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Author(s):	Jung Hur, Seong-gwan Kim
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Trade Costs and Modes of Reshoring: Evidence from Firm-level Data

Jung Hur* Seong-gwan Kim**

Abstract

We propose a theoretical framework to empirically investigate the relationship between international trade costs and reshoring entry mode. In our model, there are two types of reshoring strategy: domestic backward vertical integration (DBVI) or domestic outsourcing (DO). The relative prevalence of DO depends negatively on international trade costs. Using firm level panel data of Korea, we find supportive evidence of reshoring patterns. In the manufacturing sectors, the number of domestic affiliates increased as the FDI-trend declined. During the same period, we confirm a negative relationship between DO and the distance to the host country of FDI in those sectors.

Key words: reshoring, incomplete contract, trade cost, cross-border backward vertical integration, domestic backward vertical integration, domestic outsourcing

JEL Classifications: F12

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* (Corresponding Author) Department of Economics, Sogang University, Baekbeom-ro 35, Mapo-gu, Seoul, Republic of Korea, 04107. Tel: +82-2-705-8518. Email: ecsjhur@sogang.ac.kr.
** (First Author) Department of Economics, Sogang University, Baekbeom-ro 35, Mapo-gu, Seoul, Republic of Korea, 04107. Tel: +82-2-705-8179. Email: sgnkim28@gmail.com

1. Introduction

Reshoring (which refers to return of FDI activities back to home countries) has been considered as an important alternative to FDI amid reduced attractiveness of emerging economies as a destination of FDI, e.g., increased labor costs, more regulations on FDI conditions, difficulties of innovation, and weak enforcement of intellectual property rights. However, the success of reshoring seems to vary across countries.[1] For instance, according to the Reshoring Initiative (2019), from 2010 to 2018 the annual average number of reshoring companies in U.S. is 482 while that in Korea is 10.4. Also, the new jobs per reshoring companies are 109 in U.S. but 19 in Korea.[2] The purpose of our study is to provide a theoretical analysis of under what condition the reshoring of multinational firms can occur and to explain a Korea case that seem to be distant from a choice of reshoring.

Previous theoretical studies for reshoring focused on the causation of the phenomenon while limiting domestic organizational choice of firms that need to procure intermediate inputs. Chu *et al.* (2013) argued that capital accumulation by offshoring raised labor costs in developing countries, which caused a return of offshored tasks. Differently, Krenz *et al.* (2021) suggests that improved productivity of industrial robots makes previously offshored firms reshore. These models are commonly based on vertical integration assumption that the multinational enterprises (MNEs) would maintain the production of intermediate input within their firm boundaries. In contrast, Long and Tuuli (2018) presented a model in which firms returning to the home country engage in outsourcing to procure intermediate inputs, assuming complete contract situation. Gijsbrechts *et al.* (2021) assumed a dual sourcing system where reshoring is defined as reallocation of sourcing volumes from remote to local suppliers. In fact, above two papers premise environment that lots of domestic supplying firms compete in home

[1] De Backer *et al.* (2016) found that the reshoring activities by MNEs of OECD countries did not necessarily create an increase in employment and investments for home countries. The desirable effects seem to have been heterogeneous across developed countries.

[2] The report compared the U.S. and Korea's reshoring policy. While Korea's U-turn laws (laws governing the reshoring of offshored Korean businesses) was insignificant to bring them back to home, the reshoring policies of U.S. effectively incentivizes firms to return home. The policy includes 1) overall corporate tax reduction, 2) various other tax-cutting measures, and 3) removal of regulations.

country and thus the MNEs may have an option to purchasing inputs from them. But the MNEs do not have opportunity to re-establish their own production facilities at home.

In this paper, we attempt to relax the limited firm boundary choice assumed in the above papers by allowing an FDI firm to choose not only domestic production (i.e., reshoring) but also domestic outsourcing as alternative modes of returning home strategies under incomplete contract situation. In other words, the situation in which FDI firms can also opt for domestic outsourcing is premised on the supply chain of domestic manufacturing sector being sufficiently present; otherwise, the FDI firms could have only two options – reshoring or not – as in the previous literature. Furthermore, we model the two modes of the domestic input procurement strategies of the FDI firms as a choice of firm boundary based on the property rights theory (PRT) by Grossman and Hart (1986) and Hart and Moore (1990).

Building on this setup, we theoretically show that the relative prevalence of domestic outsourcing in MNEs' repatriation depends negatively on international trade costs between home and host countries of FDI. In a trading relationship for an intermediate input, each firm undertakes a relation-specific investment that cannot be contracted, in which case there is an incentive to hold-up the investment to increase their ex-post gains. The efficiency of each sourcing strategy (i.e., foreign in-house production, domestic in-house production, and domestic outsourcing) [3] varies depending on the relative importance of these investments. We use international trade costs to measure the relative importance of foreign supplier investments. And the dependence of MNEs on upstream firms is measured by the share of intermediate goods expenditure. Less reliance on upstream industries reduces ex-post opportunism associated with incomplete contract and reduces outsourcing losses. Thus, MNEs which engage in domestic outsourcing can be characterized by low upstream dependence. In this paper, we show that the average dependence of MNEs on sourcing country of intermediate goods is proportional to trade costs. In other words, the outsourcing propensity of MNEs returning from the sourcing country has a negative relationship with the trade cost.

[3] Note that we exclude the choice of international outsourcing for the MNEs by assuming low wage gap between home and host country. This is because our study is motivated by the current situation of emerging countries where the labor costs has been increased. As discussed in Antràs and Helpman (2004), if the wage differential across countries is small enough, domestic vertical integration dominates international outsourcing in producer-intensive sector in equilibrium.

For our empirical analysis, we use the distances between home and host countries of MNE affiliates as a proxy for the trade costs. Using Korean firm-level data of the *Survey of Business Activities* provided by the Statistics Korea, we set up two multinational groups based on how distant locations of their affiliates are and examine the differences in domestic outsourcing between each group after the implementation of the *Act on Assistance to Korean Off-shore Enterprises in Repatriation*.[4] Our finding shows that domestic outsourcing is more prevalent in the MNE group engaged in FDI in closer host country.

Our result may imply that desirable effects of reshoring, i.e., a job creation or new investment by the re-shored MNEs, seem to be limited. Krenz *et al*. (2021) also showed that reshoring may not cause an increase in employment. They argued that the growing attractiveness of domestic low-skill automation by improved productivity in automated processes resulted in a U-turn of previously offshored firms. So, the reshoring is possibly caused by the technical substitutable relationship between domestic industrial robots and foreign labor. Our viewpoint is different from theirs. Presence of a strong domestic supply chain gives returning home MNEs a room to resort to a cheaper way of domestic outsourcing, instead of taking an expensive way of investing to set up their own domestic production facilities and hire production workers.[5]

Our simple analysis on reshoring can be viewed as a small but complementary discussion to the two large literature on global sourcing strategies. First, Yeaple (2003), Grossman and Helpman (2005), Grossman *et al*. (2006) and Antràs *et al.* (2017) examine firms'

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[4] The *Act on Assistance to Korean Off-shore Enterprises in Repatriation*, enacted in 2013, aims to facilitate the repatriation of Korean off-shore enterprises to Korea by establishing an efficient system to assist them in repatriation and resettlement.

[5] This paper does not deny the possibility of employment growth through outsourcing. Even if repatriating MNEs delegate their existing foreign production processes to other domestic firms, new hiring by the contracting firms can increase domestic employment. However, it is difficult to expect that new jobs created by contractors will be qualitatively equivalent to those created by MNEs' domestic in-house production. According to Kim and Rhee (2009) and Driffield *et al*. (2021), existing Korean MNEs primarily engaged in FDI in China and Southeast Asia, where labor and factor costs are lower, with the objective of reducing production costs. Therefore, if these FDIs are replaced by domestic outsourcing, intermediate goods will be supplied by firms that can supply intermediate goods at the lowest cost through competition, that is, firms that pay low labor costs (Weil, 2014). Indeed, Perraudin *et al*. (2014) and Bilal and Lhuillier (2021) compared the wage distribution between firms, confirming that contractors tend to pay relatively lower wages. In this respect, outsourcing may create new employment opportunities, but it will not necessarily produce the best results in terms of job quality. Therefore, this paper assumes only the direct employment effect by repatriating MNEs in discussing the desirable job creation effect of reshoring.

location decision for foreign input purchases. A large set of country characteristics play an important role in forming the decisions, e.g., contract systems, competitiveness among suppliers, search costs, labor costs, and infrastructure of host countries, etc. Second, as an alternative to the outsourcing, firms may decide to internalize the input production. Antràs (2003), Antràs and Helpman (2004) and Antràs and Chor (2013) identify industry characteristics where in-house production in foreign markets is more prevalent than international outsourcing, and vice versa. Our study is different in that, given the in-house production of an MNE, we consider the firm's choice of returning home strategies between domestic outsourcing versus domestic in-house production. Acemoglu *et al.* (2010) also considers the two domestic organizational choice of a firm, but the firms are purely domestic ones. We begin with a multinational firm who is currently producing inputs in its own foreign affiliate and import them back to home market. Then, we consider under what condition the firm will move their foreign production facility from the current foreign location back to home country and if so, which type of organization is preferred between domestic outsourcing and domestic in-house production.

