discretionary policy making while retaining the desirable countercyclical response to shocks, so a forward-looking CB might be expected to adopt such a strategy. In actual practice there is, after all, no tangible barrier that would prevent a CB from behaving in this more desirable fashion. Admittedly there exists no "technology" for inescapably precommitting future actions, but that does not imply that such behavior is actually infeasible. What is needed for avoidance of the inflationary bias in (6) is for the CB to recognize the futility--on average, over extended time spans--of continually exploiting expectations that are given "this period" but reflect responses to actions of the CB taken in the past, and to recognize that its objectives would be more fully achieved on average if it were to abstain from attempts to exploit these temporarily-given expectations.

In terms of the language employed in the introduction to Persson and Tabellini (1994), the CB needs to violate the problem's "incentive constraints." It is certainly able to do so because these are not actually constraints placed on the CB by physical reality or any outside actor, but

merely reflections of its own misplaced "ambition to move the economy from a second best towards the first best" (1994, p. 4). The actual issue, therefore, is whether the commitment equilibrium without incentive constraints is implementable, in the following sense: will the economy's individuals expect the CB to act as in (13)? But that is merely the question of whether expectations are in fact rational. My own presumption is that if the CB consistently behaves in the fashion specified by (13)--or in any other specified fashion--that private individuals will expect it to do so. That is nothing more than the assumption of rational expectations.

The usual objection is that despite the superiority on average of (13) over (5)-(6) it remains true that within each period π_t^e is predetermined, so that the higher is the currently-chosen value of π_t , the greater will be y_t . Thus an inflation rate above zero in period t will typically yield a preferred outcome for that period--this is the "temptation" that characterizes dynamic inconsistency. Furthermore, the public understands this, according to the usual position, so individuals will expect the CB to choose a positive inflation rate--which makes the optimal rate positive. But, as demonstrated above, the CB could on average achieve outcomes that it prefers if it were to consistently forgo the temptation. Clearly, the CB can understand this--it can see that the unconditional expectation of (1) will be greater if it adopts the commitment rule (13) rather than the discretionary pattern (5).¹⁰ Thus the crucial question is, to repeat, what would happen if the CB were to behave according to rule (13) consistently, i.e., on a maintained basis? The implicit answer of the usual analysis is that expectations would nevertheless be such that $\pi_t^e > 0$. My contention, by contrast, is that if the CB persists with behavior as in (13) then, after a few periods, expectations will conform to actuality and $\pi_t^e = 0$ will prevail. This is, given the presumption that (13) prevails, simply to adopt the

assumption that RE obtains.

It should be added that I would not argue that, if a CB were to adopt rule (13) in real time after behaving differently in the past, expectations would conform to reality immediately. On the contrary, I would think that an adjustment period would be needed during which expectations might differ from (13). But there is nothing about that conclusion that is unique to this problem; it is a conclusion that should be expected (by analysts) to pertain to any change in policy.¹¹ That is one of the main messages of Lucas (1976, pp. 39-42) and (1980, pp. 208-210), echoed in McCallum (1980, p. 722-724). Operationally, it suggests that emphasis should be placed on the long run properties of any policy procedure. In this regard, and indeed more generally with respect to the basic argument of this section, it may be of interest to note that the position being taken here is essentially the same as that of Kydland and Prescott's original (1977) paper¹² and also Prescott's (1977) follow-up contribution.

A corollary of my argument that (13) rather than (5) may be adopted by an independent CB is that there is in fact no necessary "trade-off between flexibility and commitment," as is often claimed in the literature.¹³ The first of these two aspects of policy behavior concerns the coefficient on the shock term u_t in expression (7) whereas the second aspect involves the other two coefficients. But clearly there is no immutable physical or legal connection between these two coefficients or aspects; they can be chosen independently.

The literature includes, of course, various objections to the assumption that rule-like or committed behavior as in (13) can be sustained. But the arguments are only suggestive, not compelling. One highly persuasive point has been made by Flood and Isard (1989)--namely, that rules cannot plausibly be made contingent on all conceivable types of shocks that might occur.

