Interacting factor endowments and trade costs: A multi-country, multi-good approach to trade theory

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Abstract

We provide a synthetic analysis of the different ways in which countries participate in the world economy. Classic trade questions are reconsidered by generalizing a factor-proportions model to multiple countries, multiple goods or multi-stage production, and country-specific trade costs. Each country's production specialization, trade and welfare is determined by the *interaction* between its relative endowment and its trade costs. We consider the effects of allowing one good to 'fragment' into component and assembly production. The volume of trade and welfare levels are higher with fragmentation for most countries, although for many countries these variables fall with fragmentation.
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Trade theory tends to be dominated by two-country models while empirical research inevitably confronts multi-country data. Theoretical analyses which do assume multiple countries often rely on product differentiation (Armington or monopolistic-competition), free trade, and possibly factor-price equalization to obtain results. Often the models are not solved for world general equilibrium, especially outside of the factor-price-equalization set.

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While rich insights have certainly been gained from the two-country approach, some inherent limitations of two-ness rule out many interesting and important questions. A couple of examples for factor-proportions models are as follows. First, consider a country with the average world endowment. In a two-country model, the other country has the same endowment by definition and so a country with the average world endowment is predicted not to trade, which is surely counter empirical. Second, suppose that there are three goods to be produced. With two countries, one country must produce at least two of the goods, so some specialization patterns are ruled out. Both countries cannot be specialized even if they have extreme endowment ratios. Third, consider trade costs. In a two-country world, there is no meaningful sense in which one country has low trade costs and the other high trade costs. We could never ask how two countries with the same factor proportions but different trade costs differ in their production and trade patterns. A fourth example comes from the theory of multinational firms. A two-country model will generally not support horizontal and vertical firms simultaneously.

These limitations are the motivation for this paper. The purpose of the paper is to reconsider a set of classic trade questions where there are multiple countries which differ in relative endowments and trade costs. Our basic set up is a two-dimensional space of countries, differing in relative factor endowments and in trade costs, and we characterize the production and trade of every country in this two dimensional space. We begin by deriving the pattern of production specialization, trade, and factor prices in a three-good, two-factor context, comparing trade to autarky for all countries. The model is also an excellent vehicle for considering multi-stage production and outsourcing, topics of current interest. Our second exercise is thus to begin with trade in a two-good model, and then allow the production of one good (X) to fragment into two stages, components (C) and assembly (A) and assess how countries with different factor endowments and trade costs react to this new opportunity.

Several results can be highlighted for the three-good model. First, a low-trade-cost country with the average world endowment may specialize and trade a great deal. Such a country gains from trade, but those gains are small compared to countries with endowments far from the world average. Second and closely related, there is not a strong correlation between trade volumes and gains from trade. This raises questions about attempts such as that of Frankel and Romer (1999) to empirically quantify gains from trade on the basis of trade volumes.

Turning to fragmentation and outsourcing, we show that some countries engage in assembly just for the domestic market, while others operate as export platforms for assembled goods. We thereby provide an integrated treatment of patterns of production that have previously been studied in quite different models.[1] Fragmentation also affects trade volumes and welfare. While many countries respond to fragmentation with increased trade volumes, for some countries trade volumes fall.[2] Turning to welfare, we show that while most countries gain from fragmentation, a set of countries with relative factor abundance close to the factor intensity of integrated X production lose from fragmentation, a result anticipated by Jones and Kierzkowski (2001).

1. Related literature

Our paper relates to an extensive range of existing literature, both theoretical and empirical. An early multi-country approach to factor-proportions trade is found in Leamer (1984, 1987) with

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[1] Domestic market oriented assembly and export platform assembly correspond to the notions of horizontal and vertical investment developed in the literature on multinationals (Markusen, 2002).

[2] Our results on the relationship between trade volumes, trade costs and fragmentation are consistent with those of Yi (2003).