The paper is constructed as follows: Section 2 provides a theoretical framework of international sourcing strategy and derive empirical hypothesis about the intensive margin of reshoring. Section 3 gives the data source, explanation, and main results. The paper is concluded in Section 4.

2. Theory and empirical hypothesis

2.1 Model setup

We consider the model of vertical integration of Acemoglu *et al.* (2010) in trading environments with a trade barrier. In the model, there are two types of agents: final-good producer and intermediate input supplier who denotes by P and S, respectively. In the trading environments, the producer can contract with a supplier at home or in foreign countries. We assume that the wage differential across countries is not large, and the domestic producer's input plays a more important role relative to that of foreign suppliers. Therefore, when making intermediate inputs abroad, the producer does not outsource inputs and produce them within

its boundary (cross-border backward vertical integration, CBVI).[6] When producing intermediate inputs at home, the producer insources inputs and has residual rights of control over the components and the assets of the supplier (domestic backward vertical integration, DBVI) or outsources the inputs through independent subcontracting (domestic outsourcing, DO).

Under domestic production, the output of the producer-supplier relationship is given by

$$F(x_S, e_P, e_S) = \psi x_S (e_P + e_S) + (1-\psi) e_P, \tag{1}$$

where $\psi \in (0,1)$ is the share of the producer's inputs accounted for by the supplier (hereafter, we refer to ψ as the upstream dependency). $x_S = 1$ indicates that the specialized intermediate input is delivered, otherwise $x_S = 0$. e_P and e_S are non-verifiable investments by producer and supplier, respectively. We assume that the non-verifiable investments are subject to residual rights in the contract, and thus DBVI implies that producer has control right over e_P and e_S after ex-post breakup. In contrast, DO allocate the residual right over e_S to stand-alone supplier. For simplicity, we normalize the intensity of upstream and downstream industries to 1.

Under foreign production, the output of the producer-supplier relationship is given by

$$F(x_S, e_P, e_S) = \psi x_S (e_P + \tau e_S) + (1-\psi) e_P. \tag{2}$$

Producers engaging in CBVI face tariff and other costs of distance when they import specialized intermediate inputs. Iceberg cost $\tau \in (0,1)$ catches these trade costs inversely and designate the importance of investment by foreign supplier relative to domestic firms.[7] Without loss of generality, we assume that ψ is homogeneous in domestic production and foreign production and is sector-specific.

The cost of investment for the producer and the supplier is

[6] According to Antràs and Helpman (2004), the rent extraction of domestic vertical integration is more profitable than labor cost savings of international outsourcing if the intensity of the downstream industry is high and the wage differential is low. As a result, domestic vertical integration dominates international outsourcing in equilibrium.

[7] The PRT (Grossman and Hart, 1986; Hart and Moore, 1990) offers that backward vertical integration is efficient if the importance of non-contractible investment by the supplier is relatively low.

$$C_P(e_P)=\frac{1}{2}e_P^2 \quad \text{and} \quad C_S(e_S)=\frac{1}{2}\psi e_S^2. \tag{3}$$

Also, CBVI generates fixed costs of f, which relates to some management costs; supervision, accounting, and marketing costs.[8]

If both parties fail to reach an agreement on ex-post surplus distribution, they receive outside options depending on the organizational form $z\in\{O,B,C\}$, which indicates DO, DBVI, and CBVI in order. In the case of DO $(z=O)$, the outside options are

$$\begin{aligned} &O_P^O(e_P,e_S)=F(x_S=0,e_P,e_S)=(1-\psi)e_P, \\ &O_S^O(e_P,e_S)=\theta\psi e_S, \end{aligned} \tag{4}$$

where $\theta\in[0,1)$ is an inverse measure of the supplier's input specificity. Due to specificity in the relationship, the supplier suffers some revenue loss when selling the intermediate input outside the relationship. The producer has an output of zero for relationship-specific investments. In the case of DBVI $(z=B)$, the producer's and the supplier's outside options are

$$\begin{aligned} &O_P^B(e_P,e_S)=F(x_S=1,e_P,(1-\lambda)e_S)=e_P+\psi(1-\lambda)e_S, \\ &O_S^B(e_P,e_S)=0. \end{aligned} \tag{5}$$

Ownership transfers the right to use assets of the supplier to the producer if the bargaining breaks down. As a result, the producer invests directly in the production of components, but the lack of supplier cooperation results in an investment loss of a fraction $\lambda\in[0,1)$. Similarly, in the case of CBVI $(z=C)$, they are

$$\begin{aligned} &O_P^C(e_P,e_S)=F(x_S=1,e_P,(1-\lambda_C)e_S)=e_P+\psi\tau(1-\lambda_C)e_S, \\ &O_S^C(e_P,e_S)=0, \end{aligned} \tag{6}$$

where $\lambda_C\in[0,1)$ is the fraction of foreign supplier's investment that the producer loses after bargaining breaks down. Following Antràs and Helpman (2004), we assume that $\lambda_C>\lambda$. The assumption seems reasonable when a contractual breach is more fatal overseas. Language and cultural distance at home and abroad can further increase the inefficiency of investment by the producer in a foreign country. Also, there is a possibility of the exercise of ownership being

[8] Following Antràs and Helpman (2004) and Chun *et al.* (2020), we assume additional fixed costs of organizing production when producing intermediate inputs abroad.

inefficient because the contract is not fully executed in host locations.[9]

The producer and the supplier conduct symmetric Nash bargaining over the distribution of ex-post surplus and the output accruing to party $i \in \{P,S\}$ under organizational form $z \in \{O,B,C\}$ is

$$y_i^z(e_P,e_S)=O_i^z(e_P,e_S)+\frac{1}{2}\left[F(x_S=1,e_P,e_S)-\left(O_P^z(e_P,e_S)+O_S^z(e_P,e_S)\right)\right]. \tag{7}$$

2.2 Equilibrium

Investments by producer and supplier are non-contractible ex ante in that the third party can not verify it. Therefore, they simultaneously choose their investments according to respective organizational forms. Equilibrium investments pair $(e_P^*(z),e_S^*(z))$ is determined by maximi-zing their payoff so that

$$e_P^*(z)=\underset{e_p}{arg\,max}\{y_P^z(e_P,e_S^*(z))-C_P(e_P)-T(z)\},$$
$$e_S^*(z)=\underset{e_S}{arg\,max}\{y_S^z(e_P^*(z),e_S)-C_S(e_S)+T(z)\},$$

where $T(z)$ is the amount of ex ante transfer associated with organizational form z. For each organizational form z, Nash equilibrium investment levels are

$$\begin{aligned} &e_P^*(O)=1-\frac{\psi}{2}, && e_S^*(O)=\frac{1+\theta}{2}, \\ &e_P^*(B)=1, && e_S^*(B)=\frac{\lambda}{2}, \\ &e_P^*(C)=1, && e_S^*(C)=\frac{\tau\lambda_C}{2}. \end{aligned} \tag{8}$$

We see that backward vertical integration imposes benefits and costs in that it increases the producer's investment and reduces the supplier's investment than outsourcing (namely, $e_P^*(O)<e_P^*(B)=e_P^*(C)$, $e_S^*(O)>e_S^*(B)$, and $e_S^*(O)>e_S^*(C)$). The optimal organizational form z^* will maximize the net benefit. Another feature is that the costs of CBVI are shown

[9] The World Bank provides data on enforcing contracts ranking for all economies.

to be decreasing in iceberg cost since higher iceberg cost reduces distortion of the supplier's investment.

Now, we need to compare the investment level under each organizational form with the first-best investment level under complete contract. The overall loss in investments under $z \in \{O,B,C\}$ is specified by

$$L(O)=(1-e_P^*(O))+(1-e_S^*(O)), \tag{9}$$

$$L(B)=1-e_S^*(B), \tag{10}$$

$$L(C,\tau)=1-\tau e_S^*(C), \tag{11}$$

where $1=\overline{e_P}=\overline{e_S}$ indicates the first-best level of investment by each contracting party in home country. The supplier's investment level under CBVI is multiplied by its relative importance to compare with modes of organization in the home country. The equation (11) states that the relative costs of CBVI are decreasing in the importance of foreign supplier's investment τ. As a result, vertically integrating supplier in foreign countries becomes more attractive.

