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SIMPLE RULES, DISCRETION AND MONETARY POLICY

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ABSTRACT

In this paper we explore the possibilities arising under a policy in which a partially state contingent money-supply rule is mixed with discretion. In addition to demonstrating that such mixed strategies can dominate both complete discretion and rigid adherence to the partially state contingent rule, we investigate the appropriate setting of parameters in a partially state contingent policy when it is acknowledged that the rule will not be followed on all occasions--i.e., that sometimes the monetary authority will resort to discretion.

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Simple Rules, Discretion and Monetary Policy

by Robert P. Flood and Peter Isard 1/

I. Introduction

This paper describes a monetary policy that combines a simple rule with discretion. The analysis employs a well-known framework in which expectations are rational and social welfare depends negatively on both price level instability and deviations of output from its full employment level. The paper starts with the traditional application of this framework, which compares different policy strategies under the assumptions that the structure of the economic model is known and that disturbances to the economy can be characterized as having well-understood probability distributions (Section II). Following Barro and Gordon (1983), we adopt widely used definitions in distinguishing between discretion (i.e., policies derived from conditional optimization). A further distinction is drawn between fully state contingent rules and partially state contingent rules.

Criticism of the traditional analytic framework has called into question the assumptions about the nature of, and costs of assimilating, the information that monetary authorities confront. It has been argued that fully state contingent rules are not relevant options for monetary

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1/ This paper is based on Flood and Isard (1989). The authors are grateful for helpful comments and reactions from Kenneth Rogoff, Elhanan Helpman, Dale Henderson and Guillermo Calvo. The views expressed here are those of the authors and do not necessarily reflect the views of the Directors of the International Monetary Fund.

policy in practice and, indeed, proponents of monetary rules have generally suggested that the authorities adopt a simple rule. It thus becomes relevant to consider the issue of rules and discretion when fully state contingent rules are precluded (Section III). The paper demonstrates that a hybrid policy in which a partially state contingent rule is mixed with discretion can dominate both complete discretion and rigid adherence to the rule. We also investigate the appropriate setting of parameters in a partially state contingent rule when it is rationally perceived that the monetary authority has incentives to follow the rule under a set of circumstances that have been well defined ex ante, but to resort to discretion under other types of circumstances. 1/

The results of this section have broad applicability. The methodology that economists typically employ in designing and evaluating policy rules is to simulate and compare the counterfactual paths that a model economy would have taken under each candidate rule if agents had expected the rule to be in place forever. This methodology can also be used to search for the "optimal" values of the parameters in any proposed rule by comparing the "welfare" levels generated along the associated counterfactual paths. The validity of such methodology is questionable, however, for evaluating a rule that is not fully state contingent. It is possible that policymakers operating with a rule that was only partially state contingent, had they actually been confronted with the counterfactual history, would have chosen to respond to contingencies not specified in the rule. And the recognition of this possibility ex ante by

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1/ For the purpose at hand, we assume that society has designed its institutions to provide the underlying incentives.

rational market participants may render inappropriate the parameter settings derived under a methodology that abstracts from the non-zero probability of occasional discretionary departures from the rule. It thus becomes interesting to explore conditions, in a particular model environment, when the usual policy evaluation methodology gives the "right answers" even though the evaluation problem is only partially specified.

Our approach to the problem of setting optimal rules that are not fully state contingent draws on the "process switching" literature. 1/ In that literature agents understand that some processes are time-varying drawings from a distribution of such processes. Agents form their expectations of future realizations of the variables governed by the processes using a joint distribution of processes and the outcomes of the processes.

II. The Analytic Framework

1. Structure and assumptions

A standard model of monetary policy choice, stimulated by the work of Lucas (1972) and Kydland and Prescott (1977), consists of the following equations:

$$(1)\quad y_t = \beta(\pi_t - E_{t-1}\pi_t) + x_t ,$$

$$(2)\quad \pi_t = b_t + v_t .$$

1/ For example, see Flood and Garber (1980, 1983).

In equation (1): y_t is the logarithm of real output at time t--expressed as a deviation from its "natural" rate; $\pi_t = p_t - p_{t-1}$ is the rate of change of prices, with p_t the logarithm of the price level; and x_t is a productivity shock. In equation (2), b_t is the rate of growth of the monetary base and v_t is a shock to the relationship between base growth and inflation. It is assumed that x and v are mutually and serially uncorrelated, each having zero mean.

