



Ubiquitous inequality: The home market effect in a multicountry space[☆]



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HIGHLIGHTS

- We reveal an economic mechanism for spatial inequalities of both nominal income and real income in a multicountry space.
- We derive a non-monotonic relation between income inequalities and trade integration.
- The HME is examined in a multicountry space.
- Two HMEs in terms of firm share and labor wage, are observed and equivalent.
- The HME in terms of trade pattern is not equivalent to other two.

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ABSTRACT

We show that spatial inequalities in an economic space of multiple countries in terms of both nominal income and real income are ubiquitous in the sense that they appear when countries are differentiated by population only. A new trade theory model is constructed without any freely traded homogeneous good, so that we can examine the home market effect (HME) and the non-monotonic relation between income inequalities and globalization. Meanwhile, there are three HME definitions for a two-country space in terms of firm share, labor wage, and trade pattern. The first two remain applicable in a multicountry space, and they are shown to be equivalent. However, a natural extension of the third is not equivalent.

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1. Introduction

Two kinds of inequality are known in our society, natural or physical and ethical or political. The former is attributed to different skills and abilities and is considered acceptable, while the latter results from specific economic systems and is considered detrimental because it makes economies inefficient and unstable.

This naturally leads to a question, is the second inequality avoidable?

This paper focuses on spatial inequality, which appears not only between countries but also within them, exhibiting uneven economic development. Globalization is one of the reasons for spatial income inequalities (Anand and Segal, 2008). The heterogeneity of space (uneven distribution of technologies, natural resources, and amenities) results in such inequalities, whose linkage has been extensively explored by traditional trade theory. Meanwhile, by a model of New Trade Theory (NTT), a recent paper of Takahashi et al. (2013) shows that the income inequality between two countries always occur in the spatial equilibrium even when the countries are homogeneous and differ only in size. Moreover, such a spatial inequality initially rises and then falls when globalization deepens. Consequently, the inequality appears even when there are no relative advantages in technology, resource endowment, and geographic feature.

However, the analysis of Takahashi et al. (2013) is limited to the case of two countries. In a space of two countries, there is only one way the countries can interact. Moving away from one

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country automatically implies that firms go to the other country. Whereas in the case of more than two countries, there are many ways in which these countries can interact.¹ So it is not clear how the two-country analysis extends. We need a multicountry model to incorporate complex feedback, which is also important for empirical studies.

The primary purpose of this paper is to generalize Takahashi et al. (2013) into an economic space of multiple countries, showing the non-monotonic curve of income inequality between any two countries when trade is more integrated. Some empirical studies supporting this fact are known. For example, Williamson (1965) observes a non-linear relation between regional inequalities and national development in the United States; Barrios and Strobl (2009) observe bell-shaped spatial inequalities in the European Union; and Sala-i-Martin (2006) concludes that the poverty rate in Latin America decreased in 1970s but increased slightly in 1980s and 1990s. By contrast, theoretical studies are not sufficient. To the best of our knowledge, Behrens et al. (2009) is the only NTT paper considering firm locations in an economic space of multiple countries.² However, as in most NTT papers, a freely traded good is assumed there which equalizes the wages all over the world if there is no Ricardian productivity difference among the countries. For this reason, their model cannot be applied to examine the spatial inequality of nominal income, especially its non-monotonicity.

The income inequality between any pair of countries is an economic concern in general, which is observable in our two-factor model (labor and capital) without a freely traded good. Due to the assumption of homogeneous labor and capital endowment, the income inequality is measured by the wage differential between the countries in our model. We derive the wage rates by investigating the home market effect (HME), which plays a central role in NTT. The HME is formally defined as a phenomenon in which a country with a larger local demand attracts a more-than-proportionate share of manufacturing firms (Krugman, 1980, Section III; Helpman and Krugman, 1985, Section 10.4). Note that in a perfect competitive market with a technology of constant returns to scale, the firm share in a country is exactly the same as the population share there. Thus, the HME discloses an agglomeration force resulting from the monopolistic competition and the technology of increasing returns to scale, which is known as the second-nature force.³ The HME is closely related to trade costs, or globalization level. Moreover, two other definitions for the HME are known in relevant literature. One is based on wage rates. Other things being equal, the wage is higher in a larger country (Krugman, 1991, p. 491; Behrens et al., 2009, footnote 1). The existence of this HME implies the wage inequality, and we are also interested in how this inequality depends on trade integration. The third definition is based on trade pattern: the large country is a net exporter of manufactured goods (Krugman, 1995, p. 1261; Davis, 1998, p. 1271). Note that capital is mobile across countries which generates returns repatriated to the owners, a trade surplus in manufactured goods is possible in our model.