Given the equilibrium investment levels, the social surpluses which are the sum of the maximized payoffs of producer and supplier under $z \in \{O,B,C\}$ are calculated as

$$V^O=\frac{1}{2}-\frac{\psi^2}{8}-\frac{\psi}{8}(\theta-3)(\theta+1), \tag{12}$$

$$V^B=\frac{1}{2}+\frac{\lambda}{2}\psi\left(1-\frac{\lambda}{4}\right), \tag{13}$$

$$V^C=\left(\frac{1}{2}-f\right)+\frac{\lambda_C}{2}\psi\tau^2\left(1-\frac{\lambda_C}{4}\right), \tag{14}$$

where f represents the fixed organizational costs of CBVI. Comparing (12) with (13), we see that for $1+(\theta-3)(\theta+1)+4(\lambda-\lambda^2/4)>0$, there is a threshold ψ_B in the interval $(0,1)$ such that DO is more efficient than DBVI for all values below ψ_B and less efficient for all values above ψ_B. Likewise, comparing (12) with (14) generates the following Proposition 1:

Proposition 1 (Effect of a change in iceberg cost on the prevalence of CBVI relative to

DO). *Suppose that* $1+(\theta-3)(\theta+1)+4\tau^2(\lambda_C-\lambda_C^2/4)>8f$. *There exists a threshold* ψ_C *in the interval* $(0,1)$ *such that CBVI is more efficient than DO for all values above* ψ_C *and less efficient for all values below* ψ_C. *Moreover,* ψ_C *is a decreasing function of iceberg cost* τ *for fixed cost with* $f>1/8$.

Regardless of supplier location, the upstream dependency ψ determines the relative cost of outsourcing versus (cross-border) vertical integration.[10] Less transaction volume with supplier in the production process means that producer underestimates the potential loss of outsourcing and becomes more active in investing. On the other hand, it can be seen from equation (8) that relationship-specific investment of supplier remains constant since the market value of the intermediate input is not affected by the transaction volume with the producer. This makes outsourcing strategy more attractive than (cross-border) vertical integration. CBVI also expose producer to iceberg cost, including transactions between countries in the process of importing intermediate inputs. Recall from equation (11) that CBVI incurs less cost as investments by foreign supplier become more important. Therefore, larger τ has a positive effect on the prevalence of CBVI relative to DO.

Turning our attention to the location decision between DBVI and CBVI, CBVI causes fixed cost and iceberg cost, but it has the advantage of reducing supplier investment losses in incomplete contract situation. Other language and culture abroad strengthen the outside option of foreign supplier, which gives it higher bargaining power and has the effect of enticing more active investment. However, the iceberg cost between countries has the effect of discounting the supplier's investment value, which determines the relative efficiency of the DBVI and CBVI strategies.

Proposition 2. *Let* $\Lambda(\lambda)\equiv\lambda-\lambda^2/4$. *For* λ_C, λ, *and* f *with* $\psi(\Lambda(\lambda_C)-\Lambda(\lambda))>2f$, *there exists a threshold* $\hat{\tau}$ *in the interval* $(0,1)$ *such that CBVI is more efficient than DBVI for all*

[10] According to Williamson (1975, 1985), the motivation for vertical integration is related to the hold-up risk associated with outsourcing. Additionally, upstream dependency serves as an indicator of the extent to which producer can be held up by supplier, and this upstream dependency can be a decisive factor in explaining the sourcing strategy between vertical integration and outsourcing (Acemoglu *et al.*, 2010). In Appendix A.1, we provide empirical evidence to support the relationship between upstream dependency and sourcing strategy.

values above $\hat{\tau}$ *and less efficient for all values below* $\hat{\tau}$.

Assuming a hypothetical situation where the trade cost does not exist (i.e., $\tau=1$), foreign supplier invests more actively in intermediate inputs than domestic supplier due to difference in bargaining power. At the same time, if the fixed cost required for CBVI is small enough, it would be a more efficient alternative for producer to have production site for the intermediate inputs overseas. In reality, however, producer has to pay some trade costs which makes foreign suppliers' investment value lowered in order to import intermediate inputs. Proposition 2 shows that if these trade costs are large enough (i.e., $\tau<\hat{\tau}$), DBVI will be a more efficient sourcing strategy even if foreign supplier invests more.

Now, we would characterize the equilibria of organizational form by thresholds $\psi=\psi_B$, $\psi=\psi_C(\tau)$, and $\tau=\hat{\tau}$ discussed above. The equilibrium organizational form is given by

$$z^*=\underset{z\in\{O,B,C\}}{arg\,max}\,V^z.$$

Figure 1(a) summarizes our results on equilibrium organizational form. In equilibrium, producers engage in CBVI can be classified into two types based on the threshold value ψ_B. That is, it is divided into a group that choose CBVI as an alternative to DO and a group that choose CBVI as an alternative to DBVI. For example, considering a host country in Figure 1(b), which incurs an average iceberg cost of τ_l, producers between C_1 and C_2 do not prefer DBVI, whereas producers between C_2 and C_3 do not prefer DO. If the iceberg cost falls to τ_h and the cost of CBVI increases, the former group would choose DO as an alternative strategy, and the other group would modify its strategy to DBVI. In other words, there is a difference in the repatriation strategy between the two groups.

[Insert Figure 1]

Now, let's assume that domestic producers consider CBVI with foreign suppliers. Producers indexed by $\psi>\psi_B$ choose CBVI over DBVI if they face iceberg costs above $\hat{\tau}$. However, for producers engaging in DO, the iceberg cost that leads them to choose CBVI as an alternative strategy varies depending on their upstream dependency. Consider a foreign country that incurs iceberg costs of τ_l on average and another country that incurs lower

iceberg costs of τ_h. Figure 2 shows that producers between C_1 and C_2 choose CBVI over DO if the iceberg cost is τ_l. Similarly, if the iceberg cost is τ_h, producers within the range of C_3 and C_4 choose CBVI. Here, we observe that as the iceberg cost decreases, the average upstream dependency of producers engaging in CBVI increases. This means that the share of producers in each host country who prefer DO to DBVI is positively related to the iceberg cost corresponding to the host country. Therefore, when the production conditions in the host country deteriorate, and producers decide to repatriate domestically, the share of producers who prefer DO strategy increases with the iceberg cost. This is summarized by the following Corollary.

Corollary (Effect of iceberg cost on reshoring strategy). *Suppose that CBVI country incurs an iceberg cost of* τ *and that* $V^B = V^C(\hat{\tau})$. *If* τ *decreases to* $\tilde{\tau}$ *and* $\tilde{\tau} < \hat{\tau}$, *then CBVI in the host country becomes inefficient compared to DBVI as well as DO. Moreover, the share of producers that engage in DO as an alternative of CBVI increases with the initial iceberg cost* τ *(i.e., a reciprocal of the trade cost).*

[Insert Figure 2]

In this paper, we proxy the trade cost using the distance between home and host countries of MNE affiliates, and thus each host country corresponds to different trade costs that domestic firms face. Based on Corollary, we derive our testable hypothesis as follows:

Testable Hypothesis. *The share of MNEs that engage in DO as an alternative strategy of CBVI decreases with the distance between home country and the CBVI country.*

For empirical analysis, we restrict host countries to two countries: Vietnam and China. Korean Manufacturing firms with affiliates in Vietnam face high trade costs on account of long-distance from their home country. In contrast, China affiliates incurs low trade costs. In the next section, we examine reshoring trends and test the hypothesis about domestic outsourcing of returning home MNEs conditional on the CBVI country.

3. Empirical results

3.1 Data

In this section, we examine the domestic entry modes of reshoring firms by using the Survey of Business Activity (SBA) from the Statistics Korea of Korean government. The SBA provides firm-level panel data from 2008 to 2017. The database is representative in that it contains data on all Korean firms with more than 50 employees and equity capital exceeding 300 million Korean Won. For our analysis, we specifically focus on manufacturing firms within this dataset. The manufacturing sectors are classified at the two-digit level.

3.2 Korean affiliates at home and abroad

Turning our attention to extensive-margin analysis of reshoring, we measure DBVI or CBVI using the number of affiliates by country. Table 1 reports the aggregated number of Korean manufacturers' affiliates by host-country from 2008 to 2017. The share of affiliates by host-country is shown in parentheses. As of 2008, about 90% of Korean manufacturing affiliates were distributed across the 11 countries listed in Table 1. Notably, Korea, China, the United States, and Vietnam accounted for around 90% of these affiliates. 'Total' represents the total number of Korean manufacturing affiliates by year, which has decreased since 2013. At the country level, the number of China-located Korean affiliates (or, shortly, China affiliates, hereafter) decreased from 1256 to 902 over the same period. In the United States, 48 affiliates disappeared during the period. Meanwhile, it shows that domestic and Vietnam affiliates (i.e., Vietnam-located Korean affiliates) have been increasing steadily since 2015. According to the Export-Import Bank of Korea (2014), since 2008, corporate tax-related incentives for foreign companies have been abolished in China, and production costs have increased along with a rapid rise in wages. Furthermore, in Korea, the *Act on Assistance to Korean Off-shore Enterprises in Repatriation* was enacted in 2013 to support the repatriation of Korean MNEs. Starting from that December, tax reductions, subsidies for domestic establishment, assistance with location, and personnel support have been provided to repatriating enterprises.[11] As a

[11] According to the National Assembly Budget Office (2021), following the implementation of the repatriation

result, the number of domestic affiliates has actually increased, while the number of affiliates in China has decreased. The expansion of new investments to Vietnam can be seen as changes in business activities triggered by rising costs in China. The expansion of supply chains to relatively low-cost regions like Vietnam provided MNEs with the opportunity to reduce their production costs. For this reason, there was active investment by enterprises with China affiliates into Vietnam (Hur and Kim, 2019).