The monetary authority controls b_t and uses it to minimize a loss function that depends both on the deviation of output from some socially optimal level and on the rate of inflation. As is typical in this literature, 1/ some existing distortion, such as unemployment insurance or income taxation, is present in the labor market and drives a wedge, κ, between the socially optimal level of output and the market-determined equilibrium. We write the social loss function as:

$$(3) \quad \psi_t = (y_t - \kappa)^2 + \alpha\pi_t^2, \quad \alpha, \kappa > 0.$$

$\kappa > 0$ provides an incentive for the monetary authority to generate inflationary surprises to overcome the existing distortion.

It is convenient to reformulate the policy criterion function, using (1) - (3), as:

1/ For example, see Barro and Gordon (1983), Canzoneri (1985), or Rogoff (1985).

$$(4) \quad L_t = (b_t + v_t - E_{t-1}b_t - k + u_t)^2 + a(b_t + v_t)^2$$

where $L_t = \psi_t/\beta^2$, $k = \kappa/\beta$, $u_t = x_t/\beta$, and $a = \alpha/\beta^2$. The expected value of this social loss function is adopted as our welfare criterion for comparing a regime that allows the monetary authorities to exercise discretion and two regimes in which monetary policy is governed by rules. One of the rules is fully state contingent while the other is partially state contingent. For the regime of discretion, we assume that the authorities minimize the value of the social loss function conditional on a predetermined value of $E_{t-1}\pi_t$. Under the two different rule regimes we solve for parameter values that minimize the expected value of the social loss function when $E_{t-1}\pi_t$ is formed in accordance with the rule.

A central consideration in any discussion of the optimal design of monetary policy is the extent to which the structure of the macroeconomic model is known, the relevant economic variables are observable, and the disturbances to the economy can be characterized in terms of well-defined probability distributions. In this regard, we follow tradition in assuming initially that both the monetary authority and the private sector know the macroeconomic structure, can deduce u_t and v_t from observable variables and their knowledge of the parameters of the model ex post, and have accurate ex ante information about the probability distributions from which u_t and v_t are drawn.

In reality, of course, monetary policy strategies must be designed for an environment in which there is incomplete information ex ante about both the macroeconomic structure and the probability distributions of disturbances. Section III attempts to address this problem formally, using ground work provided by considering a partially state contingent rule in this section. 1/ To add semantical precision, we use the term "conditional optimization" as a synonym for "discretion" and "unconditional optimization" as a synonym for "rules."

2. Conditional optimization--(discretion)

Under a strategy of discretion or conditional optimization--henceforth, CO--the monetary authority sets b_t to minimize (4) subject to the observed values of u_t and v_t, and, most importantly, subject to predetermined expectations of base money growth, $E_{t-1}b_t$. The first order condition is:

$$(5) \quad b_t = - v_t + \frac{1}{1+a} (E_{t-1}b_t + k - u_t) .$$

Private agents, understanding the monetary authority's motives, form expectations of base money growth consistent with equation (5). Combining the expectations of equations (2) and (5) yields:

$$(6) \quad E_{t-1}\pi_t = E_{t-1}b_t = k/a$$

1/ In our view, much of the attraction of partially state contingent rules--such as constant money growth rules, or nominal income targeting rules--stems from ignorance about many aspects of the relevant economic environment. An earlier version of this paper attempted to discuss such ignorance in terms of the type of uncertainty conceptualized by Knight (1921) in his classic distinction between risk and uncertainty. These attempts reflected our conviction that it is important to emphasize the existence of Knightian uncertainty--or as Fischer (1987) puts it, of contingencies that cannot be foreseen or described when formulating a rule--but also convinced us of the difficulty of incorporating such a concept, in a satisfactory way, into a formal economic model.

This expression relates the inflationary bias that arises under CO to the distortion term k. If k were zero, deviations of output from its socially optimal level would also be zero in the absence of inflation surprises and productivity shocks, and there would be no inflationary bias in (6).

To evaluate social welfare, substitute (6) into (5) to obtain:

$$(7) \quad b_t|CO = - v_t - \frac{u_t}{1+a} + \frac{k}{a} ,$$

where $b_t|CO$ is base growth under conditional optimization (discretion). The realized loss from CO is:

$$(8) \quad L_t|CO = \frac{(1+a)}{a} (-k + \frac{a}{(1+a)} u_t)^2$$

and the expected loss is:

$$(9) \quad E_{t-1}L_t|CO = \frac{1+a}{a} k^2 + \frac{a}{1+a} V(u),$$

where V(u) is the variance of u_t conditional on information from period t-1. The first term in (9) reflects the expected loss associated with whatever output or labor market distortions are responsible for the inflation bias, while the second term reflects the loss associated with fluctuations in productivity.

