



Robustly optimal monetary policy in a microfounded New Keynesian model[☆]

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ABSTRACT

We consider optimal monetary stabilization policy in a New Keynesian model with explicit microfoundations, when the central bank recognizes that private-sector expectations need not be precisely model-consistent, and wishes to choose a policy that will be as good as possible in the case of any beliefs close enough to model-consistency. We show how to characterize robustly optimal policy without restricting consideration a priori to a particular parametric family of candidate policy rules. We show that robustly optimal policy can be implemented through commitment to a target criterion involving only the paths of inflation and a suitably defined output gap, but that a concern for robustness requires greater resistance to surprise increases in inflation than would be considered optimal if one could count on the private sector to have “rational expectations.”

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1. Introduction

A central issue in macroeconomic policy analysis is the need to take account of the likely changes in *people's expectations about the future* that should result from the adoption of one policy or another. The most common approach to confronting this issue in analyses of macroeconomic policy over the past 30–40 years has been to hypothesize “rational” (or model-consistent) expectations on the part of all economic agents. For any contemplated policy, this involves determining the outcome (the predicted state-contingent evolution of the economy) that would represent a rational expectations equilibrium (REE) according to one's model and the policy under consideration. One then compares the outcomes under the different REE associated with the different policies, in order to decide which policy is preferable.

While this is certainly a hypothesis of appealing simplicity and generality, it is also a very strong and restrictive hypothesis. There are important reasons to doubt the reliability of policy evaluation exercises that are based – or at least that are solely based – on models that assume that whatever policy may be adopted, everyone in the economy will necessarily and immediately understand the consequences of the policy commitment in exactly the same way as the policy analyst does.

Even if one is willing to suppose that people are thoroughly rational and possess extraordinary abilities at calculation, it is hardly obvious that they must forecast the economy's evolution in the same way as an economist's own model forecasts

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it; for even if the economist's model is completely correct, there will be many other possible models of the economy's probabilistic evolution that are (i) internally consistent, and (ii) not plainly contradicted by observations of the economy's evolution in the past. This is especially true given the relatively short sample of past observations that will be available in practice.

The assumption of model consistent expectations is an even more heroic one in the case that a change in policy is contemplated, relative to the pattern of conduct of policy with which people had experience in the past. Indeed, it is likely that there exist many internally consistent economic models that are consistent with the probabilistic evolution of the economy in the past, which make rather different predictions regarding the effects of a change in policy, while it is hard or even impossible to identify from past data which of these models is actually correct. Hence one should be cautious about drawing strong conclusions about the character of desirable policies solely on the basis of an analysis that maintains the assumption of model consistent expectations.

Here we explore a different approach, under which the policy analyst should not pretend to be able to model the precise way in which people will form expectations, if a particular policy is adopted. Instead, under our recommended approach, the policy analyst recognizes that the public's beliefs might be anything in a certain set of possible beliefs, satisfying the requirements of (i) internal consistency, and (ii) not being *too grossly inconsistent* with what actually happens in equilibrium, when people act on the basis of those beliefs. These requirements reduce to the familiar assumption of model-consistent ("rational") expectations if the words "not too grossly inconsistent" are replaced by "completely consistent."¹ The weakening of the standard requirement of model-consistent expectations is motivated by the recognition that it makes sense to expect people's beliefs to take account of patterns in their environment that are clear enough to be obvious after even a modest period of observation, while there is much less reason to expect them to have rejected an alternative hypothesis that is not easily distinguishable from the true model after only a series of observations of modest length.

Under this approach, the economic analyst's model will associate with each contemplated policy not a unique prediction about what people in the economy will expect under that policy, but rather a *range of possible forecasts*; and there will correspondingly be a range of possible predictions for economic outcomes under the policy, rather than a unique prediction. In essence, it is proposed that one's economic model be used to place *bounds* on what can occur under a given policy, rather than expecting a point prediction. In the spirit of the literatures on "ambiguity aversion" and on "robust control",² and following Woodford (2010), we then suppose that the economic analyst chooses a policy that ensures as high as possible a value of one's objective under *any* of the set of possible outcomes associated with that policy.³ Under a particular precise definition of what it means for expectations to be sufficiently close to model-consistency, this criterion again allows a unique policy to be recommended. It will, however, differ in general from the one that would be selected if one were confident that people's expectations would have to be fully consistent with the predictions of one's model.

The present paper illustrates the consequences of this alternative approach to policy selection in the context of a New Keynesian model of the tradeoff between inflation and output stabilization that is based on explicit choice-theoretic foundations. As in Woodford (2010), we adopt a particular interpretation of the requirement of "near-rational expectations" by supposing that the policy analyst assumes that people's beliefs will be absolutely continuous with respect to the measure implied by her own model⁴ and that their beliefs will not be too different from the prediction of her model, where the distance is measured by a relative entropy criterion. A policy can then be said to be "robustly optimal" if it guarantees as high as possible a value of the policymaker's objective, under any of the subjective beliefs consistent with the above criterion.

This non-parametric way of specifying the range of beliefs that are "close enough" to the policy analyst's own beliefs is based on the approach to bounding possible model mis-specifications in the robust policy analysis of Hansen and Sargent (2005).⁵ It has the advantage, in our view, of allowing us to be fairly agnostic about the nature of the possible alternative beliefs that may be entertained by the public. In addition, it retains a high degree of theoretical parsimony: it simply defines a one-parameter family of robustly optimal policies, indexed by a parameter that can be taken to measure the policy analyst's degree of concern for robustness to possible departures from model-consistent expectations.

¹ The more general proposal is termed an assumption of "near-rational expectations" in Woodford (2010).

² See Hansen and Sargent (2008, 2011) for a discussion of these ideas and their application to decision problems arising in macroeconomics.

³ Alternatively, the policy analyst ensures that a certain lower bound for the policy objective is achieved under as broad as possible a range of possible departures from model-consistent expectations.

⁴ This implies that people correctly identify zero-probability events as having zero probability, though they may differ in the probability they assign to events that occur with positive probability according to her model.

⁵ Our use of this measure of departure from model-consistent expectations is somewhat different from theirs, however. Hansen and Sargent assume a policy analyst who is herself uncertain that her model is precisely correct as a description of the economy; when the expectations of other economic agents are an issue in the analysis, these are typically assumed to share the policy analyst's model, and her concerns about mis-specification and preference for robustness as well. We are instead concerned about potential discrepancies between the views of the policy analyst and those of the public; and the potential departures from model-consistent beliefs on the part of the public are not assumed to reflect a concern for robustness on their part. In Benigno and Paciello (2010), instead, optimal policy is computed under the assumption that members of the public are concerned about the robustness of *their own* decisions, and the policymaker correctly understands the way that this distorts their actions (relative to what the policymaker believes would be optimal for them). Hansen and Sargent (unpublished) consider a similar exercise.

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