

MANAGEMENT OF FOREIGN SUBSIDIARIES FACING UNCERTAINTIES

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DECLARATION

I hereby declare that the thesis is my original work and it has been written by me in its entirety. I have duly acknowledged all the sources of information which have been used in the thesis. This thesis has also not been submitted for any degree in any university previously.



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SUMMARY

This dissertation examines how organizations are coordinated across and within firm boundaries, and how uncertain environments affect the coordination. In the first essay, I investigate strategic behaviour of firms in the vertical relationships by analyzing location choices with referencing their customers. While proximate location to customers facilitates coordination in the vertical relationships, it is a relation-specific investment for the firm, and vulnerable to contingencies originating from customers. To deal with the risk, firms not only “underinvest” in the relation-specific locations, but also actively invest in real options. Specifically, upon uncertainties in location of customers, the likelihood of firms’ choosing the same locations as their customers’ decreases while the likelihood of choosing neighbouring locations increases. Likewise, upon uncertainties in demand from customers, likelihood of firms’ choosing locations proximate to their current customers decreases while the likelihood of choosing locations proximate to their potential customers increases. Empirical analysis of North American listed firms between 2007 and 2011 generally supports the hypotheses.

In the second and third essays, I explore the coordination inside the firm boundary by looking at the integration of top management teams (TMT) between the headquarters and acquired firms (the second essay), and the headquarters and subsidiaries (the third essay). The second essay adopts post-acquisition integration as the empirical context, and argues that the need for coordination leads to TMT integration between acquirer and target after acquisition, but the likelihood of integration diminishes over time as coordination mechanisms become more formalized, and coordination roles are delegated to lower level of acquirer’s hierarchy. In the third essay, I examine the coordination in the hierarchy by looking at TMT integration, and demonstrate how it is modified by modularity holding company structure introduces. I propose that holding company structure facilitates application of CC scheme by the

headquarters while it lowers the need for feedback of subsidiaries owned by a holding company in order to design CC schemes. In addition, it better enables the headquarters to focus on urgent issues during economic crisis by operating with less intervention. Empirical data from 2006 to 2010 show that TMT integration patterns are consistent with the hypotheses in these two essays.

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CHAPTER 1

WHICH CUSTOMERS DO FIRMS FOLLOW AND HOW CLOSELY?: UNCERTAINTIES IN GLOBAL SUPPLY CHAINS AND REAL OPTION STRATEGIES IN LOCATION CHOICES

Abstract

Previous studies demonstrate that firms are likely to enter and stay in countries where customers locate. Building on this finding as a baseline, this study extends our knowledge about firms' location choices in two ways. First, by distinguishing present and potential customers, I argue that while firms are attracted by both present and potential customers, they strategically change the balance between the two types of customers depending on conditions that they face. Second, by distinguishing customers' presence in host or target countries and in other nearby countries, I argue that while both loci of customers' presence attract firms, the magnitudes of attractions differ depending on conditions that focal firms face. Adopting real option theory, I propose that when firms face uncertainty about future demand from present customers, they are more attracted to the presence of potential customers. On the other hand, when firms face uncertainty about future location of customers, they are more attracted to (present or potential) customers' presence in other nearby countries rather than in host or target country. Exploiting different business environments originating from capital intensity of customers, uncertainty of customer performance, and capital intensity of focal firms, are the three sets of hypotheses presented. Empirical test, using rich data from COMPUSTAT customer segment file and ORBIS disks, generally support these hypotheses. This study is a significant contribution to researchers and practitioners as it identifies a new set of strategic dimensions about location choice, and offers theoretical framework to manage them.

INTRODUCTION

As global supply chains have become a norm in today's international business, their geographic configurations have been attracting great interest from researchers, and we have seen substantial developments in studies, for example, on agglomeration patterns of multinational firms (Alcácer, 2006; Alfaro & Chen, 2014) and locational designs of mutually-linked subsidiaries within multinational firms (Baltagi, Egger, & Pfaffermayr, 2007; Blonigen, Davies, Waddell, & Naughton, 2007; Chen, 2011). Yet location choice studies considering inter-firm relationships between suppliers and customers are not abundant. The current study focuses on this gap and contributes to broader streams of literatures on global supply chains by investigating how the presence of customers affect location choice strategy, and especially by identifying specific strategic decisions about location choices that focal firms pursue.

Previous studies about effects of customers' presence have found that firms are likely to choose locations close to their customers, and the supplier-customer relationships at home are often recreated in host countries (Martin, Mitchell, & Swaminathan, 1995; Martin, Swaminathan, & Mitchell, 1998; Schmitt & Van Biesebroeck, 2013). Building on these findings, this study further extends our knowledge in two ways. First, it finds differentiated and non-monotonic effects of present versus potential customers. Second, by examining (present or potential) customers' presence in the host or target country as well as in other nearby countries, it identifies another differentiated and non-monotonic effects originating from loci of customers (i.e. presence of customers in the host or target country versus other nearby countries). Figure 1 is an illustrative explanation on these elements.

The theoretical angle utilized for articulating these differentiated effects is the real option theory (Damaraju, Barney, & Makhija, 2015; Dixit & Pindyck, 1995; Folta & O'Brien,

2004; Klingebiel & Adner, 2015; Kogut & Kulatilaka, 1994; Myers, 1977). Real option theory posits that as the future is more uncertain, holding alternative opportunities or real options is more valuable. Applied to location choices of firms, this logic leads to testable propositions. When firms face uncertainty on future demand from customers, they would seek real options concerning their customer bases by choosing locations close to potential customers. In addition, if the uncertainty they face is about geographic locations of customers, they would choose locations that provide better access to customers not only in the host or target country, but also in other nearby countries which allows them to build export platforms and continue to cater customers in wider range of locations. Such location choices generate real options for the access to customers.

These extensions of our knowledge about location choice strategy are significant because they identify new areas of strategic behavior by firms. Firms and their customers are interdependent and coordinated for mutual benefits, sometimes to the extent that they are called “hybrid” organizations (Williamson, 1991). At the same time, however, they keep significant room for autonomous strategy. This study recognizes the tension between interdependence and autonomy, and reveals strategic behaviors of focal firms upon location choices.

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Insert Figure 1 about here

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Hypotheses derived from the propositions mentioned above are tested with archival data. The research question in this paper demands significant amount of data, and it is probably the reason why not so many studies have been done on this research question. First, to identify pairs of focal firm and present customers, firm-level information on supplier-customer relationships is necessary. Second, to find locations of focal firms and customers,

information on worldwide locations of the sample firms is required. Third, because focal firms and customers are from different countries, such worldwide location data needs to include at least large firms from around the world. Furthermore, the research question requires significant variance in the conditions that focal firms face. Ideally, focal firms or customers should be from various industries so that variances can be exploited in different business environments. To overcome these challenges, COMPUSTAT customer segment file and ORBIS database are used. COMPUSTAT customer segment file identifies supplier-customer relationships at firm level, and includes firms from various industries. On the other hand, ORBIS provides worldwide information about public and private companies including their equity ownerships. As I will explain in more detail later, these data sets enable the test in this paper.

The next section reviews previous studies related to supplier-customer relationships in economic geography, before it identifies the research gap. Then, specific hypotheses are presented in the following section. Design of empirical analysis and its results are explained in detail in the section following above. The last section concludes with discussion on limitations and implications of this paper.

LITERATURE REVIEW

The effect of customer presence has been studied as one of basic agglomeration economies in economic geography (Marshall, 1920). The benefit of locating near customers is not limited to the lower transportation cost (Fujita, Krugman, & Venables, 2001). Resource dependency theory argues that firms depend on external environment including customers, and need to manage uncertainties of environment. There are multiple ways to manage uncertainties including acquisitions of other firms (Pfeffer, 1972; Williamson, 1991). Close location is another way of control. It improves monitoring and alleviates information

asymmetries (Kalnins and Lafontaine, 2013). In addition, by facilitating interaction with customers, it nurtures relational competitive advantage (Dyer and Singh, 1998), and enhances innovations (Porter, 1990). These effects are confirmed by empirical studies. For example, Glaeser and Kerr (2009) demonstrate that local presence of customers, along with other factors - such as local presence of suppliers, local labor pool, and level of knowledge spillovers - encourages creation of new manufacturing firms. Adopting a different context, Alcácer and Chung (2014) examine how each of agglomeration economies and structure of each factor market affect location choice of foreign firms. Though it is not the main variable, presence of customers is shown to have positive effect on entries by foreign firms.

