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Why Firms Provide Goods to Foreign Markets Using a Combination of Entry Modes: Foreign Direct Investment and Export

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Abstract

This paper empirically explains why firms provide goods to foreign markets using a combination of two entry modes, foreign direct investment (FDI) and export. This research analyzes two factors, transaction costs and economies of scale, which differently impact the foreign market entry mode. The balanced panel data set of automobile companies is employed for empirical analysis. The empirical results show that there is a time lag before firms switch entry modes from export to FDI. A firm may choose exporting as an entry mode to satisfy the increased local demand in the short run. In the long run, a firm may expand its local production capacity through FDI to satisfy local demand. The findings also show that firms reaching the minimum efficient scale are more likely to expand foreign production capacities to meet local demand. However, firms with less than the minimum efficient scale prefer to expand domestic production of exportable goods rather than increase foreign production.

Keywords: FDI, export, transaction costs, economies of scale

INTRODUCTION

Multinational enterprises must choose a method of entry to a foreign market. A company may prefer to export to a foreign country, or it may invest in a foreign country to produce locally. Earlier studies regarding foreign market entry modes are based on a

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simple dichotomy where firms choose either FDI or export (Buckley and Pearce 1979, 1981; Root 1987). These studies focused on a comparison of the cost of entry to a foreign market through export versus FDI. The cost-based FDI theories rest on the assumption that FDI and export are substitutes. Therefore, a firm will choose only one foreign market entry mode based on a cost comparison of the two entry modes.

However, in the real world, multinational corporations continue to export domestically produced goods to foreign countries where they also operate local production facilities. For example, Toyota operates automobile plants in the US but also exports automobiles produced in domestic plants to the US market. In 2004, 68 percent of Toyota automobiles in the US market were produced in local US assembly plants while 32 percent of Toyota automobiles were exported from Japan to the US Similarly, 84 percent of US sales of Honda automobiles were attributed to production at local US assembly plants while 16 percent of US sales of Honda automobiles were from the exportation of Honda automobiles from Japan to the US. European automobile companies, on the other hand, generally prefer export as their foreign market entry mode for the US market compared to the FDI preference by Japanese firms. Local production plants account for 44 percent of total Volkswagen sales in the US market and 6 percent of total BMW sales in the US market.

According to the internalization theory, a firm has an incentive to

Table 1. Automobile Sales in the US by Maker and Source (Unit, 2004)

Origin	Maker	Production in US	Imports	Total sales in US
Japan	Toyota	745,033 (68%)	356,188 (32%)	1,101,221
	Honda	705,643 (84%)	137,646 (16%)	843,289
	Nissan	419,163 (78%)	117,594 (22%)	536,757
Europe	VW	133,948 (44%)	167,539 (56%)	301,487
	BMW	13,654 (6%)	212,628 (94%)	226,282

Source: World Motor Vehicle Statistics, Korea Automobile Manufacturers Association

internalize transaction costs by choosing FDI as a foreign market entry strategy (Buckley and Pearce 1981). On the other hand, a firm also has an incentive to produce goods in domestic plants and then export in order to decrease production costs with economies of scale (Chamberlin 1936; Krugman 1979). These two factors, transaction costs and scale economies, have different impacts on foreign market entry decisions. This paper asserts that FDI and exportation are not substitutes but complements when transaction costs and scale economies are considered simultaneously. The objective of this paper is to empirically assess why a firm chooses a mixed foreign market entry strategy rather than a single type of entry mode and why each firm has a different combination ratio between FDI and export. The findings contribute to a greater understanding of foreign market entry decisions by multinational enterprises.

LITERATURE REVIEW

Rob and Vettas (2003) developed a theoretical model to explain why firms provide goods to a foreign market using a combination of two different modes, FDI and export. The Rob and Vettas model is based on the premise that variable costs of export are higher than those of FDI due to transportation costs, taxes, and lower labor costs in a foreign country. On the other hand, the fixed costs of export are lower than those of FDI. As a result, the entry decision is dependent on the trade-off between variable costs and fixed costs. Rob and Vettas considered an additional factor, foreign market demand, and theoretically showed that as long as foreign market demand increases, the optimum strategy for firms is a combination of FDI and export, due to the complementary nature of FDI and export. Firms invest in a foreign country to satisfy proven demand, while exports are used to satisfy uncertain demand. The Rob and Vettas' research which theoretically explored mixed entry modes and dynamic factors that can affect entry mode decisions provided an important contribution to the academic literature regarding foreign market entry modes. However, the Rob and Vettas model considered only variable and fixed costs and did not take into consideration transaction costs.

"Transaction cost analysis is the most widely used theoretical perspective in international entry mode research (Brouthers and

Hennart 2007: 400)." Rao (2003) presented that cost minimization considers all the components of costs, traditional production costs and transaction costs. The internalization of transaction costs is one of important theories that explain a multinational enterprise's motive for expanding production to foreign countries. A firm decides to move its production facilities to a foreign country if gains from internalizing transaction costs are greater than costs incurred by investing in foreign countries. For example, a firm choosing FDI as its entry mode may decrease the transaction costs of searching for a foreign partner. A firm may also decrease transaction costs by reducing the number of contracts or negotiations with other foreign firms after building up its foreign operation facilities.

