

A Positive Theory of Monetary Policy in a Natural Rate Model*

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Abstract

A discretionary policymaker can create surprise inflation, which may reduce unemployment and raise government revenue. But when people understand the policymaker's objectives, these surprises cannot occur systematically. In equilibrium people form expectations rationally and the policymaker optimizes in each period, subject to the way that people form expectations. Then, we find that (1) the rates of monetary growth and inflation are excessive; (2) these rates depend on the slope of the Phillips curve, the natural unemployment rate, and other variables that affect the benefits and costs from inflation; (3) the monetary authority behaves countercyclically; and (4) unemployment is independent of monetary policy. Outcomes improve if rules commit future policy choices in the appropriate manner. The value of these commitments—which amount to long-term contracts between the government and the private sector—underlies the argument for rules over discretion.

The primary purpose of this paper is to develop a positive theory of monetary policy and inflation. On the one hand, the theory turns out to accord with two perceptions about the world in recent years:

1. Average rates of inflation and monetary growth are excessive relative to an efficiency criterion.
2. There is a tendency to pursue activist, countercyclical monetary policies.

Yet the model exhibits three other properties:

3. The unemployment rate – our proxy for real economic activity – is invariant with monetary policy (neglecting the familiar deadweight-loss aspect of inflation).

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4. The policymaker and the public all act rationally, subject to their environments.
5. The policymaker's objectives reflect the public's preferences.¹

Natural rate models with rational expectations – such as Sargent and Wallace (1975) – suggest that the systematic parts of monetary policy are irrelevant for real economic activity. Some empirical evidence on the real effects of monetary disturbances in the post-World War II United States (e.g., Barro 1977, 1981) is consistent with this result – in particular, there is some support for the proposition that anticipated monetary changes are neutral with respect to output, unemployment, and so on. On the other hand, these empirical studies and others indicated the presence of countercyclical monetary policy at least for the post-World War II United States – rises in the unemployment rate appear to generate subsequent expansions in monetary growth. Within the natural rate framework, it is difficult to reconcile this countercyclical monetary behavior with rationality of the policy-maker.² A principal object of our analysis is to achieve this reconciliation. The natural rate models that have appeared in the macroeconomics literature of the last decade share the characteristic that policy choice is over a class of prespecified monetary rules. With the policy rule predetermined, there is no scope for ongoing policymaking; discretionary policy choice is excluded a priori. If private agents can deduce the characteristics of the monetary process once it is implemented, it defines their expectations. Thus, the policy decision is made subject to the constraint that agents' expectations of future monetary policy will equal the realization. This framework allows the analysis to be reduced to a pair of single-agent decision problems, which can be considered independently. But, this approach cannot deal with the game-theoretic situation that arises when policy decisions are made on an ongoing basis. In our framework an equilibrium will include the following features:

- a*) a decision rule for private agents, which determines their actions as a function of their current information,
- b*) an expectations function, which determines the expectations of private agents as a function of their current information, and
- c*) a policy rule, which specifies the behavior of policy instruments as a function of the policymaker's current information set.

The outcome is said to be a rational expectations equilibrium if, first, the decision rule specified in *a* is optimal for agents given their expectations as calculated under *b*; and second, it is optimal for the policymaker, whose actions are described by *c*, to perform in accordance with agents' expectations *b*, given that the policymaker recognizes the form

¹ The model that we consider is sufficiently simple to allow for unanimity about desirable governmental actions.

² Many people respond with a willingness to view public policy as irrational. Despite the obvious attractions of this viewpoint, it does leave us without a theory of systematic governmental behavior. An earlier attempted reconciliation with rationality (Barro 1977, p. 104) relied on public finance considerations associated with cyclical changes in the revenue obtained from printing money. This avenue appears to be quantitatively insufficient to explain the facts about countercyclical monetary response. However, the revenue motive for money creation is important in some extreme cases. See, e.g., Hercowitz (1981) for an analysis of monetary behavior and government spending during the German hyperinflation.

of the private decision rules under a . Faced by a maximizing policymaker, it would be unreasonable for agents to maintain expectations from which they know it will be in the policymaker's interest to deviate.

If policy is precommitted, the only reasonable expectations that agents can hold are those defined by the rule. But, if policy is sequentially chosen, the equality of policy expectations and realizations is a characteristic of equilibrium – not a prior constraint. We have to determine which expectations agents can reasonably expect to be realized.

We view the policymaker as attempting to maximize an objective that reflects “society's” preferences on inflation and unemployment. (Additional arguments for the preference function are mentioned later.) Although the equilibrium involves a path of unemployment that is invariant with policy, the rational policymaker adopts an activist rule. The extent of countercyclical response depends, among other things, on society's relative dislikes for inflation and unemployment. There is an apparent contradiction because the policymaker pursues an activist policy that ends up having no desirable effects – in fact, unemployment is unaltered but inflation ends up being excessive. This outcome reflects the assumed inability of the policymaker – that is, of the institutional apparatus that is set up to manage monetary affairs – to commit its course of future actions. This feature has been stressed in an important paper by Kydland and Prescott (1977). If commitment were feasible through legal arrangements or other procedures, the countercyclical aspect of monetary policy would disappear (and, abstracting from costs of erecting and maintaining institutions, everyone would be better off). When this type of advance restriction is precluded, so that the policymaker sets instruments at each date subject only to the initial conditions prevailing for that date (which do not include restraints on policy choices), the equilibrium may involve an activist form of policy. This solution conforms to optimal behavior of private agents subject to a rationally anticipated policy rule. It corresponds also to optimality for the policymaker each period, subject to agents' decision rules. Although an equilibrium obtains, the results are suboptimal, relative to outcomes where commitment is permitted. Given an environment where this type of policy commitment is absent – as appears to characterize the United States and other countries in recent years – the results constitute a positive theory of monetary growth and inflation.

We illustrate the results with a simple model, which comes from an example in Kydland and Prescott (1977, pp. 477–80). We augment their example along the lines detailed in Gordon (1980) to include a theory of expectations formation. People form their expectations by effectively solving the problem that the optimizing policymaker will face. The policymaker's problem is then conditioned on the expectations function of private agents. Ultimately, there are no systematic differences between expected and realized inflation. But this property emerges as part of the equilibrium rather than as a constraint on the policy problem.

I. The Model of Unemployment and Inflation

The unemployment rate U_t , which is a convenient proxy for the overall state of real activity, equals a “natural rate”, U_t^n , plus a term that depends negatively on contemporaneous unexpected inflation, $\pi_t - \pi_t^e$,