For the purpose of this paper, however, these studies on agglomeration economies are not satisfactory in the sense that they capture the presence of customers only at industry level. Therefore, we cannot tell from these studies whether firms are following their present customers or exploring new customers.

In this aspect, Martin et al. (1998) and Schmitt and Van Biesebroeck (2013) take one step further using data in automobile industry. Both studies identify present and potential customers at firm level. Martin et al. (1998) confirm that presence of present as well as potential customers leads to focal firm's entry to a foreign market. In the same vein, Schmitt and Van Biesebroeck (2013) show that previous vertical relationships with customers lead to focal firms choosing locations near those present customers. In addition, after controlling the endogenous effect of previous relationships, locational proximity increases the probability of successfully signing the supply contracts with customers. In short, firms benefit from locations close to both present and potential customers. The dependent variable in this study is not location choice, but we can reasonably infer from the positive effects of locational proximity on signing contracts that firms should be geographically attracted by presence of present as well as potential customers.

These studies that identify present and potential customers at firm level significantly improve our understanding. However, they show only aggregated effects of the two customer types, and therefore a question about how these effects varies in different circumstances remains unanswered. This paper targets this gap by exploring variations in differentiated effects of present and potential customers' presence.

Another gap this study targets is related to the measurement of customers' presence. Schmitt and Van Biesebroeck (2013) adopt a pair of focal firm and customer as unit of observation. It is reasonable for them because the dependent variable they are interested in is the event of contract signing between the two firms. However, to understand firms' location choice, the aggregated presence of customers should be the key variable. In this respect, Martin et al. (1998) is more straightforward. Its context is about entry into US market by Japanese auto suppliers and it shows that greater presence of customers facilitates more entry of the firms. In a one-country context, however, presence of customers is considered only in the host country. It is not a flaw of the study itself because at the time of the sample, 1989-1990, most of firms had just started to enter foreign markets, and the scope of their operations was usually confined to the host countries. However, as globalization develops, firms have established multiple subsidiaries around the world and developed subsidiary network where each subsidiary is inter-connected with offering and receiving goods and services within or across firm boundaries (Ghemawat, 2005). Reflecting this development, studies in international economics have started to take into account effects of other countries as well as host country (Baltagi et al., 2007; Blonigen et al., 2007; Chen, 2011). Borrowing these techniques in international economics, this study considers presence of customers both in the host country and other countries. The benefit of it is substantial not only because presence of customers in other country simply matters, but also because it matters in an interestingly non-monotonic way. Customers' presence in the host country and other countries has

differentiated effects on focal firms' location choices, which reflect focal firms' strategic behaviors as the following section explains further.

THEORY AND HYPOTHESES

Before explaining main hypotheses, it is necessary to recognize the baseline hypothesis confirmed by previous studies as I explained in the previous section.

Baseline Hypothesis: Firms are likely to locate in or enter countries that are the same as or proximate to their (either present or potential) customers'

Building on the baseline hypothesis, the research question of this paper is how firms choose locations differently in relation to their present and potential customers in different circumstances. More specifically, firms may be attracted by either present or potential customers differently, or they may be attracted by customers' presence either in the host or target country, or in other nearby countries. To answer this question, real option theory is applied as a theoretical guideline. In this section, this paper will explain how real option theory can be applied, and posit concrete hypotheses based on the theoretical arguments.

Real Option Theory

Real option theory regards firm's investment as generation of opportunities (Dixit & Pindyck, 1995; Myers, 1977). For example, building production capacity in a country gives a firm options to either utilize and further develop the capacity or to leave the capacity unused depending on situations (Kogut & Kulatilaka, 1994). This option is valuable if business conditions in the future is unpredictable, and if adapting to the new condition requires significant time or cost. Klingebiel and Adner (2015) has defined three conditions of real option investments: sequencing, low initial commitment, and reallocation. Real option investments are initiated by partial investments with preparation for sequential changes of commitment level upon resolution of uncertainty. Once future conditions are realized, the

focal firm reallocates resources so that they can reap profit to their maximum from the new business conditions. Real option theory has been applied to many strategic fields including diversification (Folta & O'Brien, 2004), divestiture (Damaraju et al., 2015), joint ventures (Kumar, 2005), innovation (Klingebiel & Adner, 2015), and location choice in view of exchange rate (Kogut & Kulatilaka, 1994; Rangan, 1998) and labor cost (Fisch & Zschoche, 2012).

This paper applies real option theory to a new context: firm's location choice in relation to their customers. There are two kinds of real option investments involved in this context. First, a firm may choose a location close to potential customers in order to generate alternative revenue source for the future. This is especially important when present customers are not reliable as a future revenue source. For example, performance of present customers may deteriorate, and they may cut down the operation, which leads to lower demand of the focal firm's products. Taking into account such possibilities, focal firms would begin their operations near potential customers' locations, develop relationships with them, and sequentially expand or shrink the operation according to the updated information about demand from present and potential customers. A successful example of this is Visteon in Slovakia. As a former subsidiary of Ford Motor Company, it gained most of the revenue from sales to Ford when they announced investment in Slovakia. However, the investment did not target Ford. Instead, Kia as well as PSA had plans to open plants there. Visteon's investment corresponded to them, and they successfully supplied to Kia after its opening a plant in 2005, followed by expansions of the supply in following years. This success enabled Visteon expand their customer base, and better manage the uncertainty of customers as revenue sources.

Second, firms may choose location not in the same country as customers, but in other country near customers' locations, and build export platform (Ekholm, Forslid, & Markusen,

2007) so that the subsidiary can cater to customers even after they change locations around. Chung, Lee, Beamish, and Isobe (2010) found that multinational firms invest more in export platforms rather than subsidiaries of local market orientation to manage uncertainty about future demand. Likewise, firms would like to invest in real options by locating in a country from which they can export to customers' locations when future location of customers is not predictable.

Hypotheses

I will empirically test my argument by leveraging three kinds of variations in business environments: capital intensity of customers, uncertainty of customer performance, and capital intensity of focal firms. Each kind of business environment requires focal firms to manage different uncertainties. I will explain one by one and posit hypotheses. Note that all the hypotheses are not about the main effects, but about moderating effects of business environments. Both present and potential customers attract focal firms, but the degree of attraction should differ in the ways hypotheses predict.

Capital intensity of customers. When capital intensity of customers is low, customers are likely to change locations more frequently. It is because fixed cost of establishing subsidiaries is low, and giving up incumbent locations and opening new operation elsewhere more frequently makes economic sense. Bernard and Jensen (2007) confirms this by showing less capital intensive plants are more likely to be shut down using plant-level data in the US. Furthermore, Swenson (2005) demonstrates that US firm's choice of outsourcing destination is less sensitive to cost changes in host countries when the industry is more capital-intensive. The author argues that it is because outsourcing firms require more tailoring of production, and searching production service providers that meet the requirements is more costly in capital-intensive industries. Due to the differences in fixed

costs and requirements for tailoring production, capital intensities of customers affect their flexibilities (Kogut & Kulatilaka, 1994; Lee & Song, 2012).

Facing customers that are less capital-intensive and more footloose, focal firms want to manage the uncertainty over customers' locations in the future. In such a situation, investments in export platform, positioning near customer locations, generate relevant real options. An export platform can cater to multiple countries. Thus, even after a customer shuts down a subsidiary in one location, the export platform continues to operate for catering to customers in other locations, or for catering to a new location of the customer. Therefore, the real option of export platform is more valuable when the location of demand is uncertain (Chung et al., 2010). As a result, focal firms are less likely to locate in the same countries as present or potential customers, but more likely to locate in other countries having good access to customers.

Hypothesis 1a: The likelihood for focal firms to choose the same country as (either present or potential) customers' decreases if capital intensity of customers is low

Hypothesis 1b: The likelihood for focal firms to choose countries proximate to (either present or potential) customers' increases if capital intensity of customers is low

Uncertainty of customer performance. In the context where customers are competing with their rivals, demand of focal firm's product by customers is not necessarily stable (Aggarwal & Wu, 2014; Tripsas, 2008). Customers may radically change their product design, and choose to use different set of components (Tripsas, 2008). Or customers may shift their emphasis across product categories (Aggarwal & Wu, 2014). More simply, customers may fail and exit the market.