3. Unconditional optimization--(rules)

Consider next the implications of following a rule or an unconditional optimization strategy--henceforth, UO. Since the rule will be known to the public, the optimal parameter values, given the functional form, are derived under the condition that $E_{t-1}b_t$ is formed consistently with the rule and is not a predetermined variable that the authorities are free to exploit.

The unconditionally optimal fully state contingent policy--UOF--can be derived by postulating that base growth is given by: 1/

$$(10) \quad b_t = \lambda_0 + \lambda_1 u_t + \lambda_2 v_t$$

and then minimizing the expected value of the loss function with respect to λ_0, λ_1, and λ_2. The resulting UOF policy is:

$$(11) \quad b_t | UOF = - v_t - \frac{u_t}{1+a}$$

which mimics the CO policy (7) without including a response to the distortion term k. Under the UOF policy,

$$(12) \quad E_{t-1}L_t | UOF = k^2 + \frac{a}{1+a} V(u)$$

1/ The structure of equation (4) and the assumption of uncorrelated disturbances imply that the optimal fully state contingent rule must have a linear form.

Next consider an unconditionally optimal partially state contingent strategy--UOP--in which base money reacts to the u_t disturbances but not to the v_t disturbances. The optimization problem is analogous to the previous case for rules having the form:

$$(13)\quad b_t = \tau_0 + \tau_1 u_t$$

The optimal policy of this form is:

$$(14)\quad b_t | UOP = - \frac{u_t}{1+a}$$

Thus,

$$(15)\quad E_{t-1}L_t | UOP = \frac{aV(u)}{1+a} + (1+a)V(v) + k^2$$

4. Discussion

Ignoring time consistency issues for a moment, it is evident from (9), (12), and (15) that the UOF policy dominates both the CO policy and the UOP policy. It is also evident that the CO and UOP policies are not unambiguously ranked. CO policy is attractive relative to UOP when V(v) is large, while UOP is relatively attractive when k is large. 1/ This result emphasizes that discretion has the desirable consequence of allowing the monetary authority to react to shocks that are not allowed for in a partially state contingent rule, but has the undesirable

1/ The two policies are equally attractive when $k^2 = a(1+a)V(v)$.

consequence of generating an inflationary bias whenever distortions cause the market-determined level of output to lie below the socially optimal level. 1/

The time consistency issue arises in an environment in which a policy authority announces its intention to follow either the UOF or UOP policy but is tempted to actually follow the CO policy. 2/ The source of temptation is the welfare gain that the authority can achieve in the short run by deviating from the UOF or UOP policy to exploit the private sector's predetermined expectations. Accordingly, agents in the economy, understanding this incentive, will expect the authority to follow the CO policy no matter what they announce. Thus, the only time consistent equilibrium in this example is the CO policy.

Despite widespread awareness of this time consistency issue, many economists favor the adoption of a UOP policy. 3/ Apparently, proponents of rules either dismiss the importance of time consistency problems or believe that institutional mechanisms or reputational considerations can be effective in providing incentives for the authorities to adhere to the UOP rule. 4/ As an example of such an institutional mechanism, some form of penalty--either formal or informal--could be imposed on the authority

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1/ The comparison could also be affected by "accountability" considerations if the central bank had different preferences than society at large and would not necessarily be inclined to minimize the social loss function if left to its own discretion.

2/ See Kydland and Prescott (1977).

3/ For example, see McCallum (1987).

4/ See Rogoff (1987) for a discussion of reputational considerations. See Flood and Isard (1989) and Rogoff (1985) for discussions of institutional arrangements to mitigate monetary policy credibility problems.

or on society to remove the incentive for the authority to exploit agents' predetermined expectations. 1/

III. The Case for Mixing a Simple Rule with Discretion

If it were feasible and costless to specify and follow a fully state contingent monetary rule, and if appropriate institutional mechanisms could be established for precommitting the authorities to follow the rule, then there would be no justification for relying on either discretion or a partially state contingent rule in the conduct of monetary policy. As illustrated in the previous section, it is clear in theory that both discretion and partially state contingent rules are "second best" strategies.

