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## Asymmetric globalization and specialization

Cheng-Te Lee<sup>a</sup>, Deng-Shing Huang<sup>b,\*</sup><sup>a</sup> Department of International Trade, Chinese Culture University, Taiwan<sup>b</sup> Institute of Economics, Academia Sinica, Taiwan

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## ABSTRACT

This paper constructs a theoretical framework to analyze the impact of international openness of the relatively big globalizers on specialization. In contrast to the conventional positive effect of market size on specialization, we show market expansion induced by asymmetric globalization may decrease the level of specialization in terms of components. In addition, the number of components produced in the big globalizers may also decrease, a case distinct from the conventional home-market effects.

## 1. Introduction

The process of globalization has many facets, and one of the most important is probably international openness through trade. By integrating a relatively closed economy into the world trade system, the consequence of globalization can be regarded as the phenomenon of ‘market size’ expansion, or market thickening in the sense of McLaren (2000). Then, following the conventional wisdom of the theorem of Adam Smith (1776), “That the Division of Labour Is Limited by the Extent of the Market”, we should observe its impact on the economic organization at either the firm level or industrial level,<sup>1</sup> such as the degree of production fragmentation or vertical disintegration.

In modern economic theory, by using Dixit and Stiglitz’s (1977) monopolistic competition structure, many studies reexamine the relationship between globalization and specialization, e.g., Ethier (1979, 1982). The conventional wisdom that a rise in the size of the world market increases the number of specialized firms in the global economy is addressed by the Dixit-Stiglitz-Ethier (henceforth DSE) framework. However, the positive relationship between globalization and specialization under the DSE framework is based on the assumption of constant demand elasticity of labor, meaning that the firm size is implicitly unaffected by the global market size. Eckel (2003, 2008) extends the DSE model by considering variable demand elasticity, and in a more general framework he proves that whether the specialization increases or decreases depends on the shape of the cost function after globalization. However, all the existing studies are based on the presumption that there is even expansion in world market size through globalization, termed “symmetric globalization”. In other words, it is assumed that the newly open economy is identical to each of the small countries in the global economy.

In fact, the ongoing process of globalization does not follow the pattern of uniform expansion in the world market size. In the 1990s, we do observe that the winners of the great globalization push are in general small countries, for example, New Zealand, Chile, Dubai, Finland, Ireland, the Baltic Republics, Slovenia, Slovakia, Singapore, Taiwan, Hong Kong, and South Korea. Because small

\* Correspondence to: Institute of Economics, Academia Sinica, 128, Academia Rd. Section 2, Nankang, Taipei 11529, Taiwan.

E-mail address: [dhuang@econ.sinica.edu.tw](mailto:dhuang@econ.sinica.edu.tw) (D.-S. Huang).

<sup>1</sup> See Stigler (1951) for the implications of Smith’s (1776) theory in economic organization, especially the division of labor within a firm and vertical disintegration under industrial level. For an explicit model on the positive impacts of market size on labor division within a firm see Chaney and Ossa (2013).

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countries are more flexible and can adapt more easily to rapidly changing markets, they are winners in the globalizing world. However, since roughly 2000, the newly emerging countries or ‘winners’ are big globalizers with large populations such as Brazil, Russia, India, and China (henceforth BRIC). The four BRIC countries are highly populous, comprising more than 2.8 billion people or 41.43% of the world population in 2014, with Brazil having 0.206 billion, Russia 0.143 billion, India 1.295 billion and China 1.364 billion.<sup>2</sup> More importantly, the emergence of China in the world trade systems has triggered a dramatic change in the supply chain networks of many industries. As addressed in the [International Monetary Fund \(IMF\) reports \(2012\)](#), the rise of China has changed the supply chain network in Asia as it has become a center of Asia's supply chain. Similarly, China's output share in the world market has been rising dramatically, and it has become the top exporting country in recent years in many industries, like consumer electronics, smartphones etc. as illustrated in [Table 1](#). As shown in the table, among the world's top ten brand companies after 2013, China's smart phone companies have increased from four to seven in just three years, corresponding with a dramatic rise in the global market share from 16.5% in 2013 to 33.6% in 2015. A similar pattern can be observed for the LCD television firms. China's LCD TV firms listed in the world's top ten have increased from three brand companies to four, corresponding with a significant rise in market share from 15.6% to 18.7% during the same period.