As the simplest measure for uncertainty of demand by customers, this paper focuses on customer performance. When customer performance in the future is uncertain, focal firms are exposed to the risk of losing demand from present customers. Therefore, they should commit less to locations close to present customers.

Hypothesis 2a: The likelihood for focal firms to choose countries that are the same as or proximate to those of present customers decreases if performance of customers is uncertain

Alternatively, it is beneficial for a focal firm to seek real option by investing in locations near potential customers, and developing relationships with them to broaden customer base. With broader customer base, the focal firm can manage potential loss of demand from a present customer more effectively because they have potential alternative revenue sources as well as capability of expanding business with other customers more rapidly taking advantage of experience they have already accumulated with them.

However, seeking limited potential customers locating a specific country is still risky because performance of potential customers is also uncertain. Instead, focal firms should invest in export platforms from which they can cater to wider range of potential customers located in multiple countries. Therefore, I posit the following hypotheses on the effects of location by potential customers.

Hypothesis 2b: The likelihood for focal firms to choose countries that are proximate to those of potential customers increases if performance of customers is uncertain

Capital intensity of focal firms. The last set of hypotheses is related to capital intensity of focal firms. Capital intensity affects the ease of changing locations as is discussed above. If the same logic is applied to focal firms, subsidiaries of capital-intensive focal firms

stay in the same locations longer, and turn out to be more exposed to any risks of events that can happen as time passes. First, while a subsidiary of a focal firm is operating in a country, it may lose demand from present customers because of deterioration of present customer's profitability, or change of present customer's preferences. Therefore, to pursue real option value under this uncertainty, focal firms should invest more in relationships with potential customers. This is similar to hypothesis 2 where customer's profitability in the future is uncertain. However, potential customers' profitability is not particularly uncertain, and therefore, focal firms can engage in developing relationships with specific potential customers in the host countries in this case. Hence, potential customer's presence in the host or target country as well as in other nearby countries should attract focal firms.

Second, subsidiaries of capital-intensive firms may be exposed to a risk of customer's location changes. Though customers are not particularly footloose, their time horizon is shorter than focal firms'. However, products in capital-intensive industries are typically more firm-specific or user-specific (Nunn & Trefler, 2013). Thus customers are likely to be required to source the same product from focal firms even after they change locations. As such, the uncertainty in locations of customers should not affect significantly.

Hypothesis 3a: The likelihood for focal firms to choose countries that are the same as or proximate to those of present customers decreases if capital intensity of a focal firm is high

Hypothesis 3b: The likelihood for focal firms to choose countries that are the same as or proximate to those of potential customers increases if capital intensity of a focal firm is high

EMPIRICAL ANALYSIS

Summary of Test

To better comprehend how customers' locations around the globe affect focal firm's location choices, this paper examines (a) the effect of present and potential customers' presence in the host country, (b) the effect of present and potential customers' presence in other countries, and (c) how the effects of (a) and (b) are contingent on characteristics of different business environments. By analyzing differentiated effects of present and potential customers, and of their presence in the host country and other countries, this scheme of analysis is able to show that focal firms are operating real option strategy so that they manage uncertainties originating from business environment they are facing.

This analysis is possible only if the data set satisfies the following conditions. First, pairs of focal firms and present customers need to be identified. In agglomeration literature, supplier-buyer relationships have typically been identified at industry level (Alcácer & Chung, 2014; Alfaro & Chen, 2014). However, to find focal firm's strategic balance between present and potential customers, present customers need to be identified at firm level. Second, the global level analysis like this study requires comprehensive list of subsidiaries owned by focal firms and present and potential customers. The question of this paper is which country focal firms choose from possible alternatives, which obviously demands information of firm's location around the globe. In addition, this analysis requires information about customer's presence not only in the host country, but also in other countries. Comprehensive list of subsidiaries is needed to construct the variable for customer's presence in other countries. Third, the data set should include, at least, major multinational firms around the world because customers of a focal firm are not necessarily from the same country. For a US auto supplier such as Johnson Controls, for example, not only US assemblers but also foreign assemblers like Volkswagen and Toyota Motor are present or potential customers. Thus, unlike conventional data sets (e.g. Directory of Japanese Companies Abroad published by Toyo Keizai) used in previous studies, the data set in this study should include all the major

multinational firms around the world. Fourth, to scrutinize different effects of customers in different business environments, the data set needs to have enough variation in focal firms' business environments. For instance, focal firms or customers should be represented from a variety of industries. Previous studies do not satisfy all of these conditions.

This paper's approach is threefold. First, the effects of present and potential customers' presence in host country and other countries are assessed. Then, moderating effects of various business environments are examined. Finally, in addition to static analysis of focal firms' locations, dynamic analysis of entry is conducted, and I compared those sets of results to infer what decisions focal firms make and how those decisions result in current locations in relation to their customers.

Before proceeding to empirical test, I will explain the sample, data source, and variables.

Data and Sample

The sample of firms with present customer information comes from COMPUSTAT Customer Segment file between 2006 and 2011. By regulation, firms are required to report their major customers if sales to each customer exceed 10% of total revenues, or if firms regard the sales to those customers as important to their business. Frequently, firms also report values of sales to each major customer. This data set is often used by finance or accounting researchers (Hui, Klasa, & Yeung, 2012; Johnson, Karpoff, & Yi, 2015). My sample consists of manufacturing firms reporting their major customers.

Information about subsidiaries of sample firms and their customers is taken from vintages of ORBIS disks published between January and March of each year from 2007 to 2012. ORBIS disks are published by Bureau van Dijk, and contain information about more than 50 million public and private companies worldwide. Due to its uniquely broad coverage,

ORBIS including its subset data base such as AMADEUS (European company subset of ORBIS) has been used in numerous studies (Belenzon, Pataconi, & Zarutskie, 2015; Belenzon & Tzolmon, 2015; Bloom, Sadun, & Van Reenen, 2012; Dharmapala & Riedel, 2013), and its practical manual has been published by economists recently (Kalemli-Ozcan, Sorensen, Villegas-Sanchez, Volosovych, & Yesiltas, 2015). ORBIS tracks and constantly updates the list of firms included in the data, and their ownership information. Allowing a certain time lag for reflecting the latest information, it could be assumed that a vintage published in early months of a year represents ownership information of the previous year. Staff from Bureau van Dijk confirmed that this assumption is reasonable. Therefore, it could be said that the ORBIS data sets between 2007 and 2012 provide ownership information between 2006 and 2011.

Firm-customer data from COMPUSTAT are linked with ORBIS data by the following steps. First, focal firms in COMPUSTAT are matched with ORBIS data by comparing CUSIP from COMPUSTAT and ISIN from ORBIS. This matching is especially easy for US firms because their CUSIP is a part of ISIN. Other firms are matched by comparing company names and tickers from the both databases. Second, present customer names from COMPUSTAT are matched with ORBIS data. This step is challenging because customer information from COMPUSTAT provides only company names reported by focal firms, and those names are often abbreviated or misspelled. To tackle this challenge, after conducting full-name matching, I standardized both present customer names from COMPUSTAT and company names from ORBIS using STATA codes developed by NBER Patent Data Project. Through the standardization, for instance, “Internatl” and “International” in company names are changed to “INT”, and annotations such as “Incorporation” and “Inc.” are changed to “Inc”, and then dropped. Those present customer names that are not matched even with the standardization procedure are matched manually.

Subsidiaries are identified when firms are owned by a parent company with more than 25% equity ownership. In ORBIS, the first set of subsidiaries is identified by finding firms whose ultimate owner is among the sample firms (either focal firms or customers). In addition, the second set of subsidiaries is identified by following equity ownership linkages starting from the sample firms down to 10th level of hierarchical ownership structures. The final list of subsidiaries is a combination of these two.

Furthermore, potential customers are determined as follows. First, top present customers are identified in each year. Those are top present customers if they are the sole customers to the focal firms or they are the largest source of revenue for the focal firms. The 4 digit NAICS of top present customer for each focal firm is defined as the customer industry. To avoid ambiguity about the customer industry, those observations are dropped if 4 digit NAICS of top present customers is not consistent throughout the sample period. Then, potential customers of a focal firm are defined. Potential customers are all the customers from the customer industry recorded in COMPUSTAT customer segment file except for the present customers of the focal firms and the focal firms themselves.

