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Trade and Indeterminacy in a Dynamic General Equilibrium Model[1]

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This paper introduces sector-specific externalities in the Heckscher–Ohlin two-country dynamic general equilibrium model to show that indeterminacy of the equilibrium path in the world market can occur. Under certain conditions in terms of factor intensities, there are multiple equilibrium paths from the same initial distribution of capital in the world market, and the distribution of capital in the limit differs among equilibrium paths. One equilibrium path converges to a long-run equilibrium in which the international ranking of factor endowment ratios differs from the initial ranking; another equilibrium path maintains the initial ranking and converges to another long-run equilibrium. Since the path realized is indeterminate, so is the long-run trade pattern. Therefore, the Long-Run Heckscher–Ohlin prediction is vulnerable to the introduction of externality. *Journal of Economic Literature* Classification Numbers: E13, E32, F11, F43.

Key Words: indeterminacy; externality; two-country Heckscher–Ohlin model; trade pattern.

1. INTRODUCTION

This study investigates the dynamic behavior of multiple countries' economic activities in a two-good, two-factor model in which factors are internationally immobile and countries' technologies are subject to sector-specific external effects.

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It has been demonstrated that in a perfect foresight model with many consumers, a competitive equilibrium path behaves like an optimal growth path; see Becker [2], Bewley [5], Yano [16], and Epstein [8]. As these results suggest, a perfect foresight equilibrium path may exhibit the same behavior as in a single consumer model even in a many consumer model such as a large-country trade model. Nishimura and Yano [13, 14] studied the interlinkage of business cycles between large countries in the discrete time model. Atkeson and Kehoe [1] applied a large-country Hecksher–Ohlin (H–O) model to the analysis of development patterns. Bond *et al.* [6] characterized an integrated world equilibrium path in a dynamic H–O model. Chiglino and Olszak-Duquenne [9] investigated economic fluctuations in a two-country dynamic general equilibrium model. However, indeterminacy in a disaggregated model of world economy has not been characterized in the existing literature. Indeterminacy means that there exists a continuum of equilibria starting from the same initial condition, all of which converge to a steady state.

Recently there has been a growing literature on the existence of indeterminate equilibria in dynamic general equilibrium economies. While the earlier results on indeterminacy relied on relatively large increasing returns, Benhabib and Nishimura [4] and Benhabib *et al.* [3] showed that in multisector models indeterminacy can arise with constant social returns to scale if there is a small wedge between private and social returns.

The present paper extends the H–O model by introducing sector-specific externalities. Given a two (-country) by two (-good) by two (-factor) model of international trade in which production technologies are subject to constant returns to scale and preferences are homothetic, and in which the difference between the two countries is only in the factor endowment ratio, the H–O Theorem tells us that each country exports such a good that the abundantly endowed factor of production is intensively used for producing it.

The H–O Theorem is a result in a static framework. Formulating a two-sector dynamic general equilibrium model in which capital accumulation is taken into account, Chen [7] studied a dynamic version of the H–O model.

In the present paper we introduce sector-specific externalities in the dynamic general equilibrium model and show that indeterminacy of the equilibrium path in the world market can occur. It follows that there are multiple equilibrium paths from the same initial distribution of capital in the world market, and the distribution of capital in the limit differs among equilibrium paths, and one equilibrium path converges to a long-run equilibrium in which the international ranking of factor endowment ratios differs from the initial ranking, whereas another equilibrium path maintains the initial ranking and converges to another long-run equilibrium. Since the path realized is indeterminate, so is the long-run trade pattern. Therefore the Long-Run H–O prediction is vulnerable to the introduction of externality.