While different definitions are applied in different studies, they are shown to be equivalent in the two-country framework of

Takahashi et al. (2013). Another purpose of this paper is to examine their relation when there are more than two countries. We find that the HME definitions in terms of firm share and wage are equivalent in this more general setting as well, but the definition in terms of trade pattern is not. So our multicountry model offers some clarification for the alternative HME definitions. Essentially, the definition in firm share measures the ratio of firm number to population, but the definition in trade pattern measures the differential between firm number and population. They become different when more than two countries are involved. Since the real world consists of many countries, this theoretical result is important for empirical studies on the HME.

We emphasize that the extension to many countries requires a far more delicate mathematical idea beyond the two-country model technique. Due to the simpler structure of a two-country space, the existence of a spatial equilibrium can be explored by the intermediate value theorem. However, to ensure the equilibrium existence in a space of multiple countries, we need to construct a suitable mapping to utilize the fixed point theorem. It is noteworthy that the wages in our model are determined by wage equations implicitly. In order to establish the non-monotonic shape of wage differential, we have to investigate the wage equations to clarify the shape of wage curves by the implicit function theorem. These techniques are new in the literature of both new trade theory and inequality, which constitute a technical contribution of this paper.

The remainder of the paper is organized as follows. In Section 2, we establish the model of n countries. Section 3 provides the equilibrium analysis. The main results are given in Sections 4 and 5. While Section 4 studies the HME definitions and its existence, Section 5 examines the ubiquitous inequalities in terms of both nominal income and real income. Finally, Section 6 summarizes the conclusions.

2. The model

Countries in the real world are different in many respects, making it difficult to build a multicountry model. Since the HME aims to clarify the role of second nature and size effect in trade pattern, we assume all countries are symmetric except for their sizes.⁴ In particular, we exclude first-nature features such as technological difference, resource abundance, and geographical advantage. This does not mean that these factors are unimportant. To the contrary, as shown in Behrens et al. (2009), the excluded factors do impact on economic activities. However, including them in a model would obscure the size effect.⁵

Specifically, the global economy consists of n countries $i = 1, 2, \dots, n$, which have the same conditions except for their population sizes. Let the population share in country i be $\theta_i \in (0, 1)$. We label these countries such that $1 > \theta_1 \geq \theta_2 \geq \dots \geq \theta_n > 0$. We assume two factors for production: labor and capital.⁶ There are L units of labor and K units of capital in total. We rule

¹ Analogous to game theory, an $m \times n$ matrix game is much more complicated than a 2×2 matrix game.

² An earlier paper by Tabuchi et al. (2005) considers the economic activity of multiple regions by a core-periphery model, where skilled workers are mobile and regions have the same number of unskilled workers.

³ Borrowed from Cronon (1991), “first nature” is a force by which firms locate according to local natural advantages while “second nature” is a force by which firms locate according to an advantage stemming from the presence of other firms. These terms are adopted in a series of new economic geography papers including Krugman (1993) and Redding (2010), etc.

⁴ Although the country size is a kind of first-nature feature, in a perfect competition market with a production technology of constant returns to scale, the number of firms in a country is proportional to its population size when trade costs are positive. Therefore, in the new trade theory, it is common to assume different country size and examine how the number of firms in a country is disproportional to the country size.

⁵ For the same reason, the assumption of two symmetric regions is imposed in the core-periphery model of Krugman (1991). Such an assumption makes our model far from the real world, but it is the only way to capture the essence of the second nature. To analogize, we need to peel an orange to taste the flesh; otherwise, we will not know whether the taste is from the peel or the flesh.

⁶ According to Takatsuka and Zeng (2012a,b), capital is an important production factor to be included in HME analysis.

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