Finally, the sample is limited to those focal firms satisfying the following conditions. First, focal firms are from North America. Most of the firms in COMPUSTAT segment data are from North America. As a result, majority of recorded customers are also from North America because supplier-customer relationships are developed by close interactions happening locally. A potential issue of including non-North American firms is that only a limited number of non-North American customers are reported, and thus, potential customers defined by the procedure mentioned above may not be comprehensive for non-North American focal firms. Second, focal firms have at least five identified potential customers. Actual potential customers are not observable, and here I define potential customers based on a reasonable inference from observable information. Therefore, there is a risk that the defined

potential customers are not comprehensive. And the risk is greater if the number of defined potential customers is lower since unique characteristics of each potential customers are reflected strongly on the measurements. By limiting the sample to those with at least five defined potential customers, general trends of industry are captured safely. And third, focal firms are manufacturing firms with customers from manufacturing industries (i.e. NAICS 31-33).

Resulting sample consists of 886 firm-year with 251 different focal firms in years from 2006 to 2011. Table 1-1 reports the size of focal firms in the sample compared with that of all North American manufacturing firms in COMPUSTAT. The mean of total assets in the sample is comparable to that of COMPUSTAT. However, extremely small and extremely large firms are not included in the sample. As a result, the standard deviation of firm size in the sample is much smaller than that of COMPUSTAT. Table 1-2 shows industries of focal firms in the sample compared with COMPUSTAT firms. Transportation equipment manufacturers are clearly overrepresented in the sample. Other than that, chemical product manufacturers count lower proportion of the sample, and electronic product manufacturers are slightly overrepresented. Table 1-3 shows industries of customers. Again, transportation equipment manufacturers are overly represented. Proportion of chemical manufacturers is lower, and proportion of computer and electronic products manufacturers is higher than it is in COMPUSTAT.

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To the location data of these firms, country controls are added. Included country controls are average labor cost, GDP, quality of institution (average of control of corruption,

government effectiveness, and regulatory quality), average tariff on imported products, and distance from the headquarters. They are derived from World Bank Database.

For each focal firm-year, 155 countries are recorded after excluding focal firms' headquarters and tax havens. This is the final data used for regression estimates.

Variables

Presence. The unit of analysis in this paper is firm-year-country, and the first dependent variable is presence of a focal firm in a country. This variable is equal to 1 if a focal firm has at least one manufacturing subsidiaries in the focal country, and is equal to 0 otherwise. Country-level variable instead of subsidiary-level is adopted because appearance or disappearance of subsidiaries is hard to interpret. Subsidiaries may be established to start new operations in the focal country, or to create legal entities for tax reasons. Also, subsidiaries may disappear because a firm terminates operation in the country, or because their business is transferred to other legal entities without any physical change. By adopting country-level observations, these issues could be avoided.

Another issue related to this variable is that ORBIS data sometimes fail to record the presence of subsidiaries. Some subsidiaries recorded in 2007, for example, disappeared in 2008, but they come back to the data again in 2009. To alleviate the effect of recording errors, I recognized the absence when focal firms do not appear in the focal country for two consecutive years. As a result, the first and the last years of observation should be dropped while analyzing presence of firms because finding no record of presence in those years cannot be regarded as absence if presence is reported in the next or previous year. Therefore, the sample period of presence analysis is 2007-2010.

Entry. The second dependent variable is entry which is equal to 1 if firms enter the focal country, and is equal to 0 otherwise. For entry analysis, year 2006 and 2007 should be

dropped. This is because absence in 2006 or 2007 is defined by two-year observations in 2006 and 2007. Therefore, first observation of entry should be in 2008.

For both presence and entry, manufacturing subsidiaries of focal firms are analyzed in the main analysis, and sales and service subsidiaries are examined as an additional analysis.

Presence of present customers in the host country. The first explanatory variable is the level of presence by present customers in the host country. Only manufacturing subsidiaries of them are counted as presence. This variable is measured by the following formula.

$$PC_{i,c,t} = \sum_{j \in J} W_{i,j,t} * PC'_{j,c,t} \quad (1)$$

$PC_{i,c,t}$ is the level of presence by present customers of focal firm i in the host country c in year t . As a focal firm typically has multiple present customers, J represents all the present customers of focal firm i in year t . $W_{i,j,t}$ is a weight for customer j calculated by

$$W_{i,j,t} = \frac{S_{i,j,t-1}}{\sum_{j \in J} S_{i,j,t-1}}, \quad (2)$$

where $S_{i,j,t-1}$ is focal firm i 's sales to customer j in year $t-1$. Customer sales used for the weight is from the previous year because customer sales should be influenced by focal firm's own behavior including location choice. This endogeneity is avoided by adopting lagged value. $PC'_{j,c,t}$ in equation (1) is normalized presence of customer j in host country c in year t , and it is calculated by

$$PC'_{j,c,t} = \frac{P_{j,c,t}}{\sum_{c \in C} P_{j,c,t}} * 100. \quad (3)$$

$P_{j,c,t}$ is a dummy variable which is equal to 1 if customer j has at least one manufacturing subsidiary in country c in year t , and is equal to 0 otherwise. C represents all the countries in

the sample. Denominated by $\sum_{c \in C} P_{j,c,t}$, $PC'_{j,c,t}$ is a normalized measure of customer j 's presence. The reason of this normalization is that the variable of interest, $PC_{i,c,t}$ should reflect the weight of each customer's significance to the focal firm ($W_{i,j,t}$), not each customer's degree of internationalization.

Presence of present customers in other countries. This variable captures the presence of present customers in countries other than the focal one, and is a proxy of opportunity for focal firms to cater from the focal country to their present customers in other countries. Since customers' presence near a focal country is particularly important, presence by customers should be inversely weighted by distance from the focal country. The measurement is,

$$\overline{PC}_{i,c,t} = \sum_{\bar{c} \neq c} \frac{PC_{i,\bar{c},t}}{D_{c,\bar{c}}} \quad (4)$$

where $PC_{i,\bar{c},t}$ is present customers' presence in country \bar{c} in year t , which is calculated by the equation (1). Country \bar{c} is any country other than focal country c . $D_{c,\bar{c}}$ is a distance measure that is logged distance in km between host country c and other country \bar{c} . As a whole, this is aggregated present customer's presence in other countries inversely weighted by logged distance.

Presence of potential customers in the host country. The second explanatory variable, presence of potential customers in the host country, or $PotC_{i,c,t}$, is measured by the following formula. Note that potential customers are defined as those that are recorded as present customers of any firms in COMPUSTAT customer segment file, are in the same industry as customer industry, and are not present customers of the focal firms.

$$PotC_{i,c,t} = \frac{\sum_{k \in K} P_{k,c,t}}{\sum_{c \in C} \sum_{k \in K} P_{k,c,t}} * 100 \quad (5)$$

where $P_{k,c,t}$ is the presence of potential customer k in country c in year t . Regarding presence of one potential customer as a unit, $PotC_{i,c,t}$ is the normalized number of units in the host country.

Presence of potential customers in other countries. This variable captures the presence of potential customers in countries other than the focal one. Parallel to *presence of present customers in other countries* calculated by equation (4), this variable is measured by,

$$\overline{PotC}_{i,c,t} = \sum_{\bar{c} \neq c} \frac{PotC_{i,\bar{c},t}}{D_{c,\bar{c}}} \quad (6)$$

where $PotC_{i,\bar{c},t}$ is potential customers' presence in country \bar{c} in year t , which is calculated by the equation (5). Country \bar{c} is any country other than focal country c . $D_{c,\bar{c}}$ is a distance measure that is logged distance in km between host country c and other country \bar{c} .

Capital intensity of customers. Capital intensity, the moderating variable of interest, is captured at industry level. Industry average of capital intensity is calculated by capital expenditure divided by worker's wage in each 4 digit NAICS from 2006 to 2011. The data is from Annual Survey of Manufacturers published by US Census Bureau. Because the capital expenditure is significantly influenced by macro-economic conditions, capital intensity of industry is averaged throughout sample period.

To capture moderating effect of customer's capital intensity, a dummy variable, which is equal to 1 if customer's capital intensity is low, is created. Here, a potential issue is that industry of focal firms and that of customers are correlated. For example, when the customer industry is transportation equipment manufacturing, industry of most focal firms are also transportation equipment manufacturers. Therefore, if the whole sample was split by customer's capital intensity, industry of focal firms related to high capital intensity of customers would be significantly different from that of firms related to low capital intensity.

