International outsourcing, wage gap, and welfare

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A B S T R A C T

Comparing to other OECD countries, "the Japanese economy appears to not yet be fully taking advantage of international outsourcing" (Tomiura, 2008). Would the different attitudes toward international outsourcing strategy make a difference in the welfare of the economy as a whole? To address this issue, I present a three-country model to argue that a country that is engaged in international outsourcing, ceteris paribus, will have a higher wage rate than the country otherwise. Welfare improves in all countries since the benefits of international outsourcing diffuse abroad. However, the diffusion effect increases with the relative scale of the outsourcer to non-outsourcer.

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1. Introduction

As is well known, a new pattern of trade has emerged within international outsourcing activities. Hummels et al. (2001), using the input–output tables of OECD and some emerging market countries, calculated that vertical specialization (or so-called international outsourcing) accounted for approximately 30% of the world's exports, growing more than 30% between 1970 and 1990. They found that the overall outsourcing shares vary widely across the OECD countries, ranging from less than 10% in countries like Japan and Australia to more than 30% in countries like Canada and the Netherlands.[1] In particular, for every country but Japan, the outsourcing share grew during the period 1970–1990, while the outsourcing shares of Australia, Canada, France, the U.K., and the U.S. grew by 25% or more.

Mann (2003) calculates that the globalized production and trade made information technology hardware 10 to 30% cheaper than it would have been otherwise. The price decrease can be translated into higher productivity growth and a faster real GDP growth of 0.3% per year from 1995 to 2002 in the United States. Furthermore, Bhagwati et al. (2004) argue that the international outsourcing principally relocates associate intermediate inputs to the countries that have a comparative advantage in production, acting as an input-saving technical change, thereby augmenting productivity. In consequence, the prices of products are decreased and real wages are then raised. As a result, all of the labor in a country may benefit from an increase in international outsourcing activities due to a raising real wage, especially at the same

time when the country applies a fair tax reform and also devotes increased emphasis on education to shift the concentration of income to the poorer segments of society.

Despite the argument that globalization, either in the form of international outsourcing or foreign direct investment, improves average incomes in developing countries (Borensztein et al., 1998; Dollar and Kraay, 2002) and gives rise to welfare for the countries as a whole (Bussmann et al., 2005), some countries zealously embrace globalization while others passively confront it. This paper aims to address how the different attitudes toward international outsourcing strategy affect the welfare of the economy.

Mann's (2003) estimation shows that global production leads to higher productivity grow of the firms, which helps explain why global souring is prevailing in the last two decades while enterprises in the developed countries largely take advantage of the lower wages in the developing countries to leverage the low production cost there. For example, Apple designed most of the system architectures for the iPod in-house, but simultaneously outsourced more than 99% of its intermediate input to the low-wage Asia-Pacific region (Einhorn, 2007). By this way, Microsoft can focus on R&D activities in order to develop a game system that is expected to be technologically superior to rival systems (e.g., Sony's PlayStation), thus enhancing productivity further. A similar situation applies to almost all manufacturing industries, such as the personal computer made by Dell and Hewlett-Packard, and even software programming designed by Electronic Arts.

To the contrary, as mentioned above, Japanese firms are generally more conservative regarding production abroad.[2] It is interesting to note that, in response to Microsoft's general production cost saving

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[1] Hummels et al. (2001) define the vertical integration share as the share of imported intermediate-inputs embodied in total exports. Here, let's refer to the vertical integration share as the outsourcing share for consistency.

[2] A survey covering more than 5000 large-sized firms across all manufacturing industries in Japan shows that merely 21% of the firms are outsourcing offshore (Ito et al., 2007; Tomiura, 2007).

from international outsourcing, Sony has been forced to outsource its PlayStation game console to Foxconn, a Taiwanese firm whose major production facilities are located in China.

The real practice mentioned above implies that international outsourcing adds price competition to the firms that undertake it and then urges the other firms to follow up. It is informative to address a model to illustrate the reasons behind the phenomenon.

2. The basic model

In a world of three countries, there are two North countries and one South country that are engaged in free trade. The two North countries are developed economies, and are classified as the West and the East. Both the West and East produce differentiated final-goods in monopolistic competition. Being developed economies, the West and East are similar in terms of technology, preferences, and wage rates, and the two engage in intra-industry trade together. In contrast, the South is a developing economy that is engaged in international outsourcing trade, providing only manufacturing intermediate-inputs in perfect competition for the usage of either the West or the East. In particular, in this paper, the U.S. can be referred to as the West, Japan can be referred to as the East, and either China or Taiwan can be referred to as the South.[3]

In the first stage, the wage rates of the West, East, and South are assumed to be w, w^*, and 1, respectively. Here, I normalize the wage of the South as unity, and we have $w = w^* > 1$.

