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# Incorporating international ownership of endowments into a global applied general equilibrium model

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**Abstract**

The ability of comparative static models to capture the long-run effects of trade liberalisation is often limited by their inability to take account of capital accumulation and track foreign ownership. In this paper a method for endogenising capital and tracking foreign ownership is outlined. The mechanism adopted uses endogenous risk premium to explain how investors allocate their saving across regions. This mechanism is incorporated into the GTAP model and used to simulate the long-run effects of Asia–Pacific trade liberalisation. The results show that foreign capital ownership can significantly affect the projected long-run results of trade liberalisation. © 2002 Elsevier Science B.V. All rights reserved.

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## 1. Introduction

The sectoral detail and general equilibrium nature of computable applied general equilibrium (AGE) models make them ideal for analysing the short-run effects of trade liberalisation. It is in the long run, however, where the short-run

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gains of trade liberalisation have led to further capital accumulation, that many additional benefits from trade liberalisation are expected to occur. When long-run mechanisms are introduced, however, applied general equilibrium models quickly become large and complicated; assumptions regarding the mobility of capital need to be made and the ownership of that capital and rental income needs to be taken into account.

Some research into incorporating long-run behaviour into global applied general equilibrium models has been undertaken. In the case of the GTAP model (Hertel and Tsigas, 1997), previous attempts at simple comparative static long-run analysis have included Francois et al. (1996), Walmsley (1998). Both of these methods incorporate steady state characteristics, however, their assumptions regarding capital mobility differ significantly, with Walmsley (1998) opting for perfect capital mobility, while Francois et al. (1996) fixes the trade balance and hence, net capital flows. Both Francois et al. (1996), Walmsley (1998) have had to make certain unrealistic assumptions about the mobility of capital and the allocation of rental income to the owners of that capital.

Willenbrockel (1999) showed using a two-country model that the practice of ignoring cross-ownership of capital could give rise to misleading results. Moreover, Willenbrockel (1999) suggested that in some cases even the sign of the welfare effect might be reversed. Tracking changes in the ownership of capital resulting from trade liberalisation is thus of paramount importance for long-run analysis.

In the Dynamic GTAP model, developed by Ianchovichina and McDougall (2001), some foreign ownership of capital is incorporated by allowing households to invest both domestically and in foreign countries via a global trust. Although ownership is not tracked on a bilateral basis this allows them to track the flow of foreign income to and from abroad and hence make some conclusions regarding welfare. In this paper capital accumulation is dealt with in a comparative static framework and capital ownership is tracked on a bilateral basis. In addition to foreign capital ownership the existence of foreign guest workers and the foreign ownership of land are also examined, although to a lesser extent. The modifications are also made to the standard GTAP model.

The model developed in this paper differs from the Dynamic GTAP model in several respects. Firstly, the comparative static nature of the GTAP model is maintained in this model. Secondly, foreign capital ownership is tracked on a bilateral basis, while the Dynamic GTAP model allows households to invest either in the domestic economy or in all foreign economies via a global trust. Finally, the mechanism for allocating investment across regions differs between the two models. In this model a household allocates saving across regions so as to equalise risk adjusted rates of return, where risk is determined endogenously. In the Dynamic GTAP model the household allocates saving between domestic firms and the trust in such a way as to keep the shares invested in each of these as close as possible to those established in the initial database, subject to certain adding up constraints. In both cases the models ensure that households tend to invest more at home than they do abroad.