As a result, it is difficult to tell whether the moderating effects are driven by customers or focal firms. To solve this issue, the capital intensity of customers is compared within groups of focal firms in the same industry (at 3 digit-NAICS level), and the dummy for high capital intensity customers is assigned to those focal firms whose customer's capital intensity is above mean of their groups. Following this procedure, characteristics of focal firms are reasonably controlled for. For example, among focal firms in transportation equipment manufacturing industry, those with motor vehicle manufacturing customers are coded as 1 for capital intensive customer dummy, and those with aerospace product and parts manufacturing customers are coded as 0. The empirical analysis exploits such variations within each industry of focal firms.

When there is no variance in capital intensity of customers within an industry group of focal firms, the observations are dropped.

Uncertainty of performance by customers. The second moderator of interest is uncertainty of customer's performance. Based on previous studies (McGahan & Porter, 2003; Villalonga, 2004; Waring, 1996), "firm-specific profitability" is estimated by the following OLS regression model with firms in the same industry at 4-digit NAICS.

$$f_{i,j,t} = \beta_{0,j} + \beta_{1,j} * f_{i,j,t-1} + e_{i,j,t}$$

where, the estimated coefficient $\beta_{1,j}$ represents the persistent of firm-specific profitability in industry j . $f_{i,j,t}$ is firm-specific profitability of firm i in year t , and it is calculated by (operating profit) – (average operating profit in industry j). Conceptually, $\beta_{1,j}$ means how much of firm-specific profitability of the previous year is carried out to the current year. Larger $\beta_{1,j}$ means stable structure of industry where firms are more likely to continue current level of performance, whereas smaller $\beta_{1,j}$ means instable and dynamic circumstance of industry where firm's performance in the future is uncertain. I used data on North American

firms from COMPUSTAT from 1997 to 2006. I dropped industries with less than 6 observations.

Then, I assigned a dummy variable which is equal to 1 if the estimated persistence of firm-specific profitability in customer industry is low, and is 0 otherwise. Again, in order to control focal firm's industry, I calculated the median of persistence within each group of focal firms from the same industry (at 3-digit NAICS), and make the dummy variable 1 if the persistence in the customer industry is lower than the median within the group. The observations are dropped when there is no variance within a group.

Capital intensity of focal firms. The last moderator of interest is capital intensity of focal firms. The measure of capital intensity is the same as the one used for calculating capital intensity of customers. Though this variable is supposed to capture variances in focal firms' characteristics, it is not desirable if this analysis compared very different industries such as chemical products manufacturing and computer and electronic product manufacturing. In such a case, it is hard to tell which differences of industry characteristics are driving the results. The purpose of this variable is to capture focal firm's capital intensity while keeping other characteristics reasonably under control. Therefore, dummy variable for high capital intensity of focal firms is defined within each group of focal firms from the same 3-digit NAICS industry. This is possible because capital intensity is defined at 4-digit NAICS level.

Control variables. I added the following control variables. First, I controlled the level of presence by focal firm in other countries. The formula used for "level of presence by customers in other countries" is applied using dummy variable representing focal firm's presence. The coefficient of this variable would be positive if presence of focal firm is complementary and it attracts other subsidiaries in nearby country. It would be negative if

presence of focal firm is substitute and they avoid locations near incumbent subsidiaries. Then, country characteristics such as average labor cost, GDP, quality of institution (average of control of corruption, government effectiveness, and regulatory quality), average tariff on imported products, and distance from the headquarters are controlled. Data on country characteristics are cited from World Bank Database. Finally, fixed effects for focal firms and years are added. Table 1-4 and 1-5 show descriptive statistics of the variables.

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 Insert Table 1-4 about here
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Empirical Model

The dependent variables of this analysis are presence or entry of the focal firm, and take 0 or 1. To estimate a model with such dependent variables, logit model is appropriate. In particular, because there are fixed effects for focal firms and years, conditional logit model is adopted. The model estimates which country the focal firm chooses for presence or entry conditional on that the focal firm have presence or entry in at least one country based on the following specification.

$$\Pr[Y_{i,t,j} = 1|X] = \frac{\exp(\beta_1 X_{i,j,t} + \beta_2 X_{i,j,t} * E_i + \beta_3 Z_{j,t})}{\sum_{j \in J} \exp(\beta_1 X_{i,j,t} + \beta_2 X_{i,j,t} * E_i + \beta_3 Z_{j,t})}$$

$Y_{i,t,j}$ is the dependent variable for firm i in country j in year t , and J is a set of country choices. This model is estimated by maximum likelihood method, and obtained coefficients β_2 can be used for testing how effects of customers' presence are moderated by business environments. $X_{i,j,t}$ represents variables about presence of present or potential customers in the host or target country or other countries which is unique to focal firms, country, and year. E_i means business environments focal firms face. This is unique to focal firms. Due to firm fixed effects, only its interaction term is included. $Z_{j,t}$ is country controls.

Results

Table 1-5 shows the results of conditional logit regressions. I will explain the baseline, main, and additional results.

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Insert Table 1-5 about here
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Baseline results. First, effects of customers are estimated as a baseline. As expected, presence of both present and potential customers in both host or target country and other countries is shown to attract focal firms. Except the effect of potential customers' presence in other countries on entry, all variables about customer presence have positive and highly significant coefficients.

Coefficients of control variables are also reasonable. Focal firm's own presence in other countries is negatively associated with their location choice. This shows substitution effects of their own subsidiaries. Besides, both presence and entry are negatively associated with average wage and distance from the headquarters, and positively with GDP, institutions and tariff of the host country. All of these results are consistent with previous studies.

Main results. Next, I looked at the moderating effects of customers' capital intensity on focal firms' location choices. I expected that when customers are less capital-intensive, or more footloose, focal firms are less likely to choose the same country as customers, and instead more likely to choose nearby countries to develop an export platform. The results are consistent, concerning the effect of potential customers. According to the main effects, focal firms are attracted by the presence of potential customer both in the same and other countries. But the moderating effects suggest that the effect of potential customers in the host or target country is lower and that in other countries is higher if customers are less capital intensive. On the other hand, concerning present customers, the results are not consistent with the

prediction. In entry phase, there is no moderating effect. As a result, presence analysis shows that focal firms' locations are less associated with present customers' presence either in the host country or other countries. My interpretation is that since focal firms do not engage in real option strategies for present customers, they do not keep proximity to their customers that are moving around.

Then, the results about uncertainty on customer's performance are mostly consistent with the predictions. I expected that focal firms are less likely to seek presence of present customers overall, and presence of potential customers in the host or target country. Although the moderating effects related to present customers' presence are weak, and often statistically insignificant, signs of coefficients are consistent. Coefficients related to presence of potential customers are significant and consistent with the predictions.

Finally, the moderating effects of focal firm's capital intensity are also found to be generally consistent with the predictions. I expected that focal firms of high capital intensity seek potential customers more, because they are exposed to uncertainty about demand from present customers during the longer time horizon of investment. Even though only the effect of presence in the host or target country on focal firm's presence is significant, all the coefficients related to present customers are negative and consistent with the predictions. Regarding the effects of potential customers, presence in the host or target country is positively associated with focal firm's location choice, and the association is highly significant. Effects of potential customers' presence in other countries are not statistically significant.

In summary, the three sets of hypotheses are generally supported. Even if customer's capital intensity does not moderate the effects of present customer's presence as expected, the combined results over presence and entry suggest a mechanism that is consistent with the

hypotheses. Hypotheses about uncertainty over customer performance and capital intensity of focal firms are generally supported.

Placebo test. The main analysis was about focal firm’s manufacturing subsidiaries. In this section, I run the same analysis to study how focal firms choose locations for sales and service subsidiaries for a placebo test. As sales and service subsidiaries can be established by lower fixed costs than manufacturing subsidiaries, locations of those subsidiaries present patterns that are less consistent with real option theory. Table 1-6 shows the results.

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Insert Table 1-6 about here
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In baseline analysis, presence of any customers is found to be positively associated with focal firm’s location choice, which is the same as the main results. However, some differences emerge among control variables. Average wage of host country is positively associated with focal firm’s location in this analysis. This is understandable because sales and service activities are location-specific, and the effect of labor cost should be limited. Also, those activities naturally take places more in large markets where labor cost is likely to be high. In addition, tariff is not significant, which is consistent with the fact that sales and service functions are location-specific.