On the other hand, a firm has an incentive to increase domestic production of exportable goods when it can reduce the average costs of the goods through economies of scale by spreading the fixed costs over a larger volume of production. Therefore, economies of scale are positively related to export (Helpman 1984; Krugman 1979; Lancaster 1982). The effect of scale economies on trade is a popular topic in the field of international trade economics, such as a free trade agreement between Canada and the US. Canadian firms were unable to operate at a minimum efficient scale in its domestic market, and as a result, expected significant benefits from its free trade agreement with the US (Cox and Harris 1985, 1986; Harris 1984). Cox and Harris (1986) estimated that the benefits to the Canadian economy from trade liberalization were between 8 and 10 percent of GNP. These gains were achieved from intra-industry rationalization. Previously, Canadian firms produced goods primarily for its small domestic market. The free trade agreement enabled Canada to gain economies of scale by exporting more goods to the US.

Helpman, Meliz and Yeaple (2004) used cross-sectional data of 52 industries from 38 countries in order to study the effects of scale economies, trade barriers, and the dispersion of firm size on foreign market entry decisions. Their research focused on the proximity-concentration trade-off. That is, firms choose FDI as an entry mode when trade costs, such as transport costs, export insurance costs, and tariffs, outweigh the costs of maintaining foreign production capacity. The empirical results show that exports, relative to FDI, increase when trade frictions are low and the scale economies effect is strong. However, the Helpman, Meliz, and Yeaple model

and empirical test did not consider transaction costs as a factor affecting the proximity-concentration trade-off. Pyo (2008) developed a theoretical model that takes into account transaction costs and economies of scale simultaneously. The model demonstrates that a firm using a mixed entry mode can provide goods to a foreign country with less cost than by choosing only a single entry mode when there are simultaneous transaction costs and scale economies.

HYPOTHESES

Based on earlier studies of foreign market entry modes, transaction costs are expected to have a positive relationship with FDI and a negative relationship with export. If transaction costs and economies of scale are important reasons for why a firm will choose to initially build a production plant in a foreign country, it is expected that transaction costs and economies of scale will continue to be important factors affecting the mixed entry mode ratio of foreign production to export even after multinational firms have built local production plants. Pyo (2008) explained that a firm with high transaction costs tends to have a high ratio of foreign production to export. Based on the high local production ratios of Japanese automobile companies doing business in the US market, one can infer that the transaction costs between Japan and the US are higher than the transaction costs between Europe and the US. However, a firm with small volumes of domestic production tends to have a low ratio of foreign production to export because the firm has an incentive to increase the production of exportable goods in a domestic plant in order to exhaust its economies of scale.

According to the literature regarding foreign market entry modes, a firm has a strong incentive to handle foreign operations internally when transaction costs are high (Erramilli and Rao 1993; Gatignon and Anderson 1988). Gatignon and Anderson (1998) examined the relationship between transaction costs and the entry mode choice by employing asset specificity as an explanatory variable representing transaction costs. They found that high asset specificity encourages firms to choose high-control entry modes. As transaction costs rise, firms attempt to decrease domestic production and increase foreign production, thereby raising the ratio of foreign production to export. Consequently, we propose the following:

H1: There is a positive relationship between transaction costs and the amount of foreign production, whereby the higher the transaction costs, the higher the foreign production ratio.

Chamberlin (1936) presented a graphical analysis to explain monopolistic competition, which offered the theoretical basis for the relationship between scale economies and international trade. As a firm increases output, its average costs are generally assumed to decline due to the spreading of the initial investment over the increasing amount of output. Firms have an incentive to meet the demand for goods of foreign countries by increasing domestic production because these firms can reduce the average costs as a result. Krugman (1979) developed a general equilibrium model of monopolistic competition. According to Krugman's model, international trade has the same affect on firms' cost structure as does the increase in the domestic population. Firms are able to increase the volume of production as they expand the markets for their goods through exports. Therefore, economies of scale are positively related to the decision of choosing export as a foreign market entry mode.

When the scale economies effect of domestic production is salient, firms attempt to increase domestic production and decrease foreign production, thereby reducing the ratio of foreign production to export. However, firms with production volumes already greater than the minimum efficient scale tend to expand foreign production capacities, thereby increasing their foreign production ratios. Consequently, we propose the following:

H2: There is a negative relationship between the scale economies effect of domestic production and the amount of foreign production, whereby a firm with domestic production greater than the minimum efficient scale is more likely to have a high ratio of foreign production to export.

METHODOLOGY AND DATA

The impact of transaction costs and scale economies on a firm's foreign production ratio is empirically examined in this paper by employing worldwide passenger automobile data from 1995 to 2004.

The fixed effects model is mainly utilized to estimate intercepts and coefficients in this paper since each automobile producer in the data set has firm-specific characteristics that are not reflected in the independent variables included in the regression model. In addition, the data set of automobile firms in this paper is not randomly drawn and the population is not large. The random effects model is appropriate only when samples are drawn randomly from a large population (Baltagi 1995).

The main source of data for the automobile industry is from the World Motor Vehicle Statistics published annually by the Korea Automobile Manufacturers Association. According to the data of total sales by country, the US has the largest automobile market, followed by Japan, China, Germany, and the UK. The number of automobiles sold in the US market was over 17 million and its market share was 27.1 percent in 2004. To make a balanced panel data set, this paper employs the data of nine automobile firms investing in the US and/or four automobile firms investing in the UK from 1995 to 2004, representing over 30 percent of market share in the world automobile industry. The balanced panel data set consists of 130 observations with 13 cross-sectional units and 10 year time periods.

