



Trade structure and belief-driven fluctuations in a global economy[☆]



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ABSTRACT

This paper constructs a dynamic two-country model with country-specific production externalities and inspects the presence of equilibrium indeterminacy under alternative trade structures. It is shown that the presence of belief-driven economic fluctuations caused by equilibrium indeterminacy is closely related to the specified trade structure. If investment goods are not internationally traded and international lending and borrowing are allowed, then indeterminacy arises in a wider set of parameter space than in the corresponding closed economy. By contrast, either if both consumption and investment goods are traded in the absence of international lending and borrowing or if only investment goods are traded with financial transactions, then the indeterminacy conditions are the same as those for the closed economy counterpart.

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1. Introduction

The central concern of this paper is to explore the relation between trade structure and belief-driven economic fluctuations. Using a dynamic two-country model with country-specific production externalities, we inspect conditions for equilibrium indeterminacy under alternative trade structures. In the presence of equilibrium indeterminacy, non-fundamental shocks (sunspots) affect the expectations of agents, which gives rise to belief-driven business cycles. In this case not only shocks to the fundamentals but also extrinsic uncertainty can generate business fluctuations. We consider which trade structures may yield equilibrium indeterminacy in a wider parameter space than in the closed economy counterpart.

As for our question, the foregoing literature has provided us with two contrasting answers. On the one hand, Meng (2003), Meng and Velasco (2003, 2004) and Weder (2001) show that small-open economies with production externalities hold indeterminacy under weaker

conditions than in the corresponding closed economy models.¹ Hence, according to these studies, opening up international trade may enhance the possibility of economic fluctuations. Nishimura and Shimomura (2002), on the other hand, examine a dynamic Heckscher–Ohlin model of the two-country world in which there are country-specific production externalities. They show that the world economy has the same conditions for equilibrium indeterminacy as those for the closed economy counterpart. In addition, Sim and Ho (2007) find that if one of the two countries has no production externalities in Nishimura and Shimomura's model, then the equilibrium path of the world economy would be determinate even though the country with production externalities exhibits autarkic indeterminacy. These studies indicate that international trade does not necessarily enhance the possibility of belief-driven fluctuations.

At first sight, the opposite results mentioned above seem to stem from the difference in the modeling method used by the existing studies. The small-open economy models are based on partial equilibrium analysis in which behavior of the rest of the world is exogenously given. In contrast, the models of world economy employ the general equilibrium approach that treats the world economic system as a closed economy consisting of multiple countries. Thus one may think that the behavior of an integrated world economy is similar to the behavior of a closed

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¹ Lahiri (2001) also examines indeterminacy in a small-open economy model. Since he uses a framework different from the one used by Meng (2003) and others, his model needs a relatively high degree of external increasing returns to yield indeterminacy. Yong and Meng (2004) and Zhang (2008) also discuss equilibrium indeterminacy in small-open economies.

economy. Such a conjecture is, however, misleading. We demonstrate that the key to the relation between international trade and belief-driven fluctuations is the specification of trade structure rather than the difference in modeling strategy, that is, partial versus general equilibrium analyses. In the foregoing investigations, the papers on small-open economies such as Meng and Velasco (2003, 2004) and Weder (2001) assume that investment goods are not internationally traded, while consumption goods are traded and international lending and borrowing are allowed. By contrast, Nishimura and Shimomura (2002) follow the Heckscher–Ohlin tradition where both consumption and investment goods are traded, while neither international lending nor borrowing are possible. We show that, as well as in the small-open economy models, if investment goods are traded in the domestic market alone, then the world economy model exhibits equilibrium indeterminacy under weaker conditions than those for the closed economy model.

More specifically, we construct a $2 \times 2 \times 2$ model of the world economy in which each country produces both investment and consumption goods under social constant returns. It is assumed that both countries have identical technologies and preferences. If we assume that both investment and consumption goods are tradable and international lending and borrowing are not allowed, then our model is identical to that of Nishimura and Shimomura (2002), so that opening up international trade does not affect the indeterminacy conditions. If investment goods are nontradables and international financial transactions are possible, then the world economy exhibits indeterminacy in a wider range of parameter space than in the corresponding closed economy. Finally, if consumption goods are not traded but investment goods are tradable in the presence of international lending and borrowing, then it is shown that the indeterminacy conditions are the same as those for the closed economy.