[Insert Table 1]

Before conducting a firm-level analysis, it is necessary to consider the differences in country characteristics between developed countries like the United States and developing countries like China or Vietnam. China and Vietnam, with their low factor costs, are primarily destinations where Korean MNEs invest to reduce production costs. On the other hand, Korean MNEs that invest in the United States aim to enter markets with high purchasing power. Alternatively, they aim to enhance their competitiveness by increasing accessibility to intangible strategic assets such as advanced technologies (Kim and Rhee, 2009; Driffield et al., 2021). Therefore, excluding the United States, which is differentiated in terms of investment motivation of Korean MNEs, from the sample can be considered a necessary measure to control differences in regional characteristics by host country. Le and Tran-Nam (2018) also found that China and Vietnam have similar manufacturing environments and thus serve as substitute investment destinations for each other. Based on these facts, the subsequent empirical analysis is conducted on samples limited to China or Vietnam CBVI enterprises. This may provide the advantage of controlling the remaining country characteristics except for the distance between the home country and host country, which is the main concern of this paper. Furthermore, to control differences in productivity and other firm characteristics, the analysis is conducted excluding MNEs that invest in both China and Vietnam simultaneously.

support policy, a total of 84 companies returned to Korea from 2014 to September 2020. Among these, 71 (84.5%) returned from China, 8 (9.5%) from Vietnam, and 5 (6%) from other foreign direct investment countries. As a result, the reduction in corporate taxes and tariffs amounted to 1.8 billion KRW, while investment subsidies and job creation incentives amounted to 24.541 billion KRW.

3.3 Extensive margin of reshoring

In this section, we present host country-specific evidence for reshoring at the average firm-level. We first set up two multinational groups: Korean MNEs that engage in CBVI in Vietnam versus Korean MNEs that engage in CBVI in China. Vietnam and China have similar production environments in that they have a relatively skilled workforce compared to low wages (Holland and Pain, 1998; Nguyen and Nguyen, 2007; Le and Tran-Nam, 2018). Moreover, Korean MNEs that invest in Vietnam or China share a common goal of reducing production costs (Kim and Rhee, 2009; Driffield et al., 2021). Therefore, in terms of the determinants of reshoring strategies of CBVI enterprises, we assume that Vietnam and China share the same country characteristics, except for the distance from Korea.[12] Due to their proximity to Korea, China affiliates have a cost advantage over Vietnam affiliates in international trade. According to our theoretical model, the differences in trade costs dictate reshoring strategies of returning home MNEs.

[Insert Figure 3]

Figure 3(a) presents the fitted value of Vietnam affiliate's number of Korean manufacturers from 2008 to 2017, which generates an inverted-U pattern with a maximum point between 2013 and 2014. In other words, around 2013, the number of Vietnam affiliates per manufacturing firm is shifting from an increasing to a decreasing trend. In the previous

[12] Trade costs between countries, incurred when producing intermediate goods through foreign affiliates, can be influenced by various factors in addition to the geographical distance from Korea. One thing is that there may be communication costs incurred when knowledge is transferred from the headquarters of an MNE to its foreign affiliates. This can be estimated to a certain extent based on the distance between countries, but there may be limitations in estimating communication costs within foreign affiliates. To address this, considering the difference in ICT infrastructure between Vietnam and China could be helpful. According to ICT Development Index statistics released by the International Telecommunication Union (2010, 2012~2017), China started at the 79th position out of 159 countries in 2008, while Vietnam began at a lower rank of 86. Until 2017, China consistently maintained an advantage over Vietnam in terms of ICT accessibility, utilization, and proficiency. This implies that communication costs incurred by China affiliates may have been relatively lower than those of Vietnam affiliates.

Changes in China's policy towards foreign firms, reducing investment incentives, may be another factor leading to changes in trade costs. According to the World Bank (2007~2016), in 2008, China's "Ease of doing business" ranking was 83rd, while Vietnam was evaluated lower at 91st, an 8-place difference. This gap narrowed to 4 places in 2017, with China at 78th and Vietnam at 82nd. However, overall, China maintained a higher ranking than Vietnam. Thus, despite changes in policies, it can be inferred that operating affiliates in China was more advantageous in terms of trade costs compared to Vietnam during the sample period. As a result, it can be inferred that even if communication costs and policy factors are additionally considered, the hierarchy of trade costs between China and Vietnam will be consistent with the assumption of the empirical analysis.

section, it was confirmed that China's rising wages and worsening production conditions, which began in 2008, made Vietnam a relatively attractive investment destination and caused active investment by Korean MNEs, mainly existing China CBVI enterprises. According to Koo (2017), Korean MNEs' investment in Vietnam during the sample period was concentrated in manufacturing, especially in the electric and electronic industry, and the textiles and apparel industry. By 2016, these industries accounted for 31.4% and 28.4% of the cumulative investment, respectively. However, starting from the 2010s, Vietnam has witnessed a rapid increase in the minimum wage, leading to a continuous rise in real wages. In addition, rental costs in Vietnam's industrial zones have also continued to rise as more MNEs relocate their production bases to Vietnam (Institute for International Trade, 2022). These changes have contributed to worsening the cost burden of Korean MNEs. During the same period, there was a significant increase in the stock of industrial robots in Korea, driven by rapid advancements in automation technology. Particularly, in the field of electronics assembly, automation of production processes progressed rapidly (Kucera and Barcia de Mattos, 2019). This may have negatively affected Korean MNEs' investment in Vietnam, which was mainly focused on the electric and electronic industry. In other words, the rise in domestic industrial robots may have contributed to the return of Vietnam CBVI enterprises to Korea, as it weakened the comparative advantage of Vietnam's low labor costs. Amid these changes in production conditions in both Vietnam and Korea, the Korean government legislated various reshoring support in 2013. Figure 3(a) shows that the decline in CBVI to Vietnam corresponds to these shifts in domestic policies.

Now, we define the period before the decline of Korean affiliates in Vietnam as Period 1 (prior to 2013) and the period from 2013 as Period 2, and then track the firm-level reshoring activities. Technically, during Period 1, the MNEs with affiliates in Vietnam are selected, except for some with both Vietnam and China affiliates. During Period 2, we investigate changes in the number of affiliates of the selected MNEs in Vietnam and Korea. Figure 3(b) shows that the CBVI of the selected enterprises to Vietnam has continued to decrease since 2014, when the reshoring support policy was implemented, while their DBVI has been increasing during the same period. Such alternative investments between Vietnam and Korea might imply reshoring activities at the firm level. Indeed, the National Assembly Budget Office

(2021) reports that among the enterprises recognized for domestic repatriation from 2014 to September 2020, those returning from Vietnam accounted for 9.5%.[13] Meanwhile, before 2014, no significant change was observed in CBVI to Vietnam. This implies that the increase in production costs in Vietnam and the rise in industrial robots observed domestically did not directly impact the withdrawal of Vietnam affiliates.

Figure 3(c) shows that the trend in CBVI of Korean manufacturing firms to China has declined since 2013. As previously discussed, it can be inferred that this decrease in CBVI to China was driven by various cost shocks, including rising labor costs. Based on this finding, we divide the entire period into two segments, before and since 2013, and analyze the reshoring activity of MNEs with China affiliates before 2013. Some MNEs with both China and Vietnam affiliates are excluded from this analysis. Figure 3(d) depicts the changes in the number of affiliates in Korea and China for these enterprises during Period 2 (since 2013). The number of Korean affiliates in China has continued to decrease during Period 2, while the number of domestic affiliates has been observed to increase since 2014. China CBVI enterprises were exposed to not only various reshoring incentives provided domestically but also cost shocks from China during the sample period. However, the increase in their DBVI aligns temporally with the reshoring support policy implemented by the Korean government. This indicates that, as in the case of Vietnam CBVI enterprises, cost shocks from China did not directly influence the repatriation decisions of Korean MNEs. This could be due to the presence of other regions, like Vietnam, that hold a comparative advantage in terms of factor cost over the home country. Therefore, the trend of returning Korean MNEs from China or Vietnam can be considered a result of policy efforts. According to the National Assembly Budget Office (2021), it is confirmed that 71 out of the China CBVI enterprises relocated their production facilities in China to Korea over a period of 7 years after the implementation of the reshoring support policy, which accounts for 84.5% of all repatriating enterprises.

In the next section, we test the hypothesis derived from Section 2.2. Based on the trend of Korean MNEs returning after the reshoring support policy, the impact of host countries on

[13] In the *Act on Assistance to Korean Off-shore Enterprises in Repatriation* implemented by the Korean Government, if a CBVI enterprise reduces its foreign production facilities by 25% or more and establishes or expands domestic facilities to produce products or services that were previously produced in the foreign facilities, it is recognized as reshoring (National Assembly Budget Office, 2021).

domestic outsourcing of these enterprises during the policy period (2014-2017) is examined. In other words, we indirectly evaluate the impact of trade costs related to domestic outsourcing of reshoring enterprises.