Japan, China, and Germany also have significant automobile markets, but these three countries are excluded from the empirical testing of the data set for several reasons. First, there is no foreign automobile firm that operates its own production plant in Japan due to strong local competitors. The Japanese automobile market is regarded as the most competitive market among the 10 major domestic producers—Toyota, Nissan, Mitsubishi, Honda, Mazda, Suzuki, Fuji, Daihatsu, Isuzu, and Hino. This fierce competition among domestic producers gave the automakers a strong incentive to develop advanced automobile technologies, allowing Japanese firms to rank among the world's major producers. Domestic competition in the Japanese market resulted in foreign producers being reluctant to build local production plants in Japan through FDI. Foreign automobile firms provide their products to the Japanese market via exports, and the market shares of these foreign automobile firms are extremely small compared to the Japanese firms. Total sales by foreign firms were 0.25 million in 2001, which represented only 5.9 percent of the total market share in Japan. The market share of foreign firms declined from 5.7 percent in 2002 to 5.1

Table 2. Passenger Car Sales in Japan by Foreign Firms and Market Share (Units,%)

Maker	2001	2002	2003	2004
Ford	6,186	5,399	4,667	5,233
VW	61,121	59,834	56,050	55,380
Chrysler	7,646	5,908	6,153	5,914
M-Benz	53,207	47,752	45,341	43,743
Peugeot	12,295	15,162	15,330	12,693
BMW	36,068	35,728	36,388	38,715
Total foreign makers (1)	255,120	252,824	241,076	238,360
Total sales in Japan (2)	4,289,683	4,441,354	4,715,920	4,768,131
Market share $^{(1)}/_{(2)}$	5.9%	5.7%	5.1%	5.0%

Source: Korea Automobile Manufacturers Association, Japan Automobile Manufacturers Association

percent in 2003 and 5.0 percent in 2004.

China developed its automobile industry in the 1980s and European automobile firms such as Volkswagen and Audi entered into the Chinese market for the first time. Recently, the automobile market in China has grown very fast and more than 20 automobile firms have built production plants in China. However, the Chinese government enforces strong regulations for foreign car makers, restricting foreign firms from possessing more than 50 percent of total investment. As a result, foreign automobile producers investing in China operate local production plants with Chinese partners, such as Shanghai VW Automotive, SAIC GM Wuling Automotive and Shanghai GM. As a result, foreign firms investing in China may not be able to fully control the ratio of FDI to export due to intervention by local governments and partners.

Germany is a member of the European Union (EU), the largest economic entity in Europe. The EU has a single market consisting of a common trade policy and common currency, the euro. The EU market cannot be segmented by the national boundaries in which a firm operates. Automobiles produced within Germany can be easily transported into other EU member countries and the target market of foreign automobile companies investing in Germany is not necessarily Germany alone, but the entire EU. For example, Ford produced 7.5 million cars in German, of which 6 million cars were exported to other foreign countries. The ratio of exports to

Table 3. Automobile Production and Exports by Ford's Local Plant in Germany (Units,%)

Year	2000	2001	2002	2003	2004
Production (1)	577,386	671,098	690,771	700,336	750,178
Exports (2)	445,823	517,695	559,075	569,523	603,002
Ratios $^{(2)}/_{(1)}$	77.2%	77.1%	80.9%	81.3%	80.4%

Source: Korea Automobile Manufacturers Association, VDA, Tatsachen and Zahlen

local production was more than 80 percent in 2003 and 2004. If a firm uses a local plant as a production base, not just for local consumers, but also for exportation to other foreign countries, the scale economies effect can be influenced by the amount of exportable goods produced in the local plant. The UK is also a member of the EU, but it is not used as a production base for other EU countries. For example, Toyota produced 210,000 automobiles in UK-based plants and exported 60,000 automobiles from Japan to the UK in 2003.

SELECTION OF VARIABLES

Dependent Variable

Allocation between FDI and Export

Based on the literature previously mentioned, each firm has a different ratio between export and FDI, which can be influenced by transaction costs and economies of scale. In order to measure the ratio between the two entry modes, this paper relied on the following data: (x) total parent company exports to the target country and (y) total foreign production of local plants in the target country. From these data, the dependent variable represented by the foreign production ratio is achieved. Each firm's foreign production ratio, $ALLO_{it}$, is the total production of local plants divided by the total sales in the target country (including total production of local plants and goods imported from the parent country), i.e. $(y)/(x)+(y)$. Buckley and Pearce (1981) used the foreign market servicing ratio as a dependent variable for their empirical study on the foreign market servicing behavior of multinational enterprises, which is similar to

the dependent variable in this paper.

Independent Variables

Transaction costs

Transaction costs are difficult to measure empirically because of its multidimensionality. Despite extensive research on transaction costs, there is a lack of consensus on the best method for measuring transaction costs. One basic method to measure transaction costs, based on previous literature, was through the use of surveys (Anderson and Schmittlein 1984; Brouthers 2002; John and Weitz 1988). The use of questionnaires to measure transaction costs has the advantage of collecting data directly related to the variables of interest, but there is a limitation in the questionnaire method. Mastern (1996) indicated that many respondents did not correctly understand the concept of asset specificity generating transaction costs.

