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Fragmentation, welfare, and imperfect competition

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In this paper, we explore the effect of fragmentation of production processes on social welfare in the imperfectly competitive market. We consider a situation in which firms located in a country strategically decide whether they produce at home or move their production overseas. We show that, in such a situation, there exists a Nash equilibrium in which all of the firms move production overseas although domestic production is socially desirable. This implies that "reverse imports" do not necessarily benefit the country. We also discuss the effectiveness of a subsidy for domestic production in improving the social welfare of the country. *J. Japanese Int. Economies* **21** (3) (2007) 365–378. Faculty of Economics, Sophia University, 7-1 Kioi-cho, Chiyoda-ku, Tokyo 102-8554, Japan.
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1. Introduction

In manufacturing industries, production processes that used to be integrated within nations have been disintegrated across countries. Firms in developed countries moved labor-intensive production stages to low-wage countries through foreign direct investment or outsourcing to subcontractors. As a result, the fragmentation of production processes leads to an increase in the so-called reverse imports: goods produced at overseas affiliates or subcontractors are exported

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back to developed countries.[1] An increase in reverse imports affects the labor markets in developed as well as developing nations. One of recent debates on globalization is concerned about the impact of fragmentation on income distribution within countries. The recent work on international trade examines this issue by using the general equilibrium models that are useful to investigate the distributional effect of fragmentation of production processes.[2]

In addition to its distributional effect, the impact of reverse imports on social welfare is important in the evaluation of the economic aspect of globalization. If a firm decides to move some of its production stages overseas, it must be profitable for the firm to do so. However, the firm's private decision on its production location would not necessarily benefit an economy as a whole. In particular, it is important to examine this issue for developed countries since it is often pointed out that globalization hurts workers in industrialized nations and thus governments should restrict international capital movements and international trade in goods.[3] If firms in a developed country choose to disintegrate production processes across countries, what is its consequence in terms of the social welfare of the country? If fragmentation is not desirable for the country as a whole, is it justified for a government to intervene in the firms' choice of production locations?

In this paper, we develop a simple model with imperfect competition to investigate these questions. Firms locate their headquarters in a country and decide whether to produce at home or to move production overseas by FDI or outsourcing. Fragmentation provides savings in production costs for firms, but they must incur an additional fixed cost to coordinate the activities of foreign production. In addition to this tradeoff, firms have to incur transport costs to ship their products to the home market if they produce overseas. In this setting, the firms' optimal choice of production locations may result in an undesirable outcome for the country as a whole. In fact, we show that two types of Nash equilibria exist. First, fragmentation is socially desirable but firms choose to integrate their production at home. Second, firms choose fragmentation but domestic production is desirable from the social viewpoint of the country. The latter result implies that reverse imports do not necessarily benefit the country. These results may also provide a rationale for a government to intervene in the firms' choice of production locations. We discuss the effectiveness of a subsidy for domestic production in improving the social welfare of the country.[4]

This paper is closely related to Jones and Kierzkowski (1990) and Jones (2000). They develop a simple model to show that a key to fragmentation of production processes is a reduction in communication costs. Fragmentation provides savings in production costs but it requires an additional cost to coordinate overseas production activities. The development of communication

[1] For instance, over the past decade, there was a significant increase in the number of overseas affiliates of Japanese companies in the East Asian region. In addition, during this period, there was a noticeable increase in the reverse imports of manufactured goods. "Furthermore, looking at the share of exports to Japan in extra-regional exports in the Asian region, there is a noticeable increase in the rates of exports to Japan for all industries except iron and steel, which shows the expanding tendency of the so-called reverse imports (Ministry of Economy, Trade, and Industry, 2003, p. 140)."

[2] See Feenstra (1998), Jones (2000), Arndt and Kierzkowski (2001), and Kohler (2004) for the recent development in the work on this topic.

[3] Charles Schumer (the senior Senator from New York state) and Paul Craig Roberts (2004) state: "The question today is whether the case for free trade made two centuries ago is undermined by the changes now evident in the modern global economy.... American jobs are being lost not to competition from foreign companies, but to multinational corporations, often with American roots, that are cutting costs by shifting operations to low-wage countries."

[4] In the literature on industrial organization, it is well known that firms' optimal investments for process innovation do not necessarily generate a socially desirable outcome. For instance, see Arrow (1962), Dasgupta and Stiglitz (1980), and Mills and Smith (1996). Nevertheless, none of them is related to fragmentation of production processes.

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