As for moderating effects of business environments, a notable finding is that there is consistently no moderating effect related to present customer’s presence in the host or target country. This is a striking evidence that real option strategy is not relevant to sales and service subsidiaries. For example, even if customers are footloose, focal firms can establish sales and service subsidiaries near the customers each time they move. Other than that, sales and service subsidiaries shadow manufacturing subsidiaries. When manufacturing subsidiaries are more attracted by presence of customers in other countries, for example, sales

and service subsidiaries show the same tendencies. This is an evidence of co-location of complementary functions (Chen, 2011).

CONCLUSION

This study demonstrated that manufacturing firms pursue real option value when they choose locations in relation to their customers. As shown by previous studies, presence of customers' manufacturing subsidiaries facilitates firms' establishing manufacturing subsidiaries. Recognizing this as baseline, this study found differentiated and non-monotonic effects of present versus potential customers, and of their presence in the host or target country versus other countries depending on business environments that focal firms face. A combination of rich data sets enabled this empirical analysis.

This study's contributions are three-fold. First, it contributes to the economic geography literature by integrating global supply chain context. Agglomeration theory has argued co-location of suppliers and customers, but it has not been able to consider strategic behaviors of suppliers determining unique global supply chains of each of them.

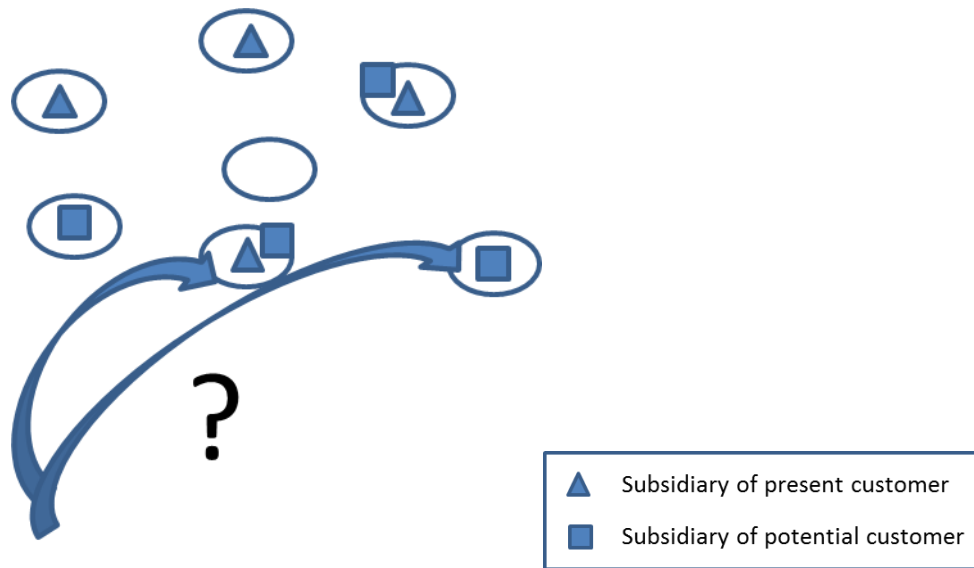
Second, this paper enriches real option theory by applying it to a complex reality. Firms are operating real option strategies against multiple types of uncertainties. In this paper's context, firms face uncertainties over customer's future location as well as future demand from them, and the results suggest that firms deal with these uncertainties at the same time. The implication is that real option theory should incorporate multiple types of uncertainties, and develop theory for optimal real option strategy in such conditions.

Third, this study contributes to our knowledge on supplier-buyer relationships. Most of previous studies focused on the relationships between suppliers and present customers, and found benefits of close relationships (for example, Williamson, 1971; Gulati and Sytch, 2007; Carnahan and Somaya, 2013). However, as cases of disruptive innovations show, building

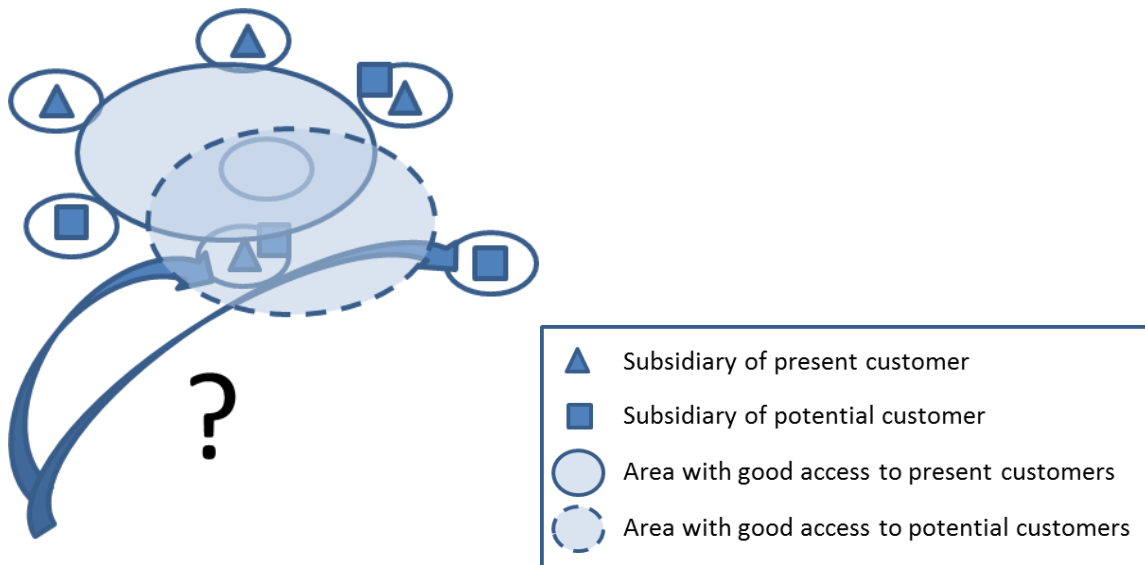
close relationships with present customers may not an optimal strategy (Christensen and Bower, 1996; Danneels, 2003). Supplier-buyer relationship literature has not been highly successful to incorporating the risk of focusing on present customers too narrowly, and it is because most of the studies are based on data on present supplier-buyer relationships empirically. If there is no such relationship, the relation cannot be defined. In this aspect, location choice information is interesting since present as well as potential customers are playing in the same universe as suppliers. Even if there is no actual supplier-buyer relationship, suppliers' strategic behavior toward potential customers can be captured by geographic distance between them. And this unique context provides supplier-buyer relationship literature with an important construct of the relationships that has been missing.

For practitioners, this study presents a structured way of thinking location strategy. Probably, location decision is not made in a completely structured way in practice. If managers adopt this framing of location strategy, however, they should be able to improve the quality of decision-makings.

Figure 1-1: An illustrative explanation of the research question



Location choices in relation to present and potential customers



Location choices in relation to present and potential customers taking into account customers' presence in both host or target countries and other countries

Table 1-1: Summary statistics of focal firms (as of 2009)

Variable	Mean	Median	Min	Max	Std Dev
N of countries with operation	7.791139	3	1	48	9.618887
Total asset (million USD)	2054.58	428.991	6.848	26812	4134.55
Ref: Total asset of North American manufacturing firms from COMPUSTAT (million USD)	2260.87	139.539	0.003	233323	11387.29

Table 1-2: Top 8 industries of focal firms, cumulatively accounting for more than 90% of the sample (as of 2009)

NAICS (3 digit)	Descriptions	N of firms	%	Ref: % in COMPUSTAT
334	Computer and electronics	50	32%	26%
336	Transportation equipment	36	23%	6%
325	Chemical	30	19%	27%
333	Machinery	11	7%	8%
332	Fabricated metal	6	4%	3%
322	Paper	4	3%	2%
331	Primary metal	3	2%	2%
335	Electrical equipment, appliance, and component	3	2%	4%

Table 1-3: Top 6 industries of customers, cumulatively accounting for more than 90% of the sample (as of 2009)

NAICS (3 digit)	Descriptions	N of firms	%	Ref: % in COMPUSTAT
336	Transportation equipment	49	31%	6%
334	Computer and electronics	47	30%	26%
325	Chemical	30	19%	27%
333	Machinery	9	6%	8%
324	Petroleum and coal products	5	3%	2%
335	Electrical equipment, appliance, and component	3	2%	4%