3.4 Intensive margin of reshoring

This paper suggests that MNEs have two organizational options, DBVI or DO, for procuring intermediate inputs domestically when returning production activity in host countries. Moreover, among the MNEs returning to their home country, the share of those that engage in DO depends on trade costs between the home and host countries. Low trade costs can reduce the relative cost of CBVI, potentially leading domestic firms that purchase intermediate inputs in the market to directly produce these inputs through foreign factories. Furthermore, the foreign entry of firms without domestic factories causes variations in reshoring patterns by host country. Unlike expanding investments in existing domestic production facilities, establishing new factories requires larger fixed costs. Therefore, it may be difficult to expect firms without domestic factories to make new investments even if they return. Instead, it could be more reasonable to anticipate that they would contribute to the activation of new transactions in the domestic market. As such, inter-country trade costs can function as an important indicator in understanding reshoring patterns. In this section, assuming that home-host country distance serves as a positive indicator of inter-country trade costs, the hypothesis that the Korean MNEs engaging in CBVI in China would contribute more to DO during the reshoring policy period (2014-2017) compared to those in Vietnam is tested.

[Insert Figure 4]

Building on the findings from Section 3.3, the period from 2014 to 2017 is defined as the reshoring period during which CBVI enterprises return to their home country, Korea. Subsequently, the financial crisis period (2008-2009) is excluded to clarify the changes in DO of MNEs before and after the reshoring period. Figure 4 displays the trend in domestic outsourcing intensity of Korean MNEs classified based on their CBVI location. Domestic outsourcing intensity is measured as the ratios of DO to revenue. The left panel in Figure 4 illustrates the domestic outsourcing intensity of Vietnam CBVI enterprises. In this case, Vietnam CBVI enterprises are defined as enterprises with Vietnam affiliates for two or more

years during the period from 2010 to 2013, and new entrants are excluded from this analysis. Similarly, China CBVI enterprises are defined as enterprises with China affiliates for a period of 2 years or more during the non-reshoring period (2010-2013), and the domestic outsourcing intensity of these enterprises is displayed in the right panel of Figure 4. MNEs that own both Vietnam and China affiliates or own affiliates in the United States are excluded from the analysis.

Similar to the DBVI trend in Figure 3, the domestic outsourcing intensity in Figure 4 also shows a changing trend from 2014. In Figure 3, it was observed that Korean MNEs have generally reduced their foreign production facilities and increased their domestic production facilities. However, Figure 4 indicates that there were distinct differences in the domestic outsourcing activities of these enterprises based on the CBVI countries during the same period. Firstly, the domestic outsourcing intensity of Vietnam CBVI enterprises, which had been on the rise, shows a declining slope after 2014. This can be interpreted as a result of expanding their own production facilities in Korea, leading to a reduction in market demand for intermediate goods. On the other hand, during the same period, China CBVI enterprises have not only expanded their domestic production facilities but have also become more active in purchasing intermediate goods from domestic supply chains. Unlike investments in domestic production facilities, there are no policy incentives for domestic market transactions. This is because the Korean government's support for returning to Korea is aimed at establishing or expanding domestic production facilities. Therefore, it can be inferred that there were other factors contributing to the differences in MNEs' reshoring strategies. This paper explains the phenomenon by categorizing CBVI enterprises into two types: those without domestic affiliates and those with domestic affiliates. The presence of domestic affiliates can serve as an indicator of a MNE's dependency on upstream industries. MNEs that are less dependent on upstream industries are more likely to rely on market transactions rather than operating affiliates domestically, as they are relatively free from investment losses caused by outsourcing. On the contrary, MNEs that avoid outsourcing due to their high dependency on upstream industries are more likely to have a strong tendency to own domestic affiliates. Taking into account inter-country trade costs, it is predicted that the former was more widely distributed within China. For these enterprises, the domestic outsourcing strategy would have been an efficient

alternative, allowing them to access high-quality production inputs without incurring fixed costs for establishing new affiliates. This would ultimately lead to the activation of domestic intermediate goods transactions by China CBVI enterprises during the reshoring period.

Next, we examine the effect of CBVI countries on DO during the reshoring period through regression analysis. Table 2 lists the summary statistics of variables included in the regression analysis. Revenue and capital stock represent annual sales and fixed tangible assets, respectively. Labor cost includes annual wages, severance pay, and fringe benefits. Although all the variables are expressed as nominal variables in Table 2, they will be adjusted by the price index in the regression analysis. Domestic outsourcing (DO) represents the cost of purchasing intermediate goods from other domestic firms, excluding their own affiliate. This variable will also be adjusted by the producer price index.

[Insert Table 2]

For the regression analysis, the sample is classified into enterprises that operated domestic affiliates for more than 1 year between 2010 and 2013, and enterprises that did not own domestic affiliates during the same period. This allows us to examine the different reshoring strategies between these two groups. For each group, we set up the difference-in-difference specification with AR (1) as follows:

$$lnDO_{it} = \beta_0 + \beta_1 DRP_t + \beta_2 DHC_i + \beta_3 DRP_t \cdot DHC_i + \rho lnDO_{it-1} + \gamma' X_{it} + u_{it}, \qquad (15)$$

where $u_{it} = \alpha_i + \varepsilon_{it}$. Here DO_{it} is the domestic outsourcing of enterprise i in year t. DRP_t is the dummy variable for the reshoring period, where it takes a value of one during the period (2014-2017) corresponding to implementation of act supporting the repatriation of Korean MNEs. DHC_i is the dummy variable for the host country equal to one for enterprises that engaged in CBVI in China for more than 2 years during the period from 2010 to 2013, and zero for enterprises that engaged in CBVI in Vietnam for more than 2 years during the same period. Likewise, enterprises with both Vietnam affiliates and China affiliates, as well as enterprises with U.S. affiliates, are excluded from the sample. X_{it} is the vector of other explanatory variables including log of revenue, log of capital stock, and log of labor cost. α_i is the firm fixed effect with $E[\alpha_i]=0$ and it is correlated with lagged dependent variable $lnDO_{it-1}$. ε_{it} is an idiosyncratic error term that may not be auto-correlated.

Turning our attention to estimation methodology, we apply system-GMM approach proposed by Arellano and Bover (1995) and Blundell and Bond (1998) to control endogeneity issue of lagged dependent variable $lnDO_{it-1}$. The presence of the lagged dependent variable makes both first-difference estimator and within estimator inconsistent. Consider the following first-differenced equation of (15):

$$\Delta lnDO_{it} = \beta_1 \Delta DRP_t + \beta_3 \Delta DRP_t \cdot DHC_i + \rho \Delta lnDO_{it-1} + \gamma' \Delta X_{it} + \Delta u_{it}. \tag{16}$$

Even after differencing the equation (15) to remove the firm fixed effect, the lagged endogenous variable $\Delta lnDO_{it-1}$ is still correlated with the error term Δu_{it}. That is why first-difference estimator becomes biased, and the same hold true for within estimator. To overcome this limit, Arellano and Bond (1991) propose first-difference (FD) GMM estimation approach that applies the following moment conditions to the first-differenced equation (16):

$$E[lnDO_{it-\tau} \Delta u_{it}] = 0; \text{ for } t = 2012, \ldots, 2017 \text{ and } 2 \le \tau \le t - 2010 \tag{17}$$

and for strictly exogenous variable $Z_{it} \in \{DRP_t, DRP_t \cdot DHC_i, X_{it}\}$,

$$E[\Delta Z_{it} \Delta u_{it}] = 0; \text{ for } t = 2012, \ldots, 2017. \tag{18}$$

The FD GMM estimators based on the moment conditions (17) and (18) can be consistent if ρ is not close to one and individual effect is not important (Blundell and Bond, 1998). However, since they are obtained from the differenced equation (16), there remains an issue that the effect of host country β_2 is not identified. We thus need to apply system-GMM approach proposed by Arellano and Bover (1995) and Blundell and Bond (1998). This approach simultaneously estimates equation (15) and equation (16), which allows the coefficient β_2 to be identified. Moreover, the system-GMM estimators have better asymptotic properties than the FD GMM estimators. The extra moment conditions for the level equation (15) are:

$$E[\Delta lnDO_{it-\tau} u_{it}] = 0; \text{ for } t = 2012, \ldots, 2017 \text{ and } 1 \le \tau \le t - 2011,$$
$$E[\Delta x_{it} u_{it}] = 0; \text{ for } t = 2012, \ldots, 2017 \text{ and } x_{it} \in X_{it},$$
$$E[\textstyle\sum_{t=2012}^{2017} u_{it}] = 0.$$

[Insert Table 3]

Table 3 presents the results of two-step system GMM estimation. Taking into account the issue of potential downward bias in two-step standard errors (Arellano and Bond, 1991; Blundell and Bond, 1998), we employ the Windmeijer (2005) errors correction method. Columns (1)-(3) present the estimation results for enterprises that did not own domestic affiliates between 2010 and 2013 before the reshoring period. Columns (4)-(6) show the results for enterprises that owned domestic affiliates during the same period. All Columns shows that lag estimates of ρ is positive and cannot be rejected at the 1% significance level, which makes our specification appropriate. Table 3 also displays some specification tests. Firstly, the AR (1) and AR (2) tests for first-order and second-order serial correlation in the first-differenced residuals, respectively. The results of AR (2) in all columns do not reject the null of no serial correlation. The Sargan/Hansen test of the over-identifying restrictions examines the null of overall validity of the moment conditions which is not rejected as well.