Virtually all practitioners would argue, however, that a fully state contingent rule for monetary policy is simply not a relevant possibility in a world in which knowledge about the macroeconomic structure and the nature of disturbances is incomplete. 2/ Consistently, the various types of "simple rules" that have actually been proposed for monetary policy are not fully state contingent UOF policies. 3/

When fully state contingent rules are discarded as irrelevant alternatives, and when it is noted that discretion (i.e., CO policies) and partially state contingent rules (i.e., UOP policies) cannot be unambiguously ranked, it is natural to investigate strategies that

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1/ If the authority is motivated to maximize the well-being of the private sector, imposing the penalty on the private sector would work as well as imposing costs on the authority.

2/ See Isard and Rojas-Suarez (1986) for a discussion of the debate on this issue.

3/ See McCallum (1987, 1988).

optimally mix a partially state contingent rule with discretion. The attraction of such an investigation to us is our perception of how well the mixing strategy mimics the behavior of monetary authorities in practice. As noted earlier, the advantage of tempering a UOP policy by sometimes switching to a CO policy is that the CO policy allows reactions to disturbances not incorporated into the UOP policy. The disadvantage is that under the mixed strategy, part of the inflationary consequences of the CO policy will be built into agents' inflation expectations even during periods when the authority is actually following the UOP policy.

In what follows, our purpose is not only to show that a mixed strategy can be socially preferable to both the CO and UOP policies, but also to derive the optimal values of the coefficients in the UOP policy, given that the authority is known to be actually following a mixed policy. In connection with the latter objective, it is important to note that the typical evaluation methodology employed for UOP policies is not generally valid when an authority adopting a UOP policy occasionally "bails out" of the policy to react to the realization of some state that had not been prescribed in formulating the UOP policy ex ante. In particular, the typical methodology for evaluating proposed UOP policies, and for deriving optimal parameter values for such policies, is based on the assumption that the policies will be followed indefinitely. This makes it interesting to investigate the conditions under which the parameters arrived at via traditional methodology are also optimal when the UOP policy is recognized to be part of a mixed strategy that includes occasional reliance on CO policy.

1. Setting optimal UOP parameter values as part of a mixed strategy

Consider the problem of setting values for τ_0 and τ_1 in the policy $b_t = \tau_0 + \tau_1 u_t$ where the optimal choice must solve:

$$\text{(16)} \quad \min_{\tau_0 \tau_1} E_{t-1}L_t = qE_{t-1}(L_t|UOP) + (1-q)E_{t-1}(L_t|CO_t)$$

Here q denotes the probability that the UOP policy will be followed during period t, while 1-q is the probability that the CO policy will be followed. For now, take q to be an exogenous constant $0 \leq q \leq 1$; the next subsection will begin to model q.

To solve this problem it is convenient to first obtain $E_{t-1}b_t$, which enters into the loss function under both branches of the policy. If UOP is followed, $b_t = \tau_0 + \tau_1 u_t$; if CO is followed (recall 5), $b_t = (1+a)^{-1}(E_{t-1}b_t - u_t + k) - v_t$. Accordingly, since $E_{t-1}b_t = qE_{t-1}(b_t|UOP_t) + (1-q)E_{t-1}(b_t|CO_t)$,

$$\text{(17)} \quad E_{t-1}b_t = \frac{(1+a)q}{a+q}\tau_0 + \frac{(1+a)q}{a+q}\tau_1 E_{t-1}(u_t|UOP)$$
$$+ \frac{(1-q)}{a+q}(k - E_{t-1}(u_t|CO)) - \frac{1+a}{a+q}E_{t-1}(v_t|CO)$$

To obtain the optimal values of τ_0 and τ_1, substitute (13) and (17) into (4) and obtain the appropriate expression for $E_{t-1}(L_t|UOP)$; substitute (5) and (17) into (4) and obtain the appropriate expression for $E_{t-1}(L_t|CO)$; then substitute these expressions into the policy problem (16) and obtain through optimization two equations in τ_0 and τ_1. In general, optimal values of the τ_0 and τ_1 will depend on the conditional expectations of u and v. However, for the case in which the CO policy is used symmetrically in the sense that $E_{t-1}(u_t|CO) = E_{t-1}(u_t|UOP) = E_{t-1}(v_t|CO) = 0$, the optimal parameter values are $\tau_0 = 0$ and $\tau_1 = -1/(1+a)$, which are identical to the optimal values of the policy parameters obtained for the pure UOP policy (recall 14)). This "symmetric" case is of interest because it provides a plausible environment in which the typical policy evaluation methodology delivers the correct policy rule parameterization even when the policy rule will sometimes be violated.