Meyer (2001) utilized a dummy variable of transaction costs. He examined the evolution of institutions in East European economies and its influence on the choice of entry modes. He assumed that German firms were more familiar with East European economies than British firms. Unfamiliarity, which implies the deficiency of knowledge about local markets, enhances transaction costs and firms tend to use wholly owned entry modes. In Meyer's paper, the degree of gap between German and British firms' familiarity with East European economies was measured by a dummy variable, where German firms were given a value of 1 and British firms were given a value of 0.

This paper adopts a different approach for measuring transaction costs based on the perspective of decision makers of firms. Decision makers of firms attempt to choose a foreign market entry strategy to avoid contingencies. Williamson (1975) addressed that bounded nationality, opportunism, and asset specificity generate market failure resulting in transaction costs. These three factors are germane to uncertainty. "Uncertainty lies in the root of any transaction cost problems (Chi and McGuire 1996: 286)," and firms have incentives to diminish transaction costs caused by uncertainty. Itaki (1991) addressed 'perceived' transaction costs which can be much more suitable for explaining the investment behaviors of decision makers. This paper utilizes the factors of increasing

uncertainty as a variable of transaction costs. Transaction costs between a foreign country and the investing firm's home country, $TRAC_{hft}$, are measured by three factors which can affect the degree of uncertainty perceived by decision makers. Geographic distance, common language, and the fluctuation of the foreign exchange rate are used as proxies for measuring perceived uncertainty from the perspective of decision makers of multinational enterprises.

Geographic distance, $DSTN_{hf}$, is one of the typical variables used in the gravity model in the field of international trade. The amount of bilateral trade is negatively related to geographic and/or culture distance between two countries. Meyer (2001) argued that Germany, compared to Britain, is much closer geographically and culturally to Eastern Europe. The history of private and business contacts between Germany and Eastern Europe helps firms to adapt to local institutions, thereby reducing the costs of searching for information, negotiating, and contracting with local partners. Geographic distance is often measured by the great-circle distance between the capital cities of two countries. Great-circle distance assumes a spherical earth and is calculated based on the latitude and longitude of two cities. Geographic distance data can be found on the following website: http://www.indo.com/distance/index.html.

Language, $LADF_{hf,}$ is also an important factor affecting transaction costs and 'perceived' transaction costs. It is easier for firms to be affiliated with foreign partners speaking a common language. The close personal and commercial relationship based on a common language allows investing firms to have an enhanced knowledge of local markets and potential competitors. On the other hand, communication problems caused by a different language system may hinder the flow of information, and the lack of local market knowledge may increase transaction costs. The language obstacle causes decision makers to hesitate in investing in foreign countries where regulatory frameworks, bureaucracies, and court systems are vastly different from a firm's home country. When a firm operates a local plant in a foreign country, the firm has to deal with unfamiliar local regulations and laws which are written in a different language. For some languages, it is very difficult to accurately translate the meaning of one language into another. If a foreign country has a totally different language system from the home country, it is expected to take a long time to overcome the language handicap. $LADF_{hf,}$ is set to be equal to -1 if two countries have a common

language system, 0 if two countries have different languages but belong to the same language family, and 1 if two countries belong to a different language family. For instance, English and German belong to the Indo-European language of the Germanic branch, and French and Spanish are the Indo-European language of the Italic branch. Japanese belongs to Altaic language.

Multinational firms are very sensitive to foreign exchange rates because the firms' markups can fluctuate in response to exchange rate movements. Firms do not reflect all fluctuation of exchange rates into the prices of exported goods. The limit of the pass-through from exchange rate to prices makes firms perceive exchange rate volatility, $FXFL_{hft}$, as an uncertainty. Kogut and Kulatilaka (1994) presented that the production switch across countries is influenced by many sources of uncertainty such as unstable labor markets and government intervention. "However, one of the most important sources of uncertainty is the volatility of the exchange rate (Kogut and Kulatilaka 1994: 127)." One of the main reasons for Japanese automobile producers choosing to locate their manufacturing plants in North America was the change in the value of the yen during 1987, which increased the costs of exporting automobiles from Japan to North America (Mair, Florida and Kenney 1988). $FXFL_{hft}$ represents the standard deviation of the change in the bilateral exchange rate between an investing firm's home country and host country. The standard deviations of the exchange rate are calculated based on monthly data from 1995 to 2004. A time lag may exist before a firm adjusts its entry mode to respond to an exchange rate fluctuation. However, a time lag effect is not considered in this paper under the assumption that the swing of exchange rates may be significant for initial entry decisions, but become less significant for adjusting the ratio between FDI and export.

The values of three factors—geographic distance, language difference, and exchange rate volatility—are standardized with a mean of zero and a unit standard deviation. Transaction costs are measured based on the addition of the three factors as presented below:

$$TRAC_{hft} = DSTN_{hf} + LADF_{hf} + FXFL_{hft}. \quad (1)$$

The cultural difference between host and home countries is also considered to be an important factor affecting entry mode decisions

(Fladmoe-Lindquist and Jacque 1995; Gatignon and Anderson 1988; Luo 2001; Zhao, Luo, and Suh 2004). Ronen and Shenkar (1985) reviewed previous empirical studies on culture cluster and synthesized their findings into nine culture categories. The US and the UK belong to the Anglo cluster, Germany and Switzerland are included the Germanic cluster, and Japan and India belong to the Independent cluster. However, the cultural difference is not considered in the empirical model because country clusters by culture distance are very similar to clusters by language family, which is already included in the measurement of transaction costs.

