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Vertical foreign direct investment: Evidence from Japanese and U.S. multinational enterprises

Kiyoyasu Tanaka [1,*]

Inter-disciplinary Studies Center, Institute of Developing Economies, 3-2-2 Wakaba, Mihama-ku, Chiba-shi, Chiba 261-8545, Japan

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ABSTRACT

Foreign direct investment (FDI) in developing countries has increased since the 1990s, but there is mixed evidence of vertical FDI associated with factor-seeking motives. This paper estimates the vertical motive of offshore production by multinational enterprises (MNEs) by exploiting past schooling characteristics as instruments for skilled-labor abundance in a host country. Using panel data on Japanese and U.S. MNEs in the 1990s, I find that skilled-labor abundance has a significantly negative impact on sales of manufacturing foreign affiliate only for Japanese MNEs. The results suggest that vertical FDI activity was more prevalent in Japanese MNEs than U.S. MNEs. A plausible explanation is that Japanese MNEs might be more vertically integrated with their offshore production than U.S. MNEs. A difference in foreign outsourcing activities could generate the observed deviation between Japanese and U.S. MNEs.

1. Introduction

The dramatic rise in foreign direct investment (FDI) is a prominent feature of economic globalization, as global FDI flows increased at a faster pace than international trade and income in recent decades. The global production of multinational enterprises (MNEs) accounted for an estimated 10% of world output in 2006, as measured by the value-added of all foreign affiliates as a share of the world GDP. In particular, FDI inflows to developing countries started to increase rapidly in the 1990s, which accounted for the largest component of international resource flows to the developing countries (UNCTAD, 2006).

A traditional explanation for offshore production by MNEs emphasizes the fact that a production process is comprised of vertically distinctive stages that are different in factor proportions and geographically separable. As differences in relative factor endowment across countries can generate international differentials in factor costs, a firm has an incentive to locate its production plant in a foreign country to take advantage of factor-cost differentials. In this respect, the factor-proportion models of international trade place the cost-saving motive at the center of explaining why the firm makes a vertical type of FDI to establish production facilities in a low wage country (Helpman, 1984; Helpman and Krugman, 1985; Markusen, 2002). From a theoretical point of view, vertical FDI can be defined as FDI motivated by cross-country differences in relative factor abundance.

Numerous empirical studies have examined the implication of the factor-proportion hypothesis that vertical FDI should arise when countries are different in relative factor endowment. Prior research, including Carr et al. (2001), Braconier et al. (2005a), and Davies (2008), shows that multinational activity is positively related to differences in relative skilled-labor abundance across countries. This result implies that firms in skilled-labor-abundant countries invest in unskilled-labor-abundant countries to take advantage of low wages for unskilled labor. By contrast, another set of research such as Brainard (1993, 1997), Markusen and Maskus (2001, 2002), and Blonigen et al. (2003), finds that multinational production is negatively correlated with differences in relative skilled-labor abundance across borders; multinationals are attracted to skilled-labor-abundant countries. Their findings are not consistent with the prediction of the factor-proportion story, but are limited to supporting a horizontal type of FDI driven by market-access motives. Despite the growing interest in vertical fragmentation of production across borders, prior formal evidence for vertical FDI remains inconclusive. Consequently, it is commonly held that multinationals around the globe engage primarily in horizontal FDI.

The view in favor of horizontal FDI was formed partly by empirical evidence based on the data of U.S. multinational firms. To identify a vertical motive of U.S. multinational production, recent

* Tel.: +81 43 299 9755; fax: +81 43 299 9763.
E-mail address: kiyoyasu_tanaka@ide.go.jp.

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research examined a long-term pattern of affiliate location (Hanson et al., 2001), a sectoral variation in skilled-labor intensity (Yeaple, 2003), and affiliate demand for imported inputs (Hanson et al., 2005). Although these studies provide some evidence of vertical FDI, Blonigen (2005) summarizes these findings as suggesting that "vertical motives are not prevalent in the general activity of U.S. outward FDI, but important only in a few manufacturing sectors such as electronics and machinery." However, it is an open question whether the assertion based on U.S. MNEs can be generalized to suggest that vertical motivations are not widespread for MNEs originating from other parent countries.

The purpose of this paper is to reconsider the factor-proportion hypothesis for FDI in order to examine the prevalence of vertical FDI by Japanese and U.S. MNEs in a comparable way. To identify a vertical motive of FDI, I analyze the relationship between offshore production by multinational firms and unskilled-labor abundance in a host country. Under the identical empirical framework with a consistent dataset on multinationals from different parent countries, the analysis allows me to assess the general importance of vertical FDI by Japanese MNEs as compared to U.S. MNEs.