2. <u>The optimality of a mixed strategy</u>

The next objective is to demonstrate that rigid adherence to a simple rule may be inferior to the strategy of mixing a simple rule with discretion. We illustrate the possible gains from a mixed strategy using the above framework. Following the results of the previous subsection, we study a mixed strategy that combines the policy resulting from conditional optimization (CO) with the partially state contingent policy (UOP) that is optimal when it is known that the CO policy will sometimes be applied.

To capture the idea that society wants the central bank to exercise discretion only when there are relatively large payoffs in terms of the social loss function, assume that the central bank has been motivated to minimize the sum of the social loss function L (as specified by condition (4)) plus a cost that arises whenever policy settings deviate from the UOP rule. 1/ To obtain a simple illustration, consider the analytic framework developed in Section II under the assumption that $u_t = 0$. Suppose further that the distribution of v_t shocks is symmetric, and assume that society wants the monetary authorities to follow the UOP rule $b_t = 0$ for small v_t shocks and to switch to the CO policy for shocks that exceed (in absolute value) a threshold size θ. As shown in the previous subsection, $b_t = 0$ is the optimal UOP policy under these circumstances (recall (14) for $u_t = 0$). If society has established the appropriate incentives for the monetary authority (i.e., has made the cost of overriding the rule large enough but not too large), then it is rational to expect that the rule will be overridden if, and only if, the shock exceeds the threshold size θ. Thus, the probability of following the UOP policy is

$$(18) \quad q = \text{prob}\,(|v_t| \leq \theta)$$

In this example, it is straightforward to show that for some parameter values the mixed strategy is preferable to (i.e., results in a smaller expected loss than) both the UOP policy (the rule) and the CO policy (discretion). The first step in the demonstration is to note that:

$$(19) \quad E_{t-1}b_t = qE_{t-1}b_t|UOP + (1-q)E_{t-1}b_t|CO \ ,$$

1/ From the point of view of our example it makes little difference whether society imposes the cost on itself (perhaps in the form of a costly institutional adjustment) or imposes the cost directly on the central bank (perhaps in the form of reduced bonuses or endless Congressional testimony). We adopt the simplest structure by assuming that the cost is imposed on the monetary authority and we assume that the cost is not a deadweight loss to society as a whole. Other examples can be constructed with alternative cost assumptions.

where $E_{t-1}b_t|UOP$ is the period t-1 conditional expectation of base money growth given that UOP is being followed, and $E_{t-1}b_t|CO$ is the t-1 conditional expectation of b_t given that CO is being followed. Recalling that a CO policy must satisfy the first order condition (14), it follows that:

$$(20) \quad b_t|CO = \frac{1}{1+a}(E_{t-1}b_t + k) - v_t$$

where we have used $u_t = 0$. Next, use equation (17) and the condition $b_t|UOP = 0$ to derive:

$$(21) \quad E_{t-1}b_t|CO = \frac{k}{a+q}$$

The probability of following UOP, q, shows up in equation (21) because this scheme modifies agents' rational expectations of base money growth. As long as q is positive, the scheme reduces expected base growth conditional on discretion and will therefore reduce the inflationary bias. Unconditional expected base growth is:

$$(22) \quad E_{t-1}b_t = \frac{(1-q)k}{a+q}$$

Next, consider that the expected value of the loss function under the mixed strategy is:

$$(23)\quad E_tL_t = qE_t(L_t|UOP) + (1-q)E(L_t|CO) \ .$$

From (4), (14), and (22) it can be seen (recall $u_t = 0$) that:

$$(24)\quad L_t|UOP = \left[\frac{(1+a)}{(a+q)} k - v_t\right]^2 + av_t^2$$

and

$$(25)\quad E_{t-1}L_t|UOP = \frac{(1+a)^2}{(a+q)^2} k^2 + (1+a)V(v|UOP)$$

where V(v|UOP) is the variance of v conditional on the UOP policy (i.e., conditional on v being "small'). Similarly, from equations (4), (5), and (22) it can be seen that:

$$(26)\quad L_t|CO = E_{t-1}L_t|CO = \frac{a(1+a)}{(a+q)^2} k^2$$

Combining these two branches of the loss function yields:

$$(27)\quad E_{t-1}L_t = (1+a)\left[\frac{k^2}{a+q} + qV(v|UOP)\right]$$

What remains to be demonstrated is that under a range of parameter values the mixed strategy is superior to both the optimal UOP rule and discretion. Since we simply want to show a possibility, an example will suffice. Recall (18) and consider a situation in which v_t is uniformly distributed on the interval $[-\nu,\nu]$ such that $q = \theta/\nu$ for any choice of θ on the relevant interval. For this distribution, $V(v) = \nu^2/3$ and $V(v|UOP) = q^2\nu^2/3$. Furthermore, by substituting the conditional variance into (27) and minimizing $E_{t-1}L_t$ with respect to q, it can be shown that the optimal value of q must satisfy:

$$(28)\quad q^2 + aq - k/\nu = 0.$$

The probability q need not be an object of choice--we simply want to illustrate that it is feasible for the optimal q to take on a value between zero and one. Such a case arises when $k/\nu < 1 + a$, which provides an example in which the mixed strategy dominates both UOP (rule) and CO (discretion).

It should be noted that the mixed strategy is not always optimal. Indeed, if k is large or if ν is small, the rule will dominate (i.e., $q = 1$ will be optimal as a corner solution). Note, however, that if ν is extremely large relative to k, then discretion has an advantage relative to the rule. Notice also that while a large value of ν makes CO attractive in this example, the mixed strategy always dominates CO (i.e., $q = 0$ is never optimal as long as $k > 0$) but does not always dominate UOP.

As a general point, it should be emphasized that the support that such analysis provides for strategies that combine rules and discretion requires careful interpretation. In particular, the analysis does not support the strategy of announcing a rule but not taking the rule seriously, as has sometimes appeared to have been the practice in the past. Rather, as we interpret the analysis, the mixed strategy calls for the authorities to follow a precisely defined rule in "normal circumstances," but to be prepared to override the rule in "abnormal circumstances." In implementing such a strategy, society would have to think carefully about how it wants to define "abnormal circumstances." Our example interpreted abnormal circumstances as synonymous with large v shocks, but it might also be appropriate for the central bank to override the rule temporarily whenever the ultimate target variables had drifted too far off their intended course.

V. Concluding Remarks

This paper has been based on the premise that fully state contingent monetary rules are not relevant choices for monetary policy in practice. The premise partly reflects the limitations in our understanding of the macroeconomic environment; in terms of the classic distinction emphasized by Knight (1921), these limitations include uncertainties about model structure and disturbances that cannot be described by well-defined probability distributions. The premise also reflects the costs that can arise from delaying policy responses to puzzling macroeconomic developments until "new information" has been extracted from these developments; thus, fully state contingent rules that embody a learning process are unattractive in practice, if not infeasible. Consistently, the premise is supported by the observation that, to our knowledge, the only specific forms of monetary policy rules that advocates have put forth have all been simple state independent or partially state contingent policies.

Once fully state contingent rules are discarded as irrelevant, and given that no partially state contingent rule can dominate discretion in all circumstances, it is natural to investigate mixed strategies that optimally combine a partially state contingent rule with discretion. The type of mixed strategy that this paper has described is not a strategy of announcing a rule but not taking the rule seriously, as has sometimes appeared to have been the practice in the past, but rather a strategy in which the authorities follow a precisely defined rule in "normal circumstances" and override the rule only under certain types of conditions.

Of course, institutional mechanisms that penalized central banks for exercising discretion under "normal circumstances" might be important for resolving credibility problems under a mixed strategy, just as they might be for precommitting the authorities to adhere rigidly to a rule in all circumstances. In this context, existing institutional oversight arrangements (generally involving regular cross examinations of central bankers by elected officials) might be more effective if the rule component of the mixed strategy was defined precisely so that adherence to the rule was straightforward to verify.

It may be relevant to note that, in the context of a mixed strategy involving a simple rule that can be overridden under certain types of conditions, many of the arguments against some types of simple monetary rules lose their force. A rule for targeting nominal GNP, for example, becomes more attractive when the rule can be overridden in response to supply shocks.

Finally, and as a general point, the paper has emphasized that the typical procedure for designing and evaluating policy rules based on counterfactual historical simulations is flawed when the rules under investigation are not fully state contingent. In particular, it is not generally valid to base counterfactual simulations on the assumption that rational market participants would have expected the authorities to adhere rigidly to a partially state contingent rule when policymakers, had they actually been confronted with the counterfactual history, would have sometimes had incentives to deviate from the rule.

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