Our main objective is to compare DO of Vietnam CBVI enterprises and China CBVI enterprises during the reshoring period using the reshoring period dummy and CBVI host country dummy. Prior to the reshoring period, the relative contribution of China CBVI enterprises to DO compared to Vietnam CBVI enterprises is calculated as β_2. In column (1) of Table 3, the contribution of a one-unit change in DHC_i to $lnDO_{it}$ is 1.875 and is insignificant. The remaining columns display common results. In other words, before the reshoring period, there was no significant difference in DO between MNEs with Vietnam affiliates and MNEs with China affiliates. This could be related to the CBVI activities of Korean MNEs in Vietnam and China during that period. Intermediate goods produced by Vietnam or China affiliates could significantly offset the domestic demand of these CBVI enterprises, so differences in DO between the two groups may not be observed. In the same manner, the difference in DO of Vietnam CBVI enterprises before and after the reshoring period is calculated as β_1, and the reshoring period effect for China CBVI enterprises is calculated as $\beta_1+\beta_3$. Therefore, the coefficient of the difference-in-difference term, β_3, indicates how much China CBVI enterprises changed their DO compared to Vietnam CBVI enterprises during the reshoring period. In Table 3, while the contribution of a one-unit change in DRP_t to $lnDO_{it}$ is consistently negative across all columns, the results are not statistically significant. This indicates that MNEs that returned from Vietnam did not change

their domestic outsourcing activities much before and after the reshoring period. In the case of China CBVI enterprises, different results are observed depending on whether they own domestic affiliates or not. In columns (1)-(3) of Table 3, the effect of the difference-in-difference term indicates that, unlike MNEs returning from Vietnam, China CBVI enterprises more actively utilized DO to procure intermediate goods after returning to their home country. On the other hand, in the case of MNEs with domestic affiliates in columns (4)-(6), no significant change is observed in domestic outsourcing activities during the reshoring period. In short, it indicates that they did not rely heavily on DO in returning to the home country. MNEs that already owned domestic affiliates may have been less dependent on the market because they could potentially replace intermediate goods produced in China by expanding investment in their existing domestic affiliates when returning to Korea. On the other hand, MNEs without domestic affiliates may have had an incentive to increase their demand for DO in the short term due to the substantial fixed costs and time required to establish new affiliates. Alternatively, if the dependency on the upstream industry is lower, MNEs might have been more active in DO, as it is more efficient to rely on the domestic supply chain than on their own affiliates. The difference in DO between Vietnam CBVI enterprises and China CBVI enterprises observed in columns (1)-(3) might also be explained through this. The lower the dependency, the more advantageous position MNEs can have in transactions with domestic firms, making it easier to procure high-quality intermediate goods and reducing the motivation to attempt CBVI. Moreover, if high inter-country trade costs need to be paid for procuring intermediates abroad, CBVI by these MNEs is less likely to be anticipated. In summary, the share of Korean MNEs that prefer DO in Vietnam or China would be inversely proportional to the trade costs that must be paid in each host country. In addition, the difference in the reshoring strategies of Vietnam CBVI enterprises and China CBVI enterprises shown in columns (1)-(3) can also be considered as a result of the CBVI of DO-preferred enterprises being concentrated in China, where trade costs are relatively low.

Turning to other explanatory variables, the revenue variable serves as a proxy for expected demand for the final goods produced by Korean MNEs, and significantly positive values are observed in all columns except for column (3). If revenues are high, the demand for final goods produced in the future can also be expected to be high. And with high demand

forecast, MNEs will increase their spending on outsourcing costs to boost production output. In the case of capital-intensive production, the role of outsourcing can also be important in reducing labor costs and thus we expect positive relationship between capital stock and outsourcing. Likewise, high labor costs in labor-intensive production create incentives to reduce costs by relying on outsourcing. As a result, labor cost and outsourcing might have a negative relationship. However, the coefficients of both capital stock and labor cost are not statistically significant.

4. Conclusion

In this paper, we emphasized that the benefits of reshoring may vary depending on the entry strategy of MNE. Outsourcing strategy in MNE's repatriation may not be effective in creating jobs at home as well as domestic investment. With this motivation, we studied the factors that determine the entry strategy of MNE in repatriation. According to our theory, a MNE's dependence on upstream industries determines its own entry strategy in repatriation. International trade costs between home and host country are related to distribution of upstream dependence of MNEs in the host country. Using distance information as a measure of the trade costs, we found supporting evidence that home-host country distance negatively impacts the domestic outsourcing of multinationals that have decided to reshore FDI.

These results have two important implications on reshoring policy. First, even if an identical reshoring policy is implemented to MNEs, the expected effect varies by country. This is because the distribution of host countries differs from country to country. If FDI is concentrated in neighboring countries, reshoring MNEs are more likely to adopt the outsourcing strategy. As a consequence, the reshoring policies of these countries may exhibit limited success in creating new investment and job opportunities domestically, even though domestic suppliers can indirectly contribute to increased employment. Second, it suggests that there may be a gap between the government's policy intention and corporate response strategies. The government's trade policy may have specific goals, such as boosting domestic production or job creation. However, our theoretical model showed that MNEs are likely to deviate from the intention of policy in the process of maximizing production efficiency.

Due to limited data, we measured the trade cost as home-host country distance. However, additional empirical studies may be required since the trade cost includes various costs such as transportation cost and tariff. Furthermore, examining the benefits of reshoring by entry strategy could be an interesting direction for further research.

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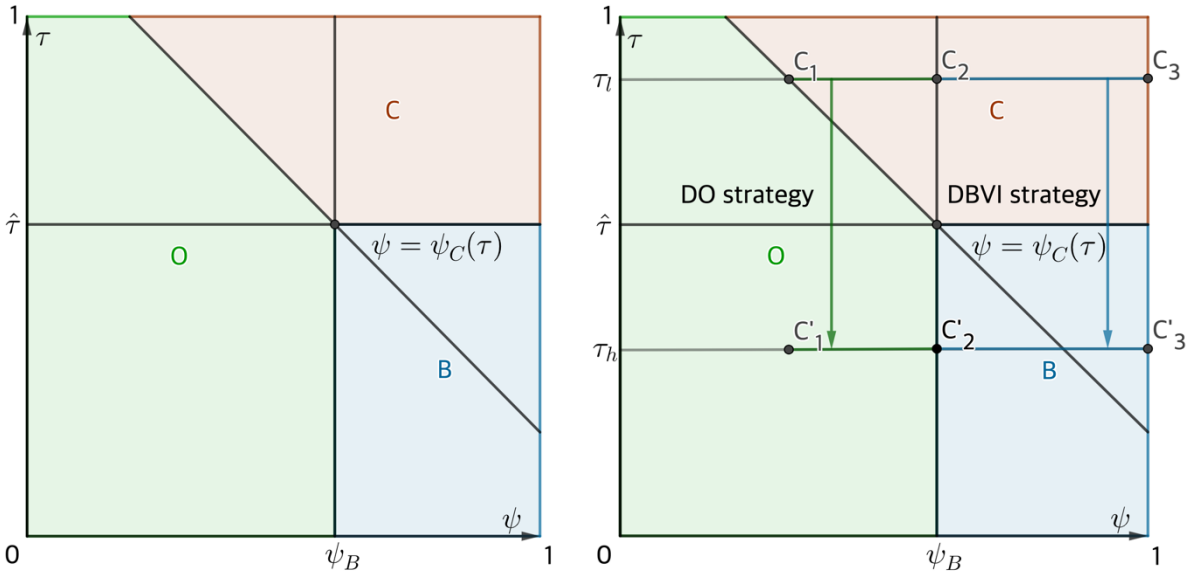
Figure 1.

(a) Equilibrium organizational forms (b) Effect of a change in iceberg cost



Note: $\psi_B = \psi_C(\hat{\tau})$ by rationality of preference.