Economies of scale

In order to measure economies of scale, we need the actual unit cost data of different sized firms so that we can find the optimum size of a firm with its minimum unit of cost. Actual unit cost data are not easily obtainable, and therefore, several substitution methods for measuring the minimum efficient scale have been introduced in earlier studies. Stigler (1958) compared market share changes of steel firms in the US market over two decades and found that the number of small firms with less than 2.5 percent market share decreased. On the contrary, firms whose market shares were over 2.5 percent held their share over the two decades, implying they operated at an optimal size. Stigler insisted that increases in demand are met by increases in output of existing firms and small firms with less than a minimum efficient scale vanished gradually due to diseconomies of scale. One issue with Stigler's method is that for some industries, it is difficult to obtain each firm's market share data long enough to analyze the market share changes of different sized firms. As a result, another commonly used method for estimating a minimum efficient scale is to measure the average size of the largest firms occupying a 50 percent market share in a particular industry (Comanor and Wilson 1967; Kobrin 1991; Pugel 1978). One advantage of the 'top 50' method is that the minimum efficient scale can be measured with only cross-sectional output data of existing firms.

The automobile industry is regarded as a pertinent example for measuring the effects of scale economies due to its mass production characteristic. Bain (1956) insisted that the minimum efficient scale for an automobile plant is about 10 percent of total demand in the US market. The average sales of passenger automobiles in the US

market between 1995 and 2004 was about 8.3 million automobiles per year. According to Bain's method, the minimum efficient scale for a plant is 0.8 million automobiles per year. The empirically estimated minimum efficient scale for 25 industries in the UK was presented in Silberston's paper (1972). A plant typically produces more than one product, with a variety of sizes and styles. The minimum efficient scale for one specific product is smaller than that for a group of products because a firm need not adjust production processes for just one model of goods. Silberston estimated that the minimum efficient scale for the automobile industry is 500 thousand for one model and 1 million for a range of models.

This paper uses a dummy variable for the measurement of a minimum efficient scale, EOS_{it}. According to the literature, a firm has a tendency to increase domestic production through exportation to acquire the scale economies effect. Until its production reaches the minimum efficient scale, the incentive to switch the production location to a foreign country does not increase proportionally with the amount of domestic production. However, once the amount of domestic production reaches the threshold point of the minimum efficient scale, a firm will have a strong incentive to enter into a foreign market through FDI. Therefore, employing a dummy variable to represent the threshold point may be an appropriate method for measuring the scale economies effect, rather than using the amount of domestic production as an independent variable.

This paper relies on Silberston's estimation of the minimum efficient scale for producing automobiles and uses one million per year as the threshold point for a dummy variable. Automobile firms with domestic production over one million are given a value of 1, meaning they have reached a minimum efficient scale. Automobile firms with less than one million are given a value of 0.

Control Variables

Market size of the host country

The market structure in the host country can be an important determinant of a firm's entry mode decision. The large market of a foreign country is justification for local production requiring a large amount of investment. When the market size is so small that only a few firms can possess a scale economies effect, foreign firms may hesitate in building a local production plant through FDI. A

one percent market share in the US represents a significant market share in other smaller countries. Silberston (1972) presented that it is necessary to consider the relative market scale for measurement of scale economies because a small market share in a large country can be a significant market share from the point of view of a small country. In this paper, market size in the host country, $MSHC_{it}$, is measured by the ratio of total sales in the host country to worldwide automobile sales, which is expressed as: (*total sales in the host country*/*total worldwide automobile sales*). Market size in a foreign country is expected to have a positive relationship with FDI.

Domestic competition in the investing firm's home country

Fierce domestic competition can be a driving force for a firm's expansion to foreign countries. The establishment of production plants in a foreign country can be a strategy to overcome intensive competition in domestic market. For example, Honda and Nissan established production facilities in the US in order to circumvent competition with Toyota. Honda and Nissan were facing very difficult competition with Toyota, the dominant firm in the Japanese market. Honda and Nissan's strategic decision of investing in the US was the result of these firms attempting to avoid domestic competition while targeting a significantly large market share in the US (Mair, Florida, and Kenney 1988).

Domestic competition of the investing firm's home country, $DCIC_{it}$, is measured by the home country's market share in the global automobile market divided by the number of domestic firms, which is expressed as:

$$\left(\frac{\textit{total sales in doemstic country} \Big/ \textit{total worldwide sales}}{\textit{the number of domestic firms}} \right).$$

The domestic competition variable uses the home country's market share in the global market as a numerator, instead of total sales in the home country, in order to consider the relative competitive level of the domestic market. A certain number of firms that does not represent fierce competition in a large country can induce a significant amount of competition in a small country. If a domestic market is highly concentrated with a large number of firms, there is a limit in horizontal expansion at home. The choices

by domestic firms are either to diversify into a new industry at home or internationalize (Buckley 1990, 1993). The market structure of the home country can be an important factor affecting firms' expansion strategies. Domestic competition is expected to have a positive relationship with FDI.

Production cost difference between countries

The production cost difference between a host country and the investing firm's home country affects the choice of foreign market entry mode. A firm that invests in a foreign country where production costs are lower than those in its home country can achieve profits from the low production costs in a foreign country. Therefore, the production cost difference (production costs of the home country less the production costs of a host country) has a positive relationship with FDI.