The phenomenon of big globalizers and their impacts on specialization and the corresponding distribution of firms between the big vs. small countries is of interest and deserves further analysis. The existing literature considering the expansion of more identical countries into the global trade system, like [Eckel \(2003, 2008\)](#), fits the case of small-globalizer countries before the 1990s (i.e., symmetric globalization).<sup>3</sup> As an extension, we will consider the case of asymmetric globalization, i.e., a relatively big globalizer integrating into the world market, and explore its effects on the degree of specialization and the distribution of firms between countries. More specifically, we prove that asymmetric globalization does not necessarily cause more specialization in term of the number of firms producing intermediate goods. In addition, while the small countries' number of firms is always reduced, the big globalizer's does not necessary increase. In the case of endogenous sunk cost and high labor elasticity, big globalizer's number of firms can also decline as a result of globalization.

The rest of this paper is organized as follow. [Section 2](#) establishes a modified DSE model and solves for the equilibrium. [Section 3](#) conducts the comparative statics to elaborate the impacts of asymmetric globalization. [Section 4](#) concludes the paper.

## 2. The model

We assume that the consumer goods are assembled costlessly by using a diversity of horizontally differentiated intermediate goods. Hence, the production function of consumer goods can be specified as follows:

$$X = n^{\frac{1}{\rho} - \frac{\sigma}{\sigma-1}} \left( \sum_{i=1}^n Q_i^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}. \quad (1)$$

The variable  $X$  represents the aggregate output of the consumer goods.  $Q_i$  is the input of intermediate goods  $i$ , and there are  $n$  types of intermediate goods or components, each produced by only one firm. In addition,  $\sigma > 1$  represents the elasticity of substitution between the various intermediate goods inputs. The parameter  $\rho \in (0, 1)$  indicates how  $n$  increases the output of the consumer goods for any volume of intermediate inputs, namely the productivity-raising effect of specialization.<sup>4</sup>

The labor is the sole input for the production of intermediate goods. The labor requirements are assumed as follows:

$$L_i = L_f(Q_i). \quad (2)$$

We impose symmetry on all intermediate goods. Hence, the indices can be omitted.

Suppose that there are internal economies of scale in the production of intermediate goods. The assumption implies that  $L(\nu Q) < \nu L(Q)$ , where  $\nu$  is a constant. Define the elasticity of labor requirements as follows:

$$\frac{\partial L}{\partial Q} \frac{Q}{L} = \gamma(Q). \quad (3)$$

The increasing internal returns to scale implies  $0 < \gamma < 1$ . The elasticity  $\gamma$  will play an important role in our analysis. It can explain how internal returns to scale alter when the output of consumer goods rises. Through the first derivative of  $\gamma$ , we can express different functional forms of the labor requirements. The elasticity  $\gamma$  is increasing in  $Q$  ( $\gamma' > 0$ ) when labor requirements are linear, which implies that there are exogenous fixed labor requirements and constant marginal labor requirements. The elasticity  $\gamma$  is a constant, and  $\gamma' = 0$  when labor requirements are iso-elastic. In the case of endogenous sunk costs, Eq. (2) becomes concave and the elasticity  $\gamma$  is decreasing in  $Q$  ( $\gamma' < 0$ ).<sup>5</sup> In addition, prices are equal to the average costs, because there is free entry in all industries (upstream and downstream). Meanwhile, all income is labor income.

Apart from [Eckel's \(2008\)](#) model of many (said  $k$ ) identical countries in the world trade system, we assume that there are a group of identical small countries and a big country in the global economy. Let  $\bar{L}$  be the sum of all the smalls' labor endowment, and  $a\bar{L}$  the

<sup>2</sup> Statistics are retrieved from the dataset of World Development Indicators, World Bank.

<sup>3</sup> In [Eckel \(2003\)](#)'s two country model, the globalization is modeled by the expansion of the world-wide labor supply. The model was simplified and extended in [Eckel \(2008\)](#) to the case of identical  $k$  countries, and the globalization is modeled by the increase in  $k$ .

<sup>4</sup> For a similar setup refer to [Eckel \(2008\)](#) and references therein.

<sup>5</sup> See [Dasgupta and Stiglitz \(1980\)](#), [Leahy and Neary \(1996\)](#), [Spence \(1984\)](#) and [Eckel \(2003, 2008\)](#) for the same notion.

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