Figure 2. Effect of iceberg cost on reshoring strategy

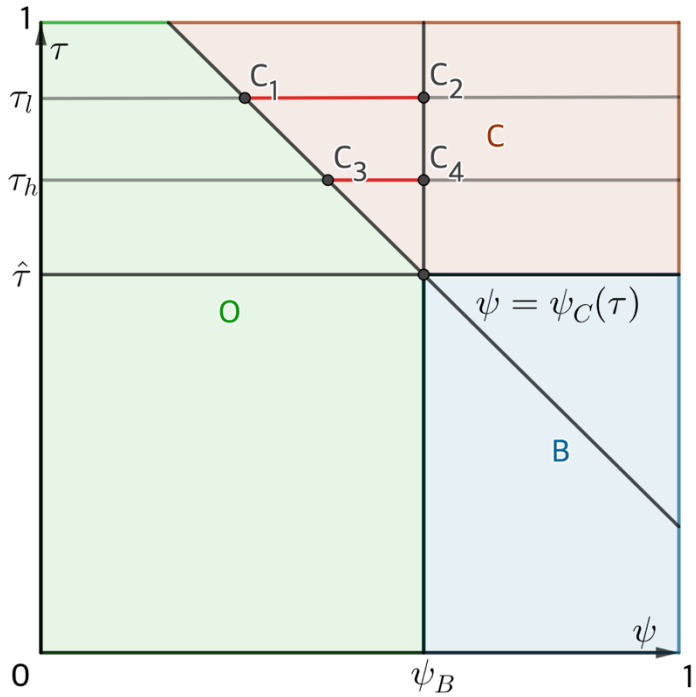
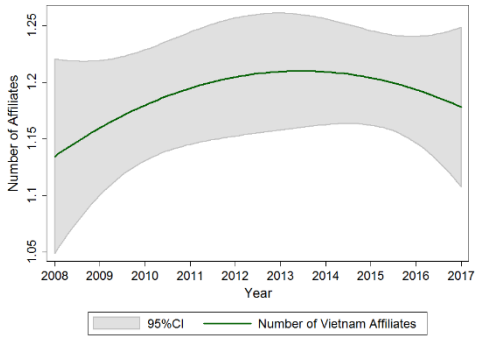
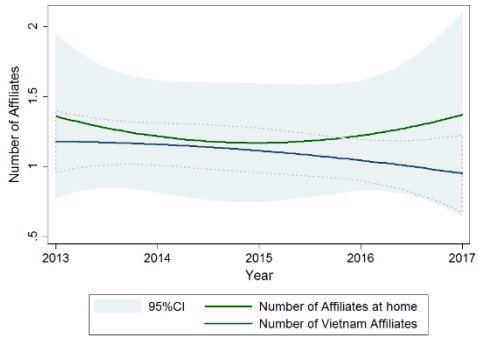


Figure 3. Growing extensive margin of reshoring

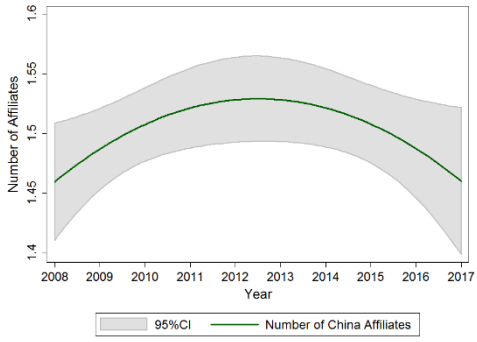
(a) CBVI-trend in Vietnam



(b) Conditional reshoring for DBVI



(c) CBVI-trend in China



(d) Conditional reshoring for DBVI

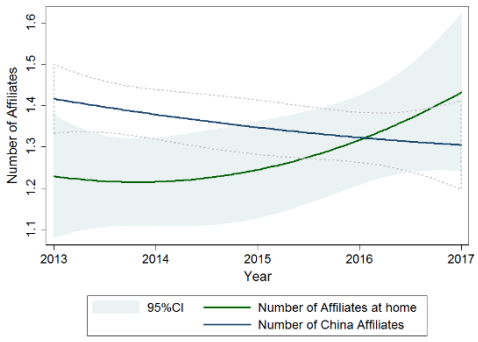
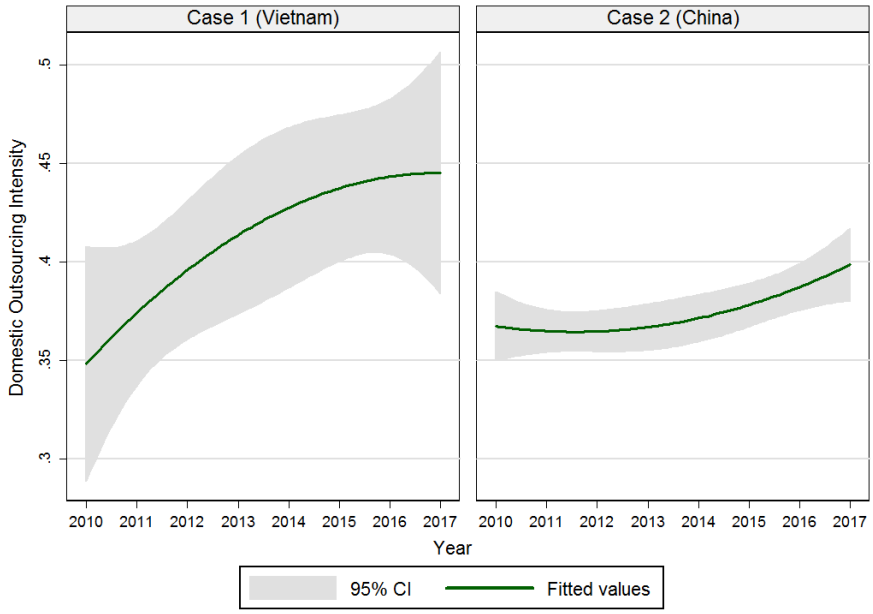


Figure 4. The Effect of host country on domestic outsourcing intensity



Note: Each panel represents the predicted trend of domestic outsourcing intensity (DO ratios to revenue) for MNEs engaged in CBVI in Vietnam and MNEs engaged in CBVI in China.

Table 1. Number of affiliates by country, 2008-2017

Number of Affiliates	Year									
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
in Korea	3034	1430	2026	2060	2031	2229	1915	1768	1861	1928
	(0.443)	(0.455)	(0.434)	(0.440)	(0.434)	(0.423)	(0.415)	(0.424)	(0.425)	(0.444)
in China	1815	779	1160	1151	1133	1256	1084	954	932	902
	(0.265)	(0.248)	(0.249)	(0.246)	(0.242)	(0.238)	(0.235)	(0.229)	(0.213)	(0.208)
in U.S.	462	217	328	322	338	355	327	292	321	307
	(0.067)	(0.069)	(0.070)	(0.069)	(0.072)	(0.067)	(0.071)	(0.070)	(0.073)	(0.071)
in Vietnam	178	107	132	133	149	187	179	174	214	249
	(0.026)	(0.034)	(0.028)	(0.028)	(0.032)	(0.035)	(0.039)	(0.042)	(0.049)	(0.057)
in India	114	61	114	107	114	135	105	95	109	97
	(0.017)	(0.019)	(0.024)	(0.023)	(0.024)	(0.026)	(0.023)	(0.023)	(0.025)	(0.022)
in Japan	120	64	81	94	91	95	93	81	92	95
	(0.018)	(0.020)	(0.017)	(0.020)	(0.019)	(0.018)	(0.020)	(0.019)	(0.021)	(0.022)
in Hong Kong	124	54	87	95	94	121	91	68	71	65
	(0.018)	(0.017)	(0.019)	(0.020)	(0.020)	(0.023)	(0.020)	(0.016)	(0.016)	(0.015)
in Germany	65	24	42	48	46	57	46	52	56	62
	(0.009)	(0.008)	(0.009)	(0.010)	(0.010)	(0.011)	(0.010)	(0.012)	(0.013)	(0.014)
in Indonesia	108	49	58	78	75	104	82	78	75	61
	(0.016)	(0.016)	(0.012)	(0.017)	(0.016)	(0.020)	(0.018)	(0.019)	(0.017)	(0.014)
in Mexico	36	17	33	31	31	32	46	52	69	54
	(0.005)	(0.005)	(0.007)	(0.007)	(0.007)	(0.006)	(0.010)	(0.012)	(0.016)	(0.012)
in Thailand	78	33	55	47	52	53	49	35	42	46
	(0.011)	(0.011)	(0.012)	(0.010)	(0.011)	(0.010)	(0.011)	(0.008)	(0.010)	(0.011)
Total*	6852	3141	4663	4684	4685	5275	4611	4167	4377	4338

Note: The number of affiliates is aggregated for all companies in the Korean manufacturing industry and classified by country. 'Total' refers to the total number of affiliates in the manufacturing industry. The share of affiliates by country is presented in parentheses.