In this paper, production cost differences between countries, $PRCD_{it}$, are measured by workers' hourly compensation cost differences between countries, because non-tradable inputs, particularly labor, are important factors in the selection of a target country (Buckley 1993). According to the Hecksher-Ohlin trade model, international trade in goods equalizes factor prices as well as product prices between the two countries, also referred to as the factor-price equalization theorem. The opening of international trade brings about the increase of the wage rate in a labor-abundant country, and therefore, the wage rates are equalized in all countries even though labor did not migrate between countries. However, Harrigon (2000) found that the change of import prices in the US did not significantly affect the wage rate. The prices of non-tradable factors such as labor did not have a significant causality with international trade. The inequality of wage rates between countries gives an incentive for managers to move the production location to foreign countries. The managers of multinational enterprises attempt to produce more goods in a location where the production costs are lowest.

The Bureau of Labor Statistics within the US Department of Labor provides international comparison data of hourly compensation costs for 22 manufacturing industries in 32 countries. The categorization of industries is based on the North American Industry Classification System (NAICS). The hourly compensation cost index data for the automobile industry is available on the Bureau of Labor

Statistic's website, http://www.bls.gov.

HYPOTHESES TEST

For the fixed effects model, the following multiple regression equation is utilized for empirical testing:

$$\begin{aligned} ALLO_{it} = {} & a_1 + a_2 D_{2i} + a_3 D_{3i} + a_4 D_{4i} + a_5 D_{5i} + a_6 D_{6i} + a_7 D_{7i} \\ & + a_8 D_{8i} + a_9 D_{9i} + a_{10} D_{10i} + a_{11} D_{11i} + a_{12} D_{12i} + a_{13} D_{13i} \\ & + \beta_1 TRAC_{it} + \beta_2 EOS_{it} + \beta_3 MSHC_{it} + \beta_4 DCIC_{it} + \beta_5 PRCD_{it} \\ & + \varepsilon_{it} \end{aligned} \quad (2)$$

where

i: firms having production plants in the US or UK, $i = 1, 2 \cdots, 13$

t: time period, $t = 1995, 1996 \cdots, 2004$

ALLO: allocation ratio of foreign production to exporting

TRAC: transaction costs

EOS: minimum efficient scale

MSHC: market size of host country

DCIC: domestic competition in home country

PRCD: production cost difference between host and home countries

$a_1 \cdots a_{13}$, $\beta_1, \cdots \beta_5$: the regression coefficients

ε_{it}: the error term.

$D_{2i} = 1$ if the observation belongs to TOUS, 0 otherwise;

$D_{3i} = 1$ if the observation belongs to HOUS, 0 otherwise;

$D_{4i} = 1$ if the observation belongs to NIUS, 0 otherwise;

$D_{5i} = 1$ if the observation belongs to MAUS, 0 otherwise; etc.

The data set has 13 cross-sectional units. As a result, a total of 12 dummy variables are included in the fixed effects regression model to avoid perfect multicollinearity. In order to estimate the regression equation (2), we use the generalized least squares (GLS) method with cross-sectional weights. The cross-sectional weighted regression can be a remedy for the heteroscedastic residual problem. The estimated heteroscedastic variances from a first-stage pooled OLS regression are used as weights.

Table 4. Parameter Estimates by the Fixed Effects Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Intercept	*0.147150	0.072434	2.031498	0.0446
TRAC (Transaction costs)	*-0.033533	0.016207	-2.069092	0.0408
EOS (Economies of Scale)	**0.104703	0.029517	3.547154	0.0006
MSHC (Market Size)	0.426232	0.333607	1.277648	0.2040
DCIC (Domestic Competition)	**17.79199	3.805060	4.675876	0.0000
PRCD (Production Costs)	0.000341	0.000538	0.632791	0.5282
Fixed Effects (Cross)				
TOUS (Toyota in the US)	0.217281			
HOUS (Honda in the US)	0.368242			
NIUS (Nissan in the US)	0.163922			
MAUS (Mazda in the US)	0.058134			
MIUS (Mitsubishi in the US)	0.317926			
SUUS (Subaru in the US)	0.404547			
SZUS (Suzuki in the US)	-0.195136			
VWUS (Volkswagen in the US)	-0.128465			
BMUS (BMW in the US)	-0.500476			
HOUK (Honda in the UK)	0.230099			
NIUK (Nissan in the UK)	0.351738			
TOUK (Toyota in the UK)	-0.041741			
FOUK (Ford in the UK)	-1.246072			
Adjusted R-squared	0.953054			
S.E. of regression	0.074035			
F-statistic	155.0498			
Prob(F-statistic)	0.000000			

*, ** Significant at $p < .05$ and $p < .01$ respectively (two-tailed test)

Testing Hypothesis 1

Transaction costs are hypothesized to have a positive relationship with the foreign production ratio and the regression coefficient of variable transaction costs (TRAC), β_1, is expected to be greater than zero. However, the sign of β_1 is contrary to the hypothesis developed in this paper. In order to find the reasons for a negative sign of β_1, we used the OLS model to measure the relationship between a firm's foreign production ratio and transaction costs. The empirical results from the OLS model presented that the estimated coefficient of transaction costs is positive and statistically significant at the one percent level. The OLS model ignores the characteristics of panel

Table 5. Parameter Estimates from the three Different Regression Models (p-value in Parentheses)