Consequently, actual rules must be contingent upon only a proper subset of the relevant shocks. And in this case, as Flood and Isard demonstrate, it can be better to violate an incomplete state-contingent rule and implement the discretionary outcome in those periods in which some shock realization is unusually large and of an unanticipated type. But nevertheless it is possible and desirable for the CB to implement an outcome analogous to (13), rather than (5), in such periods. For if the CB has enough information to know that the shock has occurred, as the Flood-Isard strategy presumes, it can respond without attempting to exploit existing expectations--the issue concerns only the magnitude of the coefficient ϕ_2 . In words, a vigorous response to shocks does not require an excessive trend rate of inflation.

The foregoing argument has some features in common with the position of Taylor (1983, p. 125), who concluded his discussion of Barro and Gordon (1983b) with the statement that it is "difficult to see why the [optimal] zero-inflation policy would not be adopted" by the central bank. The literature's main response to Taylor is provided by Canzoneri (1985), who first states "that Taylor would probably be right were it not for private information" (1985, p. 1061). But then Canzoneri continues with the argument that if "the Fed's forecast of money demand is private information, a resolution of the precommitment problem is much more difficult to come by...[because]...direct verification of the Fed's adherence to the ideal policy rule is not possible" (1985, p. 1061). The alleged problem in this case, however, still stems from the presumption that the CB attempts to exploit existing expectations. What is being suggested here, as in McCallum (1995), is that a competent CB sees that this attempt is fruitless (on average) and therefore abandons it. Doing so, it is then free to adopt the policy that Canzoneri finds "ideal" even in the private information setting.¹⁴ In that case, the RE equilibrium is the same as what Canzoneri terms a

"cooperative equilibrium." But this policy does not actually involve any cooperative behavior; it merely has the CB behaving in a rule-like or committed fashion while taking account of the public's expectational behavior (RE).

The model in the Barro-Gordon (1983b) paper, which was the subject of Taylor's comment, was one of the first "reputational" models of CB behavior. This model and others with related trigger-strategy expectational mechanisms are unsatisfactory, I would argue, in part because they possess an infinity of solutions.¹⁵ Also, the expectational mechanism used by Barro and Gordon (1983b) has an implausible feature: it assumes that if individuals expect the discretionary inflation rate in some period and that rate materializes, then individuals nevertheless switch to the lower rule-like rate when forming expectations for the next period.

A related disagreement with the standard literature involves the notion that it is useful to conduct analysis, involving institutional design, under the presumption that central banks can have preferences that are systematically different from society's. Such might occasionally be the case in some nations, but on average I would expect that the relative importance given to inflation and unemployment avoidance will be approximately the same by a central bank and the society of which it is a part. In democracies, that is, central banks will tend to be aware of and reflect the preferences of the population. That tendency might be discouraged in various ways, but I would expect that (for example) attempts to appoint governors with tastes more anti-inflationary than society's would often result in ex-post surprises about these tastes. And I would expect legislation to be overturned fairly promptly if it were truly inconsistent with the preferences of the nation's population. In any event, it would seem to be asking for trouble if institutions were designed under the presumption that CB preferences differ

from those of the public at large.

To the argument of this section it might be objected that historical evidence for the postwar fiat money era supports the idea that solutions like (5) rather than (13) will typically be chosen by actual central banks, a hypothesis that was the theme of Barro and Gordon (1983a). Although this position has considerable analytical appeal, and I have in fact presented it myself (e.g., McCallum, 1990, pp. 999-1002), it seems more likely that the actual reason for excessive inflation during (say) 1960-1980 involved a widespread belief, over the first part of that period, in long-lasting tradeoffs between inflation and unemployment rates--i.e., non-vertical long-run Phillips relations.¹⁶ But whatever one's judgment is in that regard, it is a peripheral matter from the perspective of the present paper. Even if it were somehow established that actual central bankers have behaved as in (5) in the past, that would not mean that they are necessarily fated to do so in the future. Central bankers, like businessmen, are capable of learning from experience and adopting new strategies.