This paper extends the empirical literature on vertical FDI in two important ways. First, I provide the comparable estimate of the importance of vertical FDI between Japanese and U.S. MNEs by using panel data on sales of foreign affiliates owned by Japanese parent firms from the Japanese Research Institute of Economy, Trade, and Industry (RIETI).[1] While the RIETI data are previously unexplored for empirical work on vertical FDI, it is of great interest to estimate vertical offshore production for Japanese MNEs that have invested substantially in developing countries in recent decades. In this respect, the global presence of Japanese MNEs makes the RIETI data appropriate for making a comparison with U.S. MNEs surveyed by the U.S. Bureau of Economic Analysis (BEA) data. Furthermore, prior studies such as Blonigen et al. (2003) and Braconier et al. (2005a,b) also examine outward FDI from multiple source countries, but are limited in the harmonization of the measurement of multinational activity across different sources. By contrast, I carefully examine the comparability between the RIETI and U.S. BEA data to control for a systematic discrepancy in the measurement of foreign affiliate sales in regression analysis. Then, I identify a vertical motive of FDI by exploiting a cross-country variation in foreign affiliate sales for the years 1990, 1995, and 2000; the year coverage is primarily due to data limitations on host-country skill endowments.

Second, this paper analyzes the causal relationship between multinational activity and unskilled-labor abundance in a host country. Because developing countries may have an incentive to upgrade skill levels of their labor force to attract foreign investors, it is difficult to estimate a vertical motive of FDI driven by a low wage for unskilled labor in the developing countries. Prior work has paid little attention to the endogeneity issue on skill endowments, which may lead to an underestimated role of vertical FDI activity. To fill the gap, I employ an instrumental-variable (IV) approach to address the endogeneity of host-country skilled-labor abundance. Specifically, I exploit differences in past schooling characteristics as instruments for the contemporaneous level of skilled-labor abundance as measured by the educational attainment of the labor force. Because countries with lower educational attainment are associated with the greater supply of unskilled labor, the IV estimation enables me to obtain a consistent estimate of the effect of unskilled-labor abundance on multinational activity.

Robust to a wide range of specifications and sensitivity checks, I find that unskilled-labor abundance in foreign countries has a significantly positive impact on offshore production by Japanese MNEs. The benchmark results predict that the real sales of Japanese affiliates in manufacturing would increase by 24.7% when the average years of schooling in host countries decrease by one year. An alternative interpretation is that skilled-labor abundance has the negative impact on Japanese multinational activity. For example, if the labor force in China possessed the equivalent level of educational attainment as in the U.S. for the year 2000, Japanese affiliate sales in China would have become negative, conditional on observables. The implication is that offshore production by Japanese MNEs in the manufacturing sector was strongly encouraged by the factor-cost motive. Additionally, the IV estimates imply that the endogeneity problem is likely to produce an upward bias in the estimated impact of skilled labor on affiliate activities. Because the bias could lead to an underestimated role of unskilled workers in a foreign market to which vertical FDI is attracted, a careful treatment of the endogeneity should be critical in identifying the extent of vertical motives in FDI activity. As there was little attention to the endogeneity bias, this issue may partly account for strong evidence in favor of horizontal FDI that was found in prior research (Brainard, 1997; Markusen and Maskus, 2002; Blonigen et al., 2003).

In stark contrast to Japanese MNEs, host-country unskilled-labor abundance has no significant effect on foreign affiliate sales by U.S. MNEs. Even after accounting for the endogeneity bias that may underestimate the importance of vertical FDI, the factor-proportion hypothesis is not supported by the U.S. sample. Because the empirical framework is identical for both Japanese and U.S. samples, the distinctive results are due to a difference in the cross-country patterns of Japanese and U.S. affiliate sales. In particular, U.S. affiliate activity in manufacturing is, *on average*, more concentrated in skilled-labor-abundant countries than Japanese affiliate activity. Instead, the results show that U.S. affiliate sales are significantly sensitive to country characteristics associated with market-access motives, suggesting that horizontal FDI is prevalent in U.S. multinational activity. The contrasting results suggest that vertical motivations are more widespread in the general activity of Japanese MNEs than U.S. MNEs.

The different prevalence of vertical FDI activity between Japanese and U.S. MNEs matters because vertical and horizontal FDIs have the distinctive consequences in factor incomes within and across countries (Barba-Navaretti and Venables, 2004). On the one hand, multinationals engage in vertical FDI by locating stages of production processes in the country where factor inputs intensively used in offshore production are relatively cheap. Because vertical FDI serves to move the location of production according to factor proportions across countries, multinational activity could decrease the absolute difference in factor costs across countries and change the relative factor prices within countries. On the other hand, MNEs make horizontal FDI as an alternative mode of exporting from a home country to economize on trading costs. Since horizontal FDI operates to locate identical production processes offshore, multinational activity might have little impact on international differentials in factor costs and the relative factor prices within countries.

The contrasting findings between Japanese and U.S. MNEs raise a question of what factors could contribute to the deviation in the cross-country pattern of offshore production. As alternative explanations, this paper discusses the role of geography and outsourcing in accounting for the distinctive patterns. Essentially, the geography-based explanation is that the geographic distribution of host countries with abundant unskilled labor may generate transport-cost advantages for Japanese MNEs relative to U.S. MNEs in conducting vertical FDI, which involves a multitude of cross-border shipping of intermediate and final goods. Because East Asian countries in more close proximity to Japan than to the U.S.

[1] See data description for details of the RIETI data.