Variables	Fixed Effects	Random Effects	OLS
intercept	0.147* (0.045)	0.090 (0.378)	0.135 (0.161)
TRAC	- 0.034* (0.041)	0.003 (0.878)	0.063** (0.000)
EOS	0.105** (0.001)	0.160** (0.000)	0.250** (0.000)
MSHC	0.426 (0.204)	1.020** (0.007)	0.880* (0.012)
DCIC	17.792** (0.000)	10.560** (0.000)	0.939 (0.553)
PRCD	0.000 (0.528)	0.001 (0.393)	0.001 (0.423)
Adjusted R^2 F-statistic Prob(F-statistic)	0.953 155.050 0.000	0.274 10.734 0.000	0.369 16.086 0.000

*, ** Significant at $p < .05$ and $p < .01$ respectively (two-tailed test)

data and assume that all coefficients are constant across time and cross-sectional units. Therefore, the reason for a negative sign of β_1 may be attributed to the characteristics of the fixed effects model for panel data analysis. One of the advantages in the fixed effects model is the utilization of specific cross-sectional characteristics over time. However, the empirical result from the OLS model presents the aggregate relationship between the foreign production ratio and transaction costs.

Figure 1 shows the scatter plot of the panel data set employed in this paper. For simplicity, only three automobile producers (Honda's US plant, BMW's US plant, and Toyota's UK plant) are portrayed in the figure. The aggregate relationship between the foreign production ratio and transaction costs indicates a positive sign. However, the slopes of the within-group lines are negative. This figure illustrates that the relationship between the foreign production ratio and transactions costs may indicate a negative sign when the firm-specific characteristics are considered in the fixed effects model. However, the slope of aggregate panel data set is positive as shown

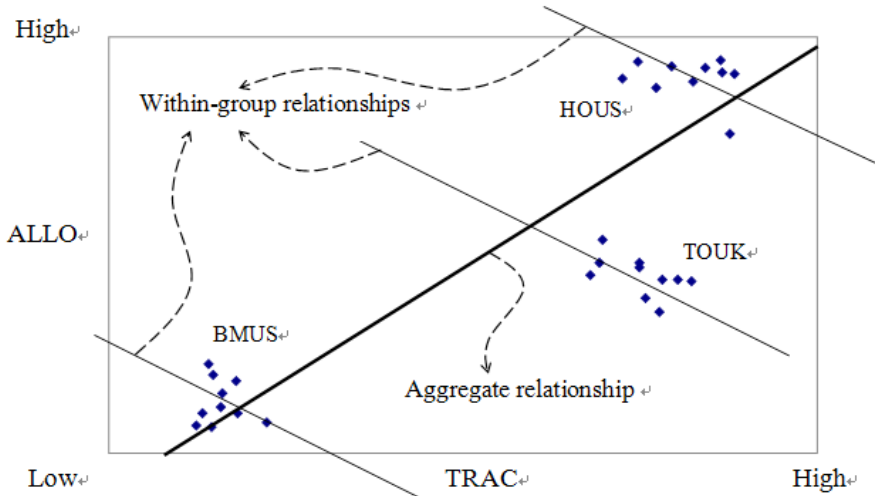

Figure 1. Within-group and Aggregate Relationships

in the OLS model and the random effects model.

FDI is regarded as a long-term strategy while exporting is a comparatively short-term strategy. FDI requires a significant amount of initial investment, and therefore, firms may not be able to quickly change their entry modes from export to FDI. Even firms that already have local production plants cannot expand the foreign production capacities in a short time frame, particularly when they must make additional investments to increase production capacities. However, firms can better control product supply through export rather than FDI.

This paper uses the data set from the automobile industry, which requires a significant investment for building production facilities. Automobile firms cannot suddenly increase their foreign production ratio, defined as the total production of local plants divided by the total sales in the target country. Therefore, a firm may choose exporting as an entry mode in order to satisfy the increased local demand in the short run, thereby decreasing the ratio of foreign production to export, as shown in the fixed effects model. In the long run, a firm expands its local production capacity resulting in the increase of the foreign production ratio.

Testing Hypothesis 2

Economies of scale (EOS) is hypothesized to have a positive relationship with the foreign production ratio. The empirical results from the fixed effects model shows that the estimated β_2 is statistically significant at the 0.05 level, and its sign is consistent with the hypothesis. This empirical result supports that firms reaching the minimum efficient scale in domestic plants are more likely to have high foreign production ratios. On the contrary, firms with less than the minimum efficient scale of domestic plants prefer to utilize scale economies by expanding domestic production of exportable goods rather than increasing foreign production.

It may also be useful to assess the relationship between the foreign production ratio and economies of scale by utilizing the data of additional automobile producers without the constraint of specific target countries. Table 6 presents the domestic and foreign production of the top 20 automobile makers.

Although firms with high volumes of production are more likely to have high foreign production ratios, the foreign production ratios do not have a linear relationship with domestic production. GM, Toyota, and Ford produced more than three million automobiles in their domestic plants, but their foreign production ratios are similar to or less than that of VW and Honda, whose foreign production ratios are 64 percent and 52 percent, respectively. These results support the theory of the *L*-shaped average cost curve becoming horizontal after reaching the minimum efficient scale. The *L*-shape curve provides a theoretical basis for using a dummy variable in this paper rather than the total domestic production for the measurement of scale economies.

To assess the robustness of empirical results, the *t*-test is utilized to compare the differences between the two groups in Table 6—(1) firms with domestic production over one million and (2) firms with domestic production less than one million.

