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General equilibrium analysis of the Eaton–Kortum model of international trade ☆

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Abstract

We study a variation of the Eaton–Kortum model, a competitive, constant-returns-to-scale multicountry Ricardian model of trade. We establish existence and uniqueness of an equilibrium with balanced trade where each country imposes an import tariff. We analyze the determinants of the cross-country distribution of trade volumes, such as size, tariffs and distance, and compare a calibrated version of the model with data for the largest 60 economies. We use the calibrated model to estimate the gains of a world-wide trade elimination of tariffs, using the theory to explain the magnitude of the gains as well as the differential effect arising from cross-country differences in pre-liberalization tariff levels and country size.

Keywords: General equilibrium; Ricardian trade theory; Trade volume; Tariff policy

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1. Introduction

Eaton and Kortum (2002) have proposed a new theory of international trade, an economical and versatile parameterization of the models with a continuum of tradeable goods that Dornbusch et al. (1977) and Wilson (1980) introduced many years ago. In the theory, constant-returns producers in different countries are subject to idiosyncratic productivity shocks. Buyers of any good search over producers in different countries for the lowest price, and trade assigns production of any good to the most efficient producers, subject to costs of transportation and other impediments. The gains from trade are larger, the larger is the variance of individual productivities, which is the key parameter in the model.

The model shares with those of the "new trade theory" the important ability to deal sensibly with intra-industry trade: trade in similar categories of goods between similarly endowed countries.[1] But unlike the earlier theory, the Eaton–Kortum (2002) model is competitive, involving no fixed costs and no monopoly rents. Of course, fixed costs and monopoly rents are present in reality, but theories based on competitive behavior are much simpler to calibrate and permit the use of a large body of general equilibrium theory to help in analysis.

One aim of this paper is to restate the economic logic of a variation of the Eaton–Kortum model of trade in a particular general equilibrium context. In the next section, we will introduce the basic ideas using a closed economy with a production technology of the Eaton–Kortum type. In Section 3, we define an equilibrium with balanced trade in a world with many countries, each one imposing import tariffs. Section 4 gives sufficient conditions for this equilibrium to exist, and addresses the problem of determining whether this equilibrium is unique and of finding an algorithm to compute it.

A second goal of the paper is to find out whether the cross-country distribution of trade volumes generated by a model of this type is consistent with the behavior of volumes in the data. In Section 5, we calibrate some of the main parameters of the theory. Section 6 discusses some instructive special cases that are simple enough to work out by hand. Using estimates from Section 5, we examine the implications of these special cases of the theory for the volume of trade and the way that trade volume behaves as a function of size, and compare these implications to data on total GDP and trade volumes for the 60 largest economies. Sections 7 and 9 go over the same ground numerically with more realistic assumptions. In these two sections we apply the algorithm described in Section 4, calibrate the model to the observed distribution of GDPs and the relative prices of tradeables to non-tradeable goods, and introduce heterogeneity in transportation costs and tariff rates.

Our normative goal is to use the quantitative theory to estimate the welfare gains from hypothetical trade liberalizations. Comparisons between free trade and autarchy are carried out in Sections 6. Section 8 studies the optimal tariff policy of a small economy. In Section 8 we also calculate the effects of a world-wide liberalization in which every country's tariffs are set to zero. We use the theory to explain the magnitude of the average gains of trade, as well as differential effects arising from cross-country differences in pre-liberalization tariff levels and country size. Section 9 describes the effects on these estimates

[1]See, for example, Ethier (1979, 1982), Krugman (1979), Helpman (1981), and the Helpman and Krugman (1985) monograph. Baxter (1992) argues that competitive, Ricardian models are equally capable of dealing realistically with intra-industry trade.