4. Second Fallacy

Let us now turn to the second of the fallacies identified in McCallum (1995), that is, inappropriate interpretations in the literature on CB independence. This one pertains to an ingenious result, developed by Walsh (1995) and utilized by Persson and Tabellini (1993), concerning contracts between a nation's government and its central bank. In particular, the result indicates that if a nation's government provides its CB with a contract (or incentive arrangement) that makes the latter's private rewards¹⁷ negatively dependent upon the inflation rate, then it is possible to induce optimal performance as in (13) even though the CB's behavior is of the discretionary type that would lead to (5) in the absence of this contract provision.

The unsatisfactory feature of this result is that such a contracting device does not actually eliminate the motivation for dynamic inconsistency, it merely locates it in a different place. Specifically, under the proposed arrangement the government would have to enforce the contract--for instance, by reducing the CB's budget when inflation is high--but the government has exactly the same incentive not to do so as the CB has to be inflationary in the usual analysis. Or, to put the point in other words, if the absence of a precommitment technology is actually a severe problem, then it must apply to a consolidated entity consisting of the CB and the government together, just as it would to an entirely independent CB. If a precommitment technology does not exist, then it doesn't exist and no arrangement can entirely escape that fact.¹⁸ Walsh, Persson, and Tabellini would perhaps not disagree with this argument, but that does not eliminate the fact that it is contrary to the central thrust of their cited papers.

Furthermore, this problem cannot be overcome analytically by a suggestion that the CB's objective function should be specified at the "constitutional stage" of the political process. Again the problem is enforcement--constitutions need to be enforced and the enforcing party will be subject to the same temptation as an independent CB. That constitutions are not always enforced in the sphere of monetary arrangements can be illustrated by the fact that no constitutional amendment has ever taken the United States off of the metallic standard that is clearly implied by Sections 8 and 10 of Article I of the Constitution.¹⁹ But in fact the United States has not been on an operative metallic standard for many years--at least since 1971 and arguably since some earlier date such as 1961 or even 1933.²⁰

In terms of practical applications, the identification of this second fallacy should not be interpreted as a denial of the usefulness of (i)

central bank charters that give a central position to inflation avoidance or (ii) arrangements that give the central bank or its governor private incentives to maintain a low inflation rate. On the contrary, it is my impression that the most ambitious scheme of this type to be implemented thus far, New Zealand's, is having a highly constructive influence on monetary policy. But my interpretation is that the main effect of such arrangements is not principally to constrain the central bank to act in accordance with the government's objectives, but rather to constrain the government by increasing the difficulty of its bringing pressure to inflate upon the central bank. This step is important because governments (i.e., treasuries or finance ministries) are typically more closely involved in the political process than are central banks, and the political processes of today's democracies tend to be short-sighted and impatient in their emphasis. Consequently, governments are less likely than central banks to exercise the patience that is required to behave in the rule-like manner discussed in Section 3. Arrangements such as those of New Zealand's therefore give central banks an increased opportunity to behave in a rule-like, committed fashion.

5. Concluding Remarks

To summarize, the foregoing paragraphs argue that the literature's standard interpretation of its analytical results is misleading in two respects. First, it suggests that central banks are unable to behave in a manner that has no inflationary bias and, second, that central bank contracts devised and enforced by governments can eliminate the dynamic inconsistency that is the root of such a bias²¹. Thus the literature underestimates the likelihood of good monetary policy performance by an independent central bank and, in addition, misrepresents the nature of beneficial effects that can result from central bank contracts. In both respects, therefore, the

literature tends to underestimate the benefits of central bank independence, by which I mean partial insulation from the pressures of day-to-day political activity in democratic nations.

It might at first glance seem that the foregoing disagreement with the standard literature represents mere academic nitpicking, for my argument agrees that central bank arrangements that emphasize inflation prevention, and provide private incentives for CBs, are desirable. But there are other issues of practical importance on which my interpretation would lead to different conclusions than that of the literature. Consider, for example, the question of whether improved monetary policy performance would be obtained by making a nation's central bank a division of its treasury (an executive department). My interpretation, unlike the literature's, would predict that substantially poorer monetary results would be obtained. Or consider the question of designing a central bank's charter and/or contract with the government. Should the central bank be involved in an influential manner in the design of these arrangements? Again different answers are provided by the different interpretations, with mine being significantly more supportive of central bank participation. As a third example, consider recent (1994) proposals in the U.S. Congress for increased Federal Reserve "accountability" via reduction of the role of regional Reserve Bank presidents in monetary policymaking, or the appointment of these presidents by the U.S. President. Clearly, my interpretation would predict that more inflation would result from either of these changes. Finally, it is worth noting that the empirical "free lunch" finding, that increased central bank independence provides improved inflation performance without increased output/employment variability,²² is a problem for the usual interpretation but not for the one presented here.

