Beyond the home market effect: Market size and specialization in a multi-country world

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ABSTRACT

The standard two-country model of international trade with monopolistic competition predicts a more-than-proportional relationship between a country's share of world production of a good and its share of world demand for that same good, a result known as the 'home market effect'. We first show that this prediction does not generally carry through to the multi-country case, as production patterns are crucially affected by third country effects. We then derive an alternative prediction that holds whatever the number of countries considered. This new prediction takes into account important features of the real world such as comparative advantage due to cross-country technological differences and lack of factor price equalization.

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1. Introduction

Since Krugman (1980), general equilibrium models of international trade with increasing returns to scale and trade costs have been associated with what has come to be known as the 'home market effect' (henceforth, HME). This effect is generally defined as "a more-than-proportional relationship between a country's share of world production of a good and its share of world demand for the same good" (Crozet and Trionfetti, 2008, p.2).[1] As a result, "countries will tend to export those kinds of products for which they have relatively large domestic demand" (Krugman, 1980, p.955).

The basic HME model is traditionally considered to be the one proposed by Helpman and Krugman (1985) in the wake of Krugman (1980). Their setup features two countries and two sectors employing labor as their only input. One sector supplies a freely-traded homogeneous good under constant returns to scale and perfect competition, whereas the other sector produces a horizontally differentiated good under increasing returns and monopolistic competition à la Dixit and Stiglitz (1977). Preferences are Cobb–Douglas across the two goods and symmetric CES across varieties of the differentiated good. For each variety of the differentiated good, fixed and marginal input requirements are constant and identical across countries. International trade in that good is hampered by frictional trade costs of the 'iceberg' type, whereas the homogenous good can be traded freely. The latter assumption leads to factor price equalization (henceforth, FPE) across countries, i.e., labor earns the same wage everywhere. When taken together, FPE, trade costs and a fixed input requirement imply that the larger country supports, in equilibrium, the production of a more-than-proportionate number of differentiated varieties. This makes the larger country a net exporter of the differentiated good as, due to symmetry, output per variety is

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[1] There is an alternative definition of the HME that captures the impact of country size on wages when these are not equalized (Krugman, 1980). We discuss the issue of factor price equalization below. See also footnotes 4 and 6 for further details.

identical across countries while demand is proportionate to country size.

The string of restrictive assumptions underlying the basic HME model is quite long. It concerns: (i) preferences; (ii) market structure; (iii) the existence of a freely traded good; (iv) factor price equalization; and (v) the focus on just two countries.[2] Given the central role played by the HME in new trade theory, a key issue has therefore become the extent to which this result survives changes in those assumptions. The literature has thus far made progress on the first four issues.

Concerning preferences, Helpman (1990) specifies the demand conditions under which the HME materializes: the cross-elasticity between varieties of the differentiated good must exceed the overall price elasticity of demand for the differentiated good as a whole. Replacing the upper-tier Cobb–Douglas preferences with a CES function, Yu (2005) finds that the value of the elasticity of substitution across the homogeneous and the differentiated goods matters for the existence of the HME. Head et al. (2002) show that, when goods are differentiated according to their place of production (as in Armington, 1969) rather than according to the firms producing them (as in Dixit and Stiglitz, 1977), the HME may also vanish. Finally, Ottaviano and van Ypersele (2005) show that CES preferences, leading to fixed markups over marginal cost, are not needed to generate a HME.

As for market structure, Feenstra et al. (2001) as well as Head et al. (2002) show that monopolistic competition per se is not crucial in that the HME can arise even in homogenous good sectors with restricted entry and Cournot competition. All that matters is the presence of positive price–cost margins and trade costs.