Table 2. Descriptive statistics of sample data

Variables		Obs.	Mean	S.D.	Min	Max
Revenue (Annual sales amount in 100 million KRW)		31,497	911	1,848	0.28	22,049
Labor Cost (Labor cost in 100 million KRW)		31,497	98	193	0.01	4,721
Capital Stock (Tangible asset in 100 million KRW)		31,497	336	880	0.01	17,961
Domestic Outsourcing (Purchase amount of intermediate goods from Korean suppliers, excluding affiliates in 100 million KRW)		31,497	355	844	0	14,542
DRP (Dummy variable for the reshoring period)		31,497	0.42	0.49	0	1
DHC (Dummy variable for the host country)	Entire sample	4,999	0.91	0.28	0	1
	MNEs with foreign affiliates only	2,605	0.92	0.28	0	1
	MNEs with domestic affiliates	2,394	0.91	0.29	0	1
DRP·DHC (The product of the DRP variable and the DHC variable)	Entire sample	4,999	0.38	0.49	0	1
	MNEs with foreign affiliates only	2,605	0.38	0.48	0	1
	MNEs with domestic affiliates	2,394	0.38	0.49	0	1

Table 3. Results from two-step SYS GMM estimation

Dependent Variable: $\log DO_{it}$	MNEs with Foreign Affiliates Only			MNEs with Domestic Affiliates		
	(1)	(2)	(3)	(4)	(5)	(6)
$\log DO_{it-1}$	0.179***	0.151***	0.178***	0.174***	0.177***	0.185***
	(0.051)	(0.056)	(0.057)	(0.042)	(0.041)	(0.042)
DRP_t	-0.415	-0.491	-0.362	-0.480	-0.525	-0.441
	(0.465)	(0.466)	(0.442)	(0.812)	(0.798)	(0.866)
DHC_i	1.875	3.004	3.626	2.851	2.397	2.163
	(2.544)	(4.068)	(3.793)	(3.849)	(3.755)	(3.366)
$DRP_t \cdot DHC_i$	1.322**	1.202*	1.174*	0.999	1.036	1.112
	(0.576)	(0.657)	(0.619)	(0.895)	(0.879)	(0.942)
$\log Revenue_{it}$	1.068***	0.806***	0.516	1.220***	1.216***	1.615***
	(0.256)	(0.277)	(0.403)	(0.347)	(0.358)	(0.550)
$\log Capital\ \ Stock_{it}$		0.483	0.309		0.236	0.334
		(0.375)	(0.407)		(0.285)	(0.284)
$\log Labor\ \ Cost_{it}$			0.325			-0.941
			(0.725)			(0.720)
Constant	-5.201**	-9.070***	-7.647***	-6.913*	-8.903*	-8.150**
	(2.206)	(3.037)	(2.872)	(4.014)	(4.792)	(4.103)
Observations	1,876	1,876	1,876	1,753	1,753	1,753
Number of Firms	439	439	439	380	380	380
AR (1)	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
AR (2)	[0.117]	[0.173]	[0.130]	[0.463]	[0.459]	[0.401]
Instruments	47	49	51	47	49	51
Sargan Test	[0.197]	[0.198]	[0.104]	[0.422]	[0.430]	[0.452]
Hansen Test	[0.208]	[0.251]	[0.196]	[0.132]	[0.152]	[0.149]

Both results are produced by two-step system GMM estimation and the Windmeijer (2005) errors correction for standard errors is employed. Standard errors are reported in parentheses (*** p<0.01, ** p<0.05, * p<0.1). The p-values are reported in bracket.

Appendix

A.1 Relationship between upstream dependency and DBVI

Figure 5. Upstream dependency and vertical integration, 2008-2017

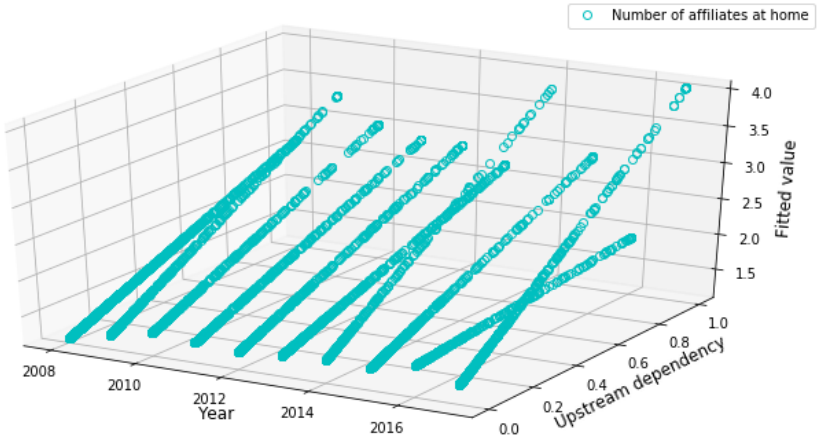


Figure 5 shows empirical evidence of the relationship between domestic sourcing strategies of manufacturing firms and their upstream dependency. The vertical axis counts the domestic affiliates of Korean manufacturers and indicates the intensity of vertical integration. Upstream dependency is measured by the share of the manufacturer's purchases accounted for by the domestic affiliates. The predicted lines from linear regressions uncover a positive relationship between upstream dependency and vertical integration, i.e., if a firm is heavily dependent on upstream industries, it is likely to engage in vertical integration.

A.2 Proof of Proposition 1:

Let $1+(\theta-3)(\theta+1)+4\tau^2\left(\lambda_C-\frac{\lambda_C^2}{4}\right)>8f$ and

$$\delta_O^C(\psi,\tau)\equiv V^C-V^O=\frac{\psi^2}{8}+\frac{\psi}{2}\tau^2\left(\lambda_C-\frac{\lambda_C^2}{4}\right)+\frac{\psi}{8}(\theta-3)(\theta+1)-f \quad \text{for any} \quad \psi\in(0,1).$$

Define a function Δ_O^C on $[0,1]$ by

$$\Delta_O^C(\psi)\equiv\begin{cases}\lim\limits_{\psi\to 1}\delta_O^C(\psi;\tau), & if\ \psi=1\\ \delta_O^C(\psi;\tau), & if\ \psi\in(0,1)\\ \lim\limits_{\psi\to 0}\delta_O^C(\psi;\tau), & if\ \psi=0\end{cases}$$

then Δ_O^C is continuous on $[0,1]$ and

$$\Delta_O^C(0)=\lim_{\psi\to 0}\delta_O^C(\psi;\tau)=-f<0<\lim_{\psi\to 1}\delta_O^C(\psi;\tau)=\Delta_O^C(1).$$

Therefore, there exists $\psi_C\in(0,1)$ such that $\Delta_O^C(\psi_C)=0$ by the intermediate value theorem.

For some $(\psi_C,\tau)\in(0,1)\times(0,1)$,

$$\delta_O^C(\psi_C,\tau)=\frac{\psi_C{}^2}{8}+\frac{\psi_C}{2}\tau^2\left(\lambda_C-\frac{\lambda_C^2}{4}\right)+\frac{\psi_C}{8}(\theta-3)(\theta+1)-f=0.$$

If $f>\frac{1}{8}$ then

$$\begin{aligned}\frac{\partial\delta_O^C}{\partial\psi_C}(\psi_C,\tau)&=\frac{\psi_C}{4}+\frac{\tau^2}{2}\left(\lambda_C-\frac{\lambda_C^2}{4}\right)+\frac{1}{8}(\theta-3)(\theta+1)\\&>\frac{\psi_C}{4}+f-\frac{1}{8}\\&>f-\frac{1}{8}\\&>0.\end{aligned}$$

Hence, by the implicit function theorem

$$\frac{\partial\psi_C}{\partial\tau}=-\frac{\dfrac{\partial\delta_O^C(\psi_C,\tau)}{\partial\tau}}{\dfrac{\partial\delta_O^C(\psi_C,\tau)}{\partial\psi_C}}=-\frac{\psi_C\tau\left(\lambda_C-\dfrac{\lambda_C^2}{4}\right)}{\dfrac{\psi_C}{4}+\dfrac{\tau^2}{2}\left(\lambda_C-\dfrac{\lambda_C^2}{4}\right)+\dfrac{1}{8}(\theta-3)(\theta+1)}\le 0\ \square$$

A.3 Proof of Proposition 2:

Let, for any $\tau\in(0,1)$,

$$\delta_B^C(\tau)\equiv V^C-V^B=-f+\left[\tau^2\left(\lambda_C-\frac{\lambda_C^2}{4}\right)-\left(\lambda-\frac{\lambda^2}{4}\right)\right]\frac{\psi}{2},$$

then $\delta_B^C(\tau)$ is increasing in τ. Define $\Delta_B^C(\tau)$ on $[0,1]$ by

$$\Delta_B^C(\tau) \equiv \begin{cases} \lim_{\tau \to 1} \delta_B^C(\tau), & if\ \tau = 1 \\ \delta_B^C(\tau), & if\ \tau \in (0,1) \\ \lim_{\tau \to 0} \delta_B^C(\tau), & if\ \tau = 0 \end{cases}.$$

Then $\Delta_B^C(\tau)$ is continuous extension of $\delta_B^C(\tau)$ and clearly $\Delta_B^C(0) < 0$. On the other hand, if $\psi(\Lambda(\lambda_C) - \Lambda(\lambda)) > 2f$,

$$\Delta_B^C(1) = -f + \left[\left(\lambda_C - \frac{\lambda_C^2}{4}\right) - \left(\lambda - \frac{\lambda^2}{4}\right)\right]\frac{\psi}{2} > 0,$$

where $\Lambda(\lambda) = \lambda - \lambda^2/4$ and it is increasing on $[0,1)$. Therefore, by the intermediate value theorem, there exists $\hat{\tau} \in (0,1)$ such that $\Delta_B^C(\hat{\tau}) = \delta_B^C(\hat{\tau}) = 0$ □