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Worldwide macroeconomic stability and monetary policy rules ☆

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ABSTRACT

We study the interaction of multiple large economies in dynamic stochastic general equilibrium. Each economy has a monetary policymaker that attempts to control the economy through the use of a linear nominal interest rate feedback rule. The main results show how the determinacy of worldwide equilibrium depends on the joint behavior of policymakers worldwide. The results also show how indeterminacy exposes all economies to endogenous volatility, even ones where monetary policy may be judged appropriate from a closed economy perspective. Two quantitative cases are discussed. In the 1970s, worldwide equilibrium was characterized by a two-dimensional indeterminacy, despite US adherence to a version of the Taylor principle. In the last 15 years, worldwide equilibrium was still characterized by a one-dimensional indeterminacy, leaving all economies exposed to endogenous volatility. This analysis provides a rationale for a type of international policy coordination, and the gains to coordination in the sense of avoiding indeterminacy may be large.

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1. Introduction

It has been widely documented that the 1970s and early 1980s were characterized by substantially more macroeconomic volatility than the later 1980s or the 1990s in the major industrialized economies.[1] In an influential paper, Clarida et al. (2000) explored the possibility that the earlier era might be viewed as a sunspot equilibrium induced by poor monetary policy. Their empirical results suggested that US policymakers did not obey the *Taylor principle*[2] during this era, and their theoretical findings suggested that failure to obey the Taylor principle can be associated with indeterminacy of rational expectations equilibrium and the possibility of sunspot equilibria. Under this interpretation, the volatility observed during the 1970s was facilitated by poor policy.[3]

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[1] See, for instance, McConnell and Perez Quiros (2000), van Dijk and Sensier (2004), Doyle and Faust (2005), Kim and Nelson (1999), and Stock and Watson (2003).

[2] For a discussion, see Woodford (2001, 2003).

[3] A related view, but one we do not explore in this paper, is the expectations trap hypothesis of Chari et al. (1998).

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A natural question is how the Clarida et al. (2000) analysis may be altered in an open economy setting. With several large economies interacting, determinacy of the resulting world equilibrium hinges on the joint actions of world policymakers. It is not very clear *a priori* how the determinacy conditions might be influenced by the nature of policy in each of the countries, the nature of the economic interactions between the economies, or the relative size of the economies involved. The principal goal in this paper is to explore an international version of the Clarida et al. (2000) argument. One of the recent extensions of the standard New Keynesian model to multiple, large industrialized economies is employed for this purpose. The primary goal is to understand how the monetary policies in the various economies impinge on the determinacy of worldwide equilibrium.

In the closed economy literature, indeterminacy of rational expectations equilibrium has been viewed as an outcome to be avoided if at all possible. This is because indeterminacy is associated with the existence of, at least potentially, quite volatile rational expectations equilibria in which the volatility is unrelated to the fundamental disturbances buffeting the economy.[4] The same view of the worldwide equilibrium is adopted for this paper. But because there are multiple policymakers in the international setting, interest also centers on the implications that might be drawn for international monetary policy coordination. The coordination can be designed primarily to avoid indeterminacy of worldwide equilibrium.

1.1. Main findings

The analysis shows how determinacy of worldwide equilibrium depends on the joint behavior of the world's policymakers in the model. The conditions for determinacy that apply in the open economy setting are shown to be related to certain conditions that are available from known closed economy analyses. The open economy setting puts a relatively sharp upper bound on how aggressive each policymaker can be in its policy rule with respect to inflation deviations in order to remain consistent with determinacy. This finding is consistent with some of the related small open economy literature and suggests that analyses of major industrialized economies in closed economy settings—surely the bulk of the analysis to date in the large and rapidly growing New Keynesian literature—may be misleading from the perspective of the discussion of which types of monetary policy rules are consistent with equilibrium determinacy.

One focus of the paper is the idea that policymakers in a large economy may be able to take a simple unilateral action to guarantee determinacy of worldwide equilibrium. For example, the monetary authority in a large economy might be able to adopt a policy rule of a specific sort that effectively coordinates expectations worldwide and renders worldwide equilibrium determinate, even in a situation where monetary policy in partner economies would be, by itself, inappropriate for generating a determinate worldwide equilibrium. However, it turns out that the scope for one country to take a simple unilateral action to guarantee determinacy of world equilibrium is limited. It can be done, to be sure, in certain situations, but generally speaking if a foreign economy is pursuing a policy sufficiently inconsistent with determinacy, domestic policymakers would have no simple options that would render worldwide equilibrium determinate.[5] Instead, they would have to suffer with indeterminacy and the potential for endogenous volatility, or try to persuade the policymakers in the foreign economy to change their approach to policymaking. One may have the intuition, as we did, that policymakers in a large economy could adopt policies and influence macroeconomic adjustment to shocks in such a way as to avoid the worst types of exposure to endogenous volatility, but such is not the case in the economy here. This and related results are discussed further in the main text.

When worldwide equilibrium is indeterminate, all countries are exposed to endogenous volatility. One aim of the paper is to try to understand how this volatility plays out across the world economy. Sunspot equilibria are simulated for several calibrated, three-country cases, and the extent to which endogenous volatility originating in one country can be transmitted across borders is verified in each case. The dimension of indeterminacy can be as large as nine in a three country model, a clear change from the closed economy analysis. This means that multiple sunspot processes can be operating simultaneously, and in this sense the world economy can be exposed to endogenous volatility originating from many sources. One finding is that even economies in which policymakers are pursuing what may be viewed as an appropriate policy—a policy rule consistent with determinacy when viewed from a closed economy perspective—are exposed to additional volatility in the sunspot equilibrium. Those pursuing inappropriate policies fare even worse. This finding suggests that policymakers from large economies running what appears from a closed economy perspective to be very reasonable monetary policies may still have much to fear from the potential for endogenous volatility worldwide. This concern would be especially pronounced in cases where a large partner economy was pursuing a monetary policy inconsistent with worldwide equilibrium determinacy.

The model analyzed here is not rich enough to match international data in a completely convincing way,[6] but in keeping with the provocative analysis of Clarida et al. (2000), the paper ends with a consideration of some empirical estimates of monetary policy rules for the three largest economies in the 1970s, an era sometimes associated with indeterminacy, and in

[4] See Woodford (1999, pp. 67–69) for a statement of this problem.

[5] In this class of models, leading examples of policies "sufficiently inconsistent with determinacy" include a policy rule which is too close to an interest rate peg, or a policy rule which is too aggressive with respect to inflation deviations from target or the output gap.

[6] For open economy estimates based on a richer model, see Lubik and Schorfheide (2005). Our model has the virtue of collapsing to the standard, simple version of Woodford (2003) when one of the economies is large and closed.