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Footnotes

¹These include Rogoff (1985), Canzoneri (1985), Cukierman and Meltzer (1986), Flood and Isard (1989), Chari, Kehoe, and Prescott (1989), Cukierman (1992), Lohmann (1992), Persson and Tabellini (1993), and Walsh (1995).

²Excellent reviews of the literature are provided by Fischer (1994), Debelle and Fischer (1995), and the introduction to Persson and Tabellini (1994).

³Some, but not all, of the discussion is paraphrased from McCallum (1995).

⁴Also, our notation differs from that of Blanchard and Fischer in using $L(\pi_t)$, rather than M , to denote the single-period objective function and π_t^e , rather than π_t^* , for the expectation of π_t formed in $t-1$. The multiperiod objective function is not crucial to the arguments of this paper, but is adopted to make it clear that these arguments do not pertain only to the case with a single-period objective.

⁵In equation (3), u_t should probably not be interpreted as a "supply shock," as it is by some writers. The reason is that a supply shock would affect the market clearing value of output, \bar{y} . Thus the adopted objective function would be of questionable appropriateness under that interpretation. Instead, u_t can be interpreted as reflecting discrepancies between the central bank's instrument, such as the monetary base growth rate, and the resulting inflation rate.

⁶Barro and Gordon (1983a, p. 597) describe this as the "once-and-for-all choice of [a] reaction function, $h(\cdot)$ " such that $\pi_t - \pi_t^e = 0$ in each period. For that condition to prevail, it must be the case that the rule applies only to periods for which π_t^e has not yet been formed--which is reflected analytically by use of the unconditional expectation of (1).

⁷Incidentally, it is tedious but straightforward to verify that equation (5) will be obtained as the policy "rule" if the derivation in this paragraph is conducted while treating π_t^e , π_{t+1}^e, \dots as arbitrarily given values. That suggests that the distinction between the two types of policy-making behavior might be regarded as between rules that do, and those that do not, accurately take account of private expectational behavior in their design.

⁸These are two prominent possibilities; others are discussed by Flood and Isard (1989), Lohmann (1992), and Svensson (1995).

⁹A striking statement of the position was provided by Chari, Kehoe, and Prescott (1989, p. 303), as follows. "We should emphasize that in no sense can societies choose between commitment [and] time-consistent [i.e., discretionary] equilibria. Commitment technologies are like technologies for making shoes in an Arrow-Debreu model--they are either available or not."

¹⁰There is still another possible way of choosing values for the coefficients in (7), namely, so as to minimize (1) itself rather than its unconditional expectation. This would give a result that would imply an average inflation rate below $\beta(k-1)\bar{y}/w$ but above zero, unless $b=1$. But the spirit of the commitment strategy by the CB is more faithfully reflected by taking the unconditional expectation. In this regard my judgment agrees with that of Barro and Gordon (1983a, p. 597) and, indeed, the literature's standard method of representing the commitment or rule-like policy.

¹¹It is, incidentally, consistent with the empirical finding--which is perhaps questionable because of its reliance on numerous non-trivial assumptions--that more independent CBs do not receive any credibility bonus in terms of a reduced sacrifice ratio (DeBelle and Fischer, 1995, pp. 202-205).

¹²See in particular Kydland and Prescott's concluding section (1977, p. 487), which states that "the implication of this analysis is that, until we have [a tested] theory [of economic fluctuations], active stabilization policy may very well be dangerous and it is best that it not be attempted.... When we do have the prerequisite understanding of the business cycle, the implication of our analysis is that policymakers should follow rules rather than discretion. The reason is not that they are stupid or evil but, rather, that discretion... either results in consistent but suboptimal planning or in economic instability." Instead, according to Kydland and Prescott, it is preferable that "as Lucas (1976) proposed...economic theory be used to evaluate policy rules and that one with good operating characteristics be selected" (1977, p. 487).