As suggested above, this paper is closely related to those of Meng and Velasco (2004) and Nishimura and Shimomura (2002). Both papers are based on Benhabib and Nishimura (1998) who investigate indeterminacy conditions in a closed, two-sector growth model with sector-specific production externalities and social constant returns. The main finding of Benhabib and Nishimura (1998) is that (i) if the consumption good sector is more capital intensive than the investment good sector from the private perspective but it is less capital intensive from the social perspective; and (ii) if the elasticity of intertemporal substitution in consumption of the representative family is sufficiently large, then there is a continuum of converging equilibrium paths around the steady state. Since the integrated world economy discussed by Nishimura and Shimomura (2002) behaves like a single, closed economy, the indeterminacy conditions for their model is the same as those shown by Benhabib and Nishimura (1998). Meng and Velasco (2004) find that in a small-open economy model in which investment goods are nontraded and there are international lending and borrowing, only condition (i) is necessary for establishing indeterminacy: the shape of the utility function has no relation to the indeterminacy conditions.² Our paper uses Nishimura and Shimomura's setting as the base model and introduces nontraded goods and intertemporal trade. The case where investment goods are not traded is, therefore, a two-(large) country version of Meng and Velasco (2004).³

² In the two-sector endogenous growth model of a closed economy where each sector employs physical and human capital under social constant returns, condition (ii) is not needed for holding indeterminacy: see Benhabib et al. (2000) and Mino (2001).

³ Weder (2001) examines an open economy version of a two-sector closed economy model studied by Benhabib and Farmer (1996). In Weder's model the production technology of each sector exhibits constant returns from the private perspective, while it satisfies increasing (or decreasing) returns from the social perspective. It is also assumed that labor supply is endogenous and private factor intensity is identical in both sectors. Weder (2001) also considers the case where the home country is not small so that the world interest rate depends on the asset holding of the home country. Despite those differences from Meng and Velasco (2003), Weder (2001) also finds that the open economy yields indeterminacy under weaker restrictions than the closed economy.

The roles of nontraded goods have been extensively discussed in the literature. The static trade theory has focused on the effects of nontraded goods on trade patterns, terms of trade and resource allocation: see, for example, Komiya (1967), Ethier (1972) and Jones (1974). Also, there is a vast literature on this topic in international macroeconomics and finance. Those macroeconomic studies have been concerned with how the presence of nontraded goods affects real exchange rates, current accounts, asset positions, policy impacts and international business cycles caused by the fundamental shocks.⁴ Turnovsky (1997, Chapter 4), among others, points out that the analytical outcomes may critically depend on which goods are not internationally traded. The foregoing contributions in most cases explore models with equilibrium determinacy. Therefore, the relation between trade structure and belief-driven business cycles has not been explored well in the foregoing studies. Our paper demonstrates that nontraded goods and trade structure play pivotal roles in the destabilizing effect of international trade caused by indeterminacy and sunspots. We also confirm that in the presence of equilibrium indeterminacy, the long-run distribution of wealth in the world market and the steady-state level of asset position of each country become indeterminate: not only the initial holding of asset of each country but also sunspot shocks affect these long-run values. Therefore, if belief-driven economic fluctuations exist, we obtain outcomes and implications that are quite different from those obtained when the equilibrium path of the world economy is determinate.

In what follows, we first set up the analytical basis of our discussion. Then we examine three types of trade structures: (i) both investment and consumption goods are tradables; (ii) only consumption goods are traded and; (iii) only investment goods are traded. In case (i) international lending and borrowing are not allowed. Cases (ii) and (iii) assume the presence of lending and borrowing between the two countries. The next section presents the base model. Section 3 examines case (i). Section 4, the main part of our paper, investigates cases (ii) and (iii). Section 5 gives the intuitive implication of our findings. This section also discusses empirical plausibility of the assumptions made for establishing our main results.

2. Baseline setting

Consider a world economy consisting of two countries, home and foreign. Both countries have the same production technologies. In each country there is a representative household. The households in both countries have an identical time discount rate and the same form of instantaneous felicity function. The only difference between the two countries is the initial stock of wealth held by the households in each country. In this section we concentrate on modeling the home country. Since taste and technology are symmetric between the two countries, the following formulations are applied to the foreign country as well.

2.1. Production

The production side of our model is the same as that used by Nishimura and Shimomura (2002). The home country has two production sectors. The first sector ($i=1$) produces investment goods and the second sector ($i=2$) produces pure consumption goods. The production function of the i -th sector is specified as

$$Y_i = A_i K_i^{a_i} L_i^{b_i} \bar{X}_i, \quad a_i > 0, \quad b_i > 0, \quad 0 < a_i + b_i < 1, \quad i = 1, 2,$$

⁴ A small sample includes Baxter et al. (1998), Brock (1988), Engel and Kletzer (1989), and Turnovsky and Sen (1995). Obstfeld and Rogoff (1996, Chapter 4) and Turnovsky (1997, Chapter 4) present lucid expositions of open-macroeconomic models with nontraded goods.

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