The descriptive statistics for the two groups show that the mean for automobile firms with large volumes of domestic production is higher than that of firms with small volumes of production. The mean of firms with domestic production over one million is 0.41, indicating that on average these firms produce 41.2 percent of automobiles in foreign plants. On the other hand, firms with domestic production of less than one million produce only 16.5 percent of automobiles in foreign plants.

Table 6. Top 20 Automobile Makers Ranked by Worldwide Production (Unit, 2004)

Ranking	Maker	Domestic	Overseas	Total
1	GM	3,651,277 (45%)	4,502,086 (55%)	8,153,363
2	Ford	3,056,530 (54%)	3,818,251 (46%)	6,874,781
3	Toyota	3,680,946 (55%)	3,048,683 (45%)	6,729,629
4	VW	1,903,190 (38%)	3,108,063 (62%)	5,011,253
5	Chrysler	3,026,950 (70%)	1,267,198 (30%)	4,294,148
6	P.S.A	1,934,279 (64%)	1,074,427 (36%)	3,008,706
7	Nissan	1,474,769 (47%)	1,695,000 (53%)	3,169,769
8	Honda	1,242,528 (40%)	1,898,413 (60%)	3,140,941
9	Renault	1,313,927 (52%)	1,195,147 (48%)	2,514,074
10	Fiat	1,004,250 (51%)	920,737 (49%)	1,924,987
11	Hyundai	1,646,385 (92%)	141,936 (8%)	1,788,321
12	Suzuki	980,731 (59%)	673,301 (41%)	1,654,032
13	Mitsubishi	882,116 (59%)	623,185 (41%)	1,505,301
14	BMW	717,445 (65%)	394,548 (35%)	1,111,993
15	Mazda	801,084 (80%)	198,924 (20%)	1,000,008
16	Kia	852,263 (94%)	51,920 (6%)	904,183
17	VAZ/Lada	717,985 (100%)	0 (0%)	717,985
18	Daihatsu	641,236 (96%)	28,311 (4%)	669,547
19	Fuji	450,062 (83%)	89,243 (17%)	539,305
20	Dongfeng	510,229 (100%)	0 (0%)	510,229

Source: World Motor Vehicle Statistic, Korea Automobile Manufacturers Association

Table 7. Summary of Levene's Test and t-test for Equality of Means

Levene's test for equality of variances		*t*-test for equality of means		
F	Sig.	t	df	Sig. (2-tailed)
0.443	0.514	3.472	18	0.003
Descriptive statistics for the two groups				
Group		Mean	Std. Deviation	Std. Error Mean
Firms with large domestic production		0.41245	0.15564	0.04693
Firms with small domestic production		0.16504	0.16210	0.05403

CONCLUSIONS

The object of this paper is to empirically explain why firms export to countries where they have already established local production plants. This research focuses on two factors—(1) transaction costs and (2) scale economies—which have different impacts on the foreign market entry mode. A firm has an incentive to decrease transaction costs by choosing FDI as an entry mode. On the other hand, a firm has an incentive to increase domestic production and export its goods in order to achieve the effect of scale economies. The fixed effects model is utilized to analyze the effects of transaction costs and economies of scale on the entry mode decision by employing the balanced panel data set from the automobile industry.

According to the empirical results, transaction costs and economies of scale have a statistically significant influence on the ratio of foreign production to export. However, empirical results demonstrated that transaction costs have a negative impact on the foreign production ratios, contrary to the hypothesis developed in this paper. The negative sign of the coefficient in the fixed effects model may be due to a time lag before firms switch entry modes from export to FDI. Firms cannot expand the foreign production capacities in a short time period, particularly when they must invest a substantial additional investment to increase foreign production capacities. Therefore, a firm may choose export as an entry mode in order to satisfy the increased local demand in the short run, thereby decreasing the ration of foreign production to export. In the long

run, a firm expands its local production capacity resulting in the increase of the foreign production ratio. With regards to economies of scale, we found that firms reaching the minimum efficient scale are more likely to expand the foreign production capacities to meet local demand.

These empirical findings are useful for policymakers deliberating policies for domestic industry protection. There are strong arguments supporting protection for infant industries. If the total production of foreign firms is less than the minimum efficient scale and transaction costs are low, foreign firms are more likely to provide goods through export to exhaust the scale economies effect. Under this condition, the appropriate policy would be trade protection through tariffs or quotas. On the other hand, if the total productions of foreign firms are already over the minimum efficient scale and transaction costs are high, foreign firms prefer FDI to export. In this case, it would be more effective for the domestic government to provide production subsidies to the domestic industry rather than trade protection. This paper implies that governments should take into account the industry structure of a foreign country as well as the domestic industry in order to choose the most appropriate protection policy.

There are several methodological limitations in this paper. One primary issue with transaction cost economics is that the range of transaction costs cannot be easily defined and there is a lack of consensus in the method for measuring transaction costs. This paper measures transaction costs by employing the factors of increasing uncertainty. Future empirical testing may be conducted based on different methods for measuring transaction costs.

Due to the constraints of data availability, the data utilized in this paper was based solely on automobile industry data from just two countries. Although the automobile industry provides the most appropriate data for empirical testing in this paper, a single industry limits the generalization of these findings. In addition, firms may choose the appropriate foreign market entry mode based on a strategic business decision and firms from different countries may have different preferences of entry modes. The strategic differences between firms were not considered in this paper due to the limited availability of data and for simplicity. These limitations provide guidance for future research to enrich the empirical findings in this paper.

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