¹³See, for example, Canzoneri (1985, p. 1062), Blanchard and Fischer (1989, p. 610), Lohmann (1992, title), and Debelle and Fischer (1994, p. 210). Persson and Tabellini (1993, pp. 73-74, 77), by contrast, recognize that there is no inherent tradeoff of this type.

¹⁴In terms of Canzoneri's notation, the CB adopts the policy $g_t = \pi^* + e_t$, where g is the rate of growth of the money stock, π^* is the target inflation rate, and e_t is the CB's forecast of $g_t - \pi_t$. Even if e_t is private information for the CB, it can still implement the rule $g_t = \pi^* + e_t$. Then, under Canzoneri's assumption that $g_t - \pi_t$ is white noise, the private sector's rational expectation of g_t is π^* and the resulting equilibrium is Canzoneri's "Ideal Solution," despite the fact that "direct verification of the Fed's adherence to the ideal policy rule is not possible." The same result can be generated in terms of the model of Section 2 above by pretending that the CB has some private information about u_t in advance of the private sector, and that the difference between the CB forecast and the actual value of u_t is white noise.

¹⁵On this topic, see Rogoff (1989) or McCallum (1990, pp. 1003-1004).

¹⁶The basis for this statement regarding historical experience, as contrasted with my argument regarding possible modes of central bank behavior, is not primarily logical in nature. It is, rather, an impression of the actual beliefs of the individuals who were involved in CB decision making during the period in question, as revealed in their writings and oral presentations.

¹⁷These regards might involve transfer payments to the CB or the governor's salary. Or the governor might be made subject to early dismissal if stipulated conditions are not met. In fact, the contract provision could involve anything that enters the CB's utility function in addition to the inflation and output or employment considerations expressed in (3). Also, the contract could pertain to money growth settings, or other measures of monetary policy ease vs. tightness, rather than inflation. See Walsh (1995, p. 155) or Persson and Tabellini (1993, pp. 60-62).

¹⁸The suggestion here is that when unemployment is higher than desired by the government, the latter may try to induce the CB to be more expansionary than is called for by policy rule (13) by devising extra ad hoc rewards for the central bank if it accommodates.

¹⁹The first of these states that "The Congress shall have Power...to borrow Money on the Credit of the United States;...to coin Money, regulate the Value thereof, and of foreign Coin, and to fix the Standard of Weights and Measures" whereas the second declares "No State shall...coin Money; emit Bills of Credit; make any Thing but gold and silver Coin a Tender in Payment of Debts...." These are the only references to monetary arrangements in the entire document. The use of the verb "to coin" and the inclusion of coinage powers in the provision that refers to weights and measures suggests strongly that the writers regarded the two main tasks of monetary management to be (a) the selection of some quantity of a metal (or metals) to be the unit of account and (b) the provision for the physical production of metallic coins.

²⁰The year 1971 was, of course, when the United States unilaterally abrogated its Bretton Woods commitment to sell gold to other IMF member nations' central banks at \$35 per ounce. But in 1961 the United States promoted the formation of the gold pool, which demonstrated a serious reluctance to conduct monetary policy as needed to keep the market price of gold from exceeding \$35 per ounce--which might be regarded as the essence of the gold standard. Finally, 1933 was the year in which the dollar was drastically devalued and it became illegal for U.S. citizens to hold gold. The foregoing emphasis on the end of the gold standard does not imply, needless to say, that the gold standard is an especially desirable monetary rule.

²¹This statement presumes that the same preferences are shared by the central bank and the public. There is, of course, a considerable bit of analysis that focuses on the possibility that the central bank (or its governor) might have more aversion to inflation than does the public. But I find emphasis on preference differences unhelpful, in two ways. First, it is unclear that preferences--as contrasted with beliefs about the workings of the economy--actually play a large role in central bank behavior. Second, the "selection of a central banker who is strongly averse to inflation" is a nonoperational idea since the preferences of actual people are neither observable nor permanent.

²²This finding is emphasized by Debelle and Fischer (1995, p. 201) and Fischer (1994, p. 48).