Table 1-4: Descriptive statistics

Variable	N	Mean	Min	Max	Std Dev	1	2	3	4	5	6
1 Focal firm's presence (manufacturing subsidiary)	103850	0.017	0	1	0.12922						
2 Focal firm's presence (sales and service subsidiary)	103850	0.011	0	1	0.104603	0.264					
3 Focal firm's entry (manufacturing subsidiary)	103850	0.004	0	1	0.064214	0.491	0.096				
4 Focal firm's entry (manufacturing subsidiary)	103850	0.003	0	1	0.055338	0.131	0.525	0.124			
5 Present customer's presence in host or target country	103850	0.508	0	100	2.529734	0.173	0.132	0.075	0.070		
6 Present customer's presence in other countries	103850	11.407	0	16.328	0.882438	0.050	0.064	0.008	0.024	-0.201	
7 Potential customer's presence in host or target country	103850	0.465	0	45.946	1.303976	0.352	0.259	0.140	0.127	0.456	0.065
8 Potential customer's presence in other countries	103850	11.503	6.264	14.239	0.612846	0.059	0.074	0.004	0.027	0.037	0.664
9 Focal firm's presence in other countries (manufacturing subsidiary)	103850	0.434	0.103	4.010	0.544473	0.219	0.121	0.079	0.055	0.015	0.084
10 Focal firm's presence in other countries (sales and service subsidiary)	103850	0.324	0.103	3.032	0.398684	0.133	0.189	0.056	0.086	0.012	0.062
11 Capital intensity of customers	103850	0.770	0.095	3.042	0.470774	-0.032	0.002	-0.013	0.002	-0.008	-0.212
12 Persistence (contrary to uncertainty) of customer profitability	100595	0.755	0.460	0.961	0.088787	0.038	0.010	0.018	0.006	0.008	-0.039
13 Capital intensity of focal firms	103850	0.673	0.115	3.042	0.418629	-0.044	-0.008	-0.014	-0.003	-0.011	-0.185
14 Average wage of workers	53908	1013.020	0.012	5.38E+03	1188.22	0.158	0.199	0.050	0.088	0.250	0.201
15 GDP	103850	2.373E+11	0.000	1.368E+13	6.47E+11	0.284	0.254	0.117	0.125	0.383	0.000
16 Institution	103850	-0.163	-2.345	2.268	0.945561	0.160	0.166	0.064	0.079	0.228	0.238
17 Average tariff on importet goods	83752	6.055	0.020	21.210	4.41897	-0.105	-0.102	-0.044	-0.051	-0.164	-0.249
18 Logged distance in km	103850	9.013	6.594	9.701	0.479341	-0.090	-0.059	-0.047	-0.032	-0.081	-0.181

Variable	7	8	9	10	11	12	13	14	15	16	17
1 Focal firm's presence (manufacturing subsidiary)											
2 Focal firm's presence (sales and service subsidiary)											
3 Focal firm's entry (manufacturing subsidiary)											
4 Focal firm's entry (manufacturing subsidiary)											
5 Present customer's presence in host or target country											
6 Present customer's presence in other countries											
7 Potential customer's presence in host or target country											
8 Potential customer's presence in other countries	0.077										
9 Focal firm's presence in other countries (manufacturing subsidiary)	0.032	0.081									
10 Focal firm's presence in other countries (sales and service subsidiary)	0.015	0.040	0.559								
11 Capital intensity of customers	-0.025	-0.096	-0.141	0.032							
12 Persistence (contrary to uncertainty) of customer profitability	0.018	0.021	0.164	0.057	0.291						
13 Capital intensity of focal firms	-0.024	-0.071	-0.197	-0.022	0.577	0.015					
14 Average wage of workers	0.457	0.316	0.022	0.024	0.001	-0.001	-0.001				
15 GDP	0.732	0.002	0.001	0.002	-0.001	-0.001	0.000	0.414			
16 Institution	0.429	0.363	0.017	0.019	0.000	0.000	0.000	0.874	0.374		
17 Average tariff on importet goods	-0.277	-0.365	-0.024	-0.025	-0.001	0.002	0.001	-0.467	-0.242	-0.590	
18 Logged distance in km	-0.182	-0.355	-0.019	-0.023	0.000	0.000	0.000	-0.215	-0.084	-0.209	0.169

Table 1-5: Conditional logit results of location choice

Dependent variable		Baseline						
		Presence			Entry			
Explanatory variables		Predictions	coeff	s.e	p-value	coeff	s.e.	p-value
Present customer	Presence in host or target country		0.0812	0.0117	<.0001	0.1183	0.0231	<.0001
	Presence in other countries i.w. by distance		0.3147	0.0769	<.0001	0.4014	0.1546	0.0094
Potential customer	Presence in host or target country		0.5234	0.0226	<.0001	0.3048	0.0456	<.0001
	Presence in other countries i.w. by distance		0.342	0.0897	0.0001	-0.00731	0.1912	0.9695
Focal firm	Presence in other countries i.w. by distance		-1.9108	0.1612	<.0001	-3.8744	0.5518	<.0001
Present customer	Presence in host or target country	x low cap intensity of customer	-					
	Presence in other countries i.w. by distance	x low cap intensity of customer	+					
Potential customer	Presence in host or target country	x low cap intensity of customer	-					
	Presence in other countries i.w. by distance	x low cap intensity of customer	+					
Focal firm	Presence in other countries i.w. by distance	x low cap intensity of customer						
Present customer	Presence in host or target country	x high uncertainty of customer profitability	-					
	Presence in other countries i.w. by distance	x high uncertainty of customer profitability	-					
Potential customer	Presence in host or target country	x high uncertainty of customer profitability	-					
	Presence in other countries i.w. by distance	x high uncertainty of customer profitability	+					
Focal firm	Presence in other countries i.w. by distance	x high uncertainty of customer profitability						
Present customer	Presence in host or target country	x high cap intensity of focal firm	-					
	Presence in other countries i.w. by distance	x high cap intensity of focal firm	-					
Potential customer	Presence in host or target country	x high cap intensity of focal firm	+					
	Presence in other countries i.w. by distance	x high cap intensity of focal firm	+					
Focal firm	Presence in other countries i.w. by distance	x high cap intensity of focal firm						
Average wage of workers			-0.00027	0.00006	<.0001	-0.00055	0.000134	<.0001
GDP			5.2E-13	3.84E-14	<.0001	5.57E-13	7.57E-14	<.0001
Institution			0.5731	0.0953	<.0001	0.799	0.1934	<.0001
Average tariff on importet goods			0.0485	0.0176	0.0058	0.0388	0.0307	0.2063
Logged distance in km			-0.5679	0.0578	<.0001	-0.6765	0.0981	<.0001
Firm FE			Yes			Yes		
Year FE			Yes			Yes		
N of obs			48237			27084		
N of events			1677			301		
N of firms			237			106		
Model			Conditional logit			Firth logit		
-2 Log likelihood			6439.803			1696.076		
LR test			<0.0001			<0.0001		

Table 1-5: Conditional logit results of location choice (continued)

Dependent variable		Capital intensity of customers								
		Presence			Entry					
Explanatory variables		Predictions	coeff	s.e	p-value	predict	coeff	s.e.	p-value	
Present customer	Presence in host or target country		0.1713	0.025	<.0001		0.1383	0.0418	0.0009	
	Presence in other countries i.w. by distance		0.6945	0.1658	<.0001		0.6334	0.3188	0.0469	
Potential customer	Presence in host or target country		0.6521	0.0385	<.0001		0.5084	0.0714	<.0001	
	Presence in other countries i.w. by distance		-0.0485	0.1753	0.7821		-0.4751	0.3491	0.1735	
Focal firm	Presence in other countries i.w. by distance		-1.6259	0.1748	<.0001		-2.2977	0.4733	<.0001	
Present customer	Presence in host or target country	x low cap intensity of customer	-	-0.1166	0.0281	<.0001		-0.0159	0.0508	0.7538
	Presence in other countries i.w. by distance	x low cap intensity of customer	+	-0.4688	0.1859	0.0117		-0.2458	0.3699	0.5064
Potential customer	Presence in host or target country	x low cap intensity of customer	-	-0.2009	0.0417	<.0001		-0.1814	0.08	0.0234
	Presence in other countries i.w. by distance	x low cap intensity of customer	+	0.5738	0.2013	0.0044		1.6911	0.4344	<.0001
Focal firm	Presence in other countries i.w. by distance	x low cap intensity of customer		-3.6707	0.325	<.0001		-19.1077	1.8752	<.0001
Present customer	Presence in host or target country	x high uncertainty of customer profitability	-							
	Presence in other countries i.w. by distance	x high uncertainty of customer profitability	-							
Potential customer	Presence in host or target country	x high uncertainty of customer profitability	-							
	Presence in other countries i.w. by distance	x high uncertainty of customer profitability	+							
Focal firm	Presence in other countries i.w. by distance	x high uncertainty of customer profitability								
Present customer	Presence in host or target country	x high cap intensity of focal firm	-							
	Presence in other countries i.w. by distance	x high cap intensity of focal firm	-							
Potential customer	Presence in host or target country	x high cap intensity of focal firm	+							
	Presence in other countries i.w. by distance	x high cap intensity of focal firm	+							
Focal firm	Presence in other countries i.w. by distance	x high cap intensity of focal firm								
Average wage of workers			-0.00027	0.000062	<.0001		-0.00045	0.000136	0.0011	
GDP			4.83E-13	3.96E-14	<.0001		4.15E-13	8.02E-14	<.0001	
Institution			0.5566	0.0984	<.0001		0.6425	0.1981	0.0012	
Average tariff on importet goods			0.0415	0.0185	0.0247		0.0187	0.033	0.5719	
Logged distance in km			-0.5765	0.0595	<.0001		-0.668	0.1035	<.0001	
Firm FE			Yes				Yes			
Year FE			Yes				Yes			
N of obs			47368				27084			
N of events			1655				301			
N of firms			155				106			
Model			Conditional logit				Firth logit			
-2 Log likelihood			5667.555				1525.011			
LR test			<0.0001				<0.0001			