Brander and Spencer (1985) employ a Cournot duopoly model in a three-country world, where they assume that two countries produce identical products and compete for the third markets, and there is no consumption in the two producing countries. This seminal paper addresses how a country can subsidize to shift profits away from its rival country and improve its own welfare. Instead, in this current three-country model, I presume that both the West and East produce and consume their differentiated products, and the South provides intermediate inputs for the use of the two North countries to produce these differentiated products. In a way similar to Brander and Spencer (1985), this paper focuses on the analysis of the welfares of two final-good producers: the East and the West.

In both the West and East, all individuals have the same utility function as

$$U = \sum_{i=1}^{n} c_i^{\theta} + \sum_{i=1}^{n^*} c_i^{*\theta}, \quad 0 < \theta < 1, \tag{1}$$

where c_i denotes consumption of the ith Western goods and c_i denotes consumption of the ith Eastern goods. Here, n represents the number of differentiated goods produced by the West while n^* represents the number of differentiated goods produced by the East.

The utility maximization is subject to a budget constraint as $\sum_{i=1}^{n} p_i c_i + \sum_{i=1}^{n^*} p_i^* c_i^* = w$ for the West. The budget constraint is also applied to the East while we already assume $w = w^*$ in the initial stage. Here, p_i denotes the price of final-goods produced by the West while p_i^* the price of final-goods produced by the East. The optimal solution to the utility

maximization leads to $\theta c_i^{\theta-1} = \lambda p_i$ and $\theta c_i^{*\theta-1} = \lambda p_i^*$, $\forall i$, where λ is the Langrange multiplier. Combining these optimal solutions, we obtain

$$\frac{c_i}{c_i^*} = \left(\frac{p_i}{p_i^*} \right)^{\frac{-1}{1-\theta}}. \tag{2}$$

That is, an individual consumes one unit of the Western goods will also consume $\left(\frac{p_i}{p_i^*} \right)^{\frac{1}{1-\theta}}$ unit of Eastern goods, $\forall i$.

2.1. Profit maximization

2.1.1. The West (choose outsourcing)

Supposed that the production of a variety of differentiated good requires headquarter services and manufacturing intermediate-inputs. It demands α units of workers to render the headquarter services. The marginal cost of producing the manufacturing inputs is β units of workers. However, the manufacturing inputs can be internationally outsourced while the headquarter services cannot. The West chooses an outsourcing strategy to relocate the production of the manufacturing intermediate-inputs to the South in order to take advantage of the lower wage cost there. All goods in the West will be produced with the same cost function:

$$\max p_i x_i - w\alpha + \beta w_S x_i, \tag{3}$$

where we normalize the productivity of the Southern workers as unity for simplicity. In this model, the West import x_i amount of manufacturing intermediate inputs from the South, which are raw material. Suppose that the Western firms, with the help of their headquarter services, can transfer these manufacturing intermediate-inputs one-to-one to final-goods.

In Eq. (3), the optimal price of the Western firms will charge is given by $p_i = \frac{\beta w_S}{\theta}$, $\forall i \in n$. The optimal quantity is given by $x_i = \frac{\alpha \theta w}{\beta(1-\theta)w_S}$, $\forall i \in n$. Assuming full employment, we then obtain the number of differentiated firms provided by the West given by $n = \frac{L}{\alpha}$.

2.1.2. The East (choose not to outsource)

Suppose that the East will not carry out international outsourcing to the South. The reason behind the scene could be political or cultural barriers between the East and South. As for the political barriers, for example, we can assume that there is no free trade or investment protection agreement between the East and South while there is such an agreement between the West and South. Take the cultural barriers as another example, the U.S. firms are generally likely to carry out international outsourcing activities while the Japanese are more conservative and usually decline to relocate production abroad.

While all activities are undertaken domestically, the profit maximization of the firms in the East is then given by

$$\max p_i^* x_i^* - w^*(\alpha + \beta x_i^*). \tag{4}$$

The optimal price of the Eastern firms is $p_i^* = \frac{\beta w^*}{\theta}$, $\forall i \in n^*$. The optimal quantity is given by $x_i^* = \frac{\alpha \theta}{\beta(1-\theta)}$, $\forall i \in n^*$. Assuming full employment in the East, the number of differentiated firms produced by the East is then given by $n^* = \frac{L^*(1-\theta)}{\alpha}$. While all firms are similar in each country, we remove the subscript i hereafter.

3. Equilibrium

In equilibrium, trade is balanced so that total demand equals total output in value. Markets are clearing in both labor and goods, such that a representative individual's consumption equals her income. Assume that per capita demand for the Western goods is d, and the

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[3] A combination of cheap labor and many favorable export-oriented policies since 1979, among other reasons, has transformed China from an agricultural economy to the world's factory. However, the export-oriented policies have led to export-led growth, creating underutilized savings, and slow growth of domestic consumption in China, such that China, at least in 1980s, is well known as the world's factory rather than a consumer market.