



Indeterminacy and sunspots in two-sector RBC models with generalized no-income-effect preferences [☆]

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Abstract

We analyze sunspot-driven fluctuations in the standard two-sector RBC model with moderate increasing returns to scale and generalized no-income-effect preferences à la Greenwood, Hercowitz and Huffman [13]. We provide a detailed theoretical analysis enabling us to derive relevant bifurcation loci and to characterize the steady-state local stability properties as a function of various structural parameters. We show that local indeterminacy occurs through flip and Hopf bifurcations for a large set of values for the elasticity of intertemporal substitution in consumption, provided that the labor supply is sufficiently inelastic. Finally, we provide a detailed quantitative analysis of the model. Computing, on a quarterly basis, a new set of empirical moments related to two broadly defined consumption and investment sectors, we are able to identify,

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among the set of admissible calibrations consistent with sunspot equilibria, the ones that provide the best fit of the data. The model properly calibrated solves several empirical puzzles traditionally associated with two-sector RBC models.

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1. Introduction

The aim of this paper is to provide a detailed theoretical and empirical assessment of the sunspot-driven two-sector Real Business Cycle model with productive externalities and increasing returns to scale, considering the Greenwood, Hercowitz and Huffman [13] (GHH) specification for individual preferences, characterized by the lack of income effect on labor choices. Compared to the previous literature in which the formal theoretical analysis of such models and their data confrontation step are largely divorced, we argue that providing a complete characterization of the local stability properties of the model as a function of various structural parameters is a crucial ingredient for a successful data confrontation strategy. Following this approach, we are able not only to derive new theoretical configurations for which the two-sector RBC model is locally indeterminate, but also to improve several well-known counterfactual predictions of this model when submitted to sunspot-driven shocks.

The recent literature suggests that by comparison to their one-sector equivalents, two-sector RBC models are able to generate local indeterminacy with much lower degrees of increasing returns to scale.¹ Yet, this result has often been obtained under relatively narrow specifications for technology and/or preferences, without much attention to robustness and domain of validity issues. Besides, in many cases, this result has been obtained through numerical simulations, without explicit consideration of the types of local bifurcations identified (and their implications for the local dynamics around the steady-state).

The first contribution of this paper is thus *theoretical*. It aims to provide a general theoretical analysis of local indeterminacy and local bifurcations in the canonical two-sector RBC model. Starting from Benhabib and Farmer's [4] formulation with increasing social returns, we consider the generalized specification of GHH preferences, enabling us to thoroughly analyze the interplays between increasing returns to scale, intertemporal substitution effects and labor supply elasticity in the emergence of local indeterminacy.

It is known that with GHH preferences and *constant* social returns, local indeterminacy occurs for sufficiently inelastic labor supply (Nishimura and Venditti [23]). Yet, for *increasing* social returns, this result has been extended only for the specific case of a logarithmic specification, and in fact essentially through numerical simulations (Guo and Harrison [15]).²

¹ While indeterminacy requires about 50% of increasing returns to scale in the one-sector RBC model of Benhabib and Farmer [3] and Farmer and Guo [8], this degree decreases to only 7% in its two-sector equivalent (see Benhabib and Farmer [4]). Indeterminacy also occurs with constant social returns to scale and decreasing private returns (Benhabib and Nishimura [5], Garnier et al. [9], Nishimura and Venditti [22]).

² In one-sector models with GHH preferences, the results are drastically different: Meng and Yip [19] and Nishimura et al. [21] have shown that local indeterminacy cannot arise. Jaimovich [18], using a specification that nests the GHH formulation as a special case, has proved that a minimum amount of income effect is necessary for local indeterminacy.

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