The role of the freely traded homogeneous good produced by the perfectly competitive sector, the so-called 'outside good', has also been analyzed in detail. Its existence leads to FPE as long as the good is produced in both countries. The outside good also allows for international specialization as it absorbs the trade imbalances arising in the Dixit–Stiglitz sector. Extending previous insights by Davis (1998), Crozet and Trionfetti (2008) introduce Armington differentiation and 'iceberg' trade costs in the homogenous good sector, thus preventing FPE from holding in general.[3] Their set-up generates the results in Davis (1998) and Helpman and Krugman (1985) as special cases when, respectively, there is no Armington differentiation and there is neither Armington differentiation nor trade costs for the outside good. Through numerical analysis they show that the HME survives, with the qualification that it is stronger for countries whose demands deviate more significantly from the average. Accordingly, "the outside good assumption, although clearly at odds with reality, does not affect qualitatively the results concerning international specialization and the direction of trade [so that] its pervasive use is justifiable on the ground of algebraic convenience" (Crozet and Trionfetti, 2008, p. 21).

The survival of the HME in a multi-country set-up is, instead, still a much neglected issue. This is surprising both because of its importance for empirical analysis (see, e.g., Davis and Weinstein, 1999, 2003; Head and Mayer, 2004; Crozet and Trionfetti, 2008) and because of the early doubts on its theoretical robustness (Krugman, 1993). Our aim is to fill this important gap in the theoretical and empirical exploration of the predictions of international trade models with monopolistic competition. In so doing, we start by showing that the HME prediction does not generally carry through to the multi-country case, as production patterns are crucially affected by third country effects. Then we derive an alternative prediction that holds whatever the number of countries considered. This prediction takes

also into account other important features of the real world such as the cross-country variations in Ricardian comparative and absolute advantages leading to the violation of FPE. In particular, we show that the model predicts the existence of a more-than-proportional relationship between a country's share of world demand and its share of world production only after the impacts of third country effects and comparative advantage are controlled for, which can be achieved through a simple linear filter.

Two modelling choices make our results analytically neat. First, we maintain the assumption of a freely traded outside good. As argued by Crozet and Trionfetti (2008), this is not likely to substantively affect our results. Second, following Deardorff (1984) and Trefler (1995), we allow for the violation of FPE by introducing Ricardian differences in technology that generate international wage differences that are invariant to international sectoral specialization.[4]

The remainder of the paper is divided into four sections. Section 2 extends the model by Helpman and Krugman (1985) to a set-up with an arbitrary number of countries and Ricardian differences in technology. Section 3 characterizes the equilibrium of the extended model. Section 4 first shows that the HME is not a general property of the equilibrium. Then it explains how a more-than-proportional relationship between a country's share of world demand and its share of world production always emerges after controlling for third country effects and technological differences. Section 5 concludes.

2. An extended Helpman–Krugman model

The world economy consists of M countries indexed $i = 1, 2,..., M$. Country i hosts an exogenously given mass of $L_i > 0$ consumers, each of whom supplies one unit of labor inelastically. Hence, both the world population and the world labor endowment are given by $L = \sum_i L_i$. Labor is the only factor of production, is assumed to be internationally immobile and its services are traded in perfectly competitive national labor markets.

Preferences are defined over a homogenous outside good (H) and over a continuum of varieties of a horizontally differentiated good (D). The preferences of a typical resident of country i are represented by the following utility function:

$$U_i = H_i^{1-\mu} D_i^\mu, \ 0 < \mu < 1. \tag{1}$$

In expression (1), D_i is a CES subutility defined over the varieties of the horizontally differentiated good as follows:

$$D_i = \left[\sum_j \left(\int_{\Omega_j} d_{ji}(\omega)^{\frac{\sigma-1}{\sigma}} d\omega \right) \right]^{\frac{\sigma}{\sigma-1}},$$

where $d_{ji}(\omega)$ is the consumption in country i of variety ω produced in country j, and Ω_j is the set of varieties produced in country j with $j = 1, 2, ..., M$. The parameter $\sigma > 1$ measures both the constant own-price elasticity of demand for any variety, and the elasticity of substitution between any two varieties.

The production of any variety of the differentiated good takes place under increasing returns to scale by a set of monopolistically competitive firms. This set is endogenously determined in equilibrium by free entry and exit. In what follows, we denote by n_i the mass of firms located in country i.