Table 1-5: Conditional logit results of location choice (continued)

Dependent variable		Uncertainty of customer profitability							
		Presence			Entry				
Explanatory variables		Predictions	coeff	s.e	p-value	coeff	s.e	p-value	
Present customer	Presence in host or target country		0.1288	0.0222	<.0001	0.1583	0.0405	<.0001	
	Presence in other countries i.w. by distance		0.3902	0.1397	0.0052	0.6603	0.2583	0.0106	
Potential customer	Presence in host or target country		0.7745	0.039	<.0001	0.652	0.0761	<.0001	
	Presence in other countries i.w. by distance		0.1555	0.1523	0.3072	-0.5388	0.2957	0.0684	
Focal firm	Presence in other countries i.w. by distance		-1.5341	0.1753	<.0001	-2.4303	0.4772	<.0001	
Present customer	Presence in host or target country	x low cap intensity of customer	-						
	Presence in other countries i.w. by distance	x low cap intensity of customer	+						
Potential customer	Presence in host or target country	x low cap intensity of customer	-						
	Presence in other countries i.w. by distance	x low cap intensity of customer	+						
Focal firm	Presence in other countries i.w. by distance	x low cap intensity of customer							
Present customer	Presence in host or target country	x high uncertainty of customer profitability	-	-0.0588	0.0264	0.0262	-0.0369	0.0518	0.4771
	Presence in other countries i.w. by distance	x high uncertainty of customer profitability	-	-0.0599	0.1691	0.7233	-0.2976	0.3371	0.3772
Potential customer	Presence in host or target country	x high uncertainty of customer profitability	-	-0.3234	0.0418	<.0001	-0.3464	0.0832	<.0001
	Presence in other countries i.w. by distance	x high uncertainty of customer profitability	+	0.4862	0.1879	0.0096	1.8994	0.4071	<.0001
Focal firm	Presence in other countries i.w. by distance	x high uncertainty of customer profitability		-4.5623	0.3516	<.0001	-16.6723	1.7707	<.0001
Present customer	Presence in host or target country	x high cap intensity of focal firm	-						
	Presence in other countries i.w. by distance	x high cap intensity of focal firm	-						
Potential customer	Presence in host or target country	x high cap intensity of focal firm	+						
	Presence in other countries i.w. by distance	x high cap intensity of focal firm	+						
Focal firm	Presence in other countries i.w. by distance	x high cap intensity of focal firm							
Average wage of workers			-0.00027	0.000063	<.0001	-0.0005	0.00014	0.0004	
GDP			4.51E-13	4.05E-14	<.0001	4.01E-13	8.24E-14	<.0001	
Institution			0.5251	0.0992	<.0001	0.6197	0.201	0.0021	
Average tariff on importet goods			0.0378	0.0187	0.0431	0.0191	0.0332	0.5659	
Logged distance in km			-0.5366	0.0611	<.0001	-0.5661	0.1066	<.0001	
Firm FE			Yes			Yes			
Year FE			Yes			Yes			
N of obs			47008			26930			
N of events			1652			300			
N of firms			231			105			
Model			Conditional logit			Firth logit			
-2 Log likelihood			6013.344			1517.646			
LR test			<0.0001			<0.0001			

Table 1-5: Conditional logit results of location choice (continued)

Dependent variable		Capital intensity of focal firms							
		Presence			Entry				
Explanatory variables		Predictions	coeff	s.e	p-value	coeff	s.e	p-value	
Present customer	Presence in host or target country		0.101	0.0226	<.0001	0.1585	0.0427	0.0002	
	Presence in other countries i.w. by distance		0.5548	0.1611	0.0006	0.6796	0.2701	0.0119	
Potential customer	Presence in host or target country		0.3452	0.0346	<.0001	0.198	0.0599	0.0009	
	Presence in other countries i.w. by distance		0.3819	0.1939	0.0489	0.2997	0.3599	0.405	
Focal firm	Presence in other countries i.w. by distance		-3.7618	0.4257	<.0001	-8.7247	1.5529	<.0001	
Present customer	Presence in host or target country	x low cap intensity of customer	-						
	Presence in other countries i.w. by distance	x low cap intensity of customer	+						
Potential customer	Presence in host or target country	x low cap intensity of customer	-						
	Presence in other countries i.w. by distance	x low cap intensity of customer	+						
Focal firm	Presence in other countries i.w. by distance	x low cap intensity of customer							
Present customer	Presence in host or target country	x high uncertainty of customer profitability	-						
	Presence in other countries i.w. by distance	x high uncertainty of customer profitability	-						
Potential customer	Presence in host or target country	x high uncertainty of customer profitability	-						
	Presence in other countries i.w. by distance	x high uncertainty of customer profitability	+						
Focal firm	Presence in other countries i.w. by distance	x high uncertainty of customer profitability							
Present customer	Presence in host or target country	x high cap intensity of focal firm	-	-0.0348	0.0264	0.1866	-0.0703	0.0501	0.1609
	Presence in other countries i.w. by distance	x high cap intensity of focal firm	-	-0.3484	0.1826	0.0564	-0.4729	0.322	0.142
Potential customer	Presence in host or target country	x high cap intensity of focal firm	+	0.2777	0.0403	<.0001	0.2003	0.0737	0.0066
	Presence in other countries i.w. by distance	x high cap intensity of focal firm	+	-0.011	0.2135	0.9589	-0.2724	0.407	0.5034
Focal firm	Presence in other countries i.w. by distance	x high cap intensity of focal firm		1.9713	0.413	<.0001	5.4501	1.5581	0.0005
Average wage of workers			-0.00028	0.000061	<.0001	-0.00052	0.000135	0.0001	
GDP			4.9E-13	3.99E-14	<.0001	5.24E-13	7.7E-14	<.0001	
Institution			0.5834	0.0974	<.0001	0.7553	0.1947	0.0001	
Average tariff on importet goods			0.0447	0.0182	0.0142	0.0366	0.031	0.2386	
Logged distance in km			-0.5878	0.0591	<.0001	-0.678	0.0988	<.0001	
Firm FE			Yes			Yes			
Year FE			Yes			Yes			
N of obs			46283			26777			
N of events			1638			299			
N of firms			228			104			
Model			Conditional logit			Firth logit			
-2 Log likelihood			5737.647			1657.534			
LR test			<0.0001			<0.0001			

Table 1-6: Conditional logit results of location choice for sales and service subsidiaries

Dependent variable			Baseline					
			Presence			Entry		
Explanatory variables			coeff	s.e	p-value	coeff	s.e.	p-value
Present customer	Presence in host or target country		0.0732	0.0125	<.0001	0.0576	0.0264	0.0292
	Presence in other countries i.w. by distance		0.3749	0.0793	<.0001	0.2099	0.1772	0.2363
Potential customer	Presence in host or target country		0.2644	0.0239	<.0001	0.187	0.0416	<.0001
	Presence in other countries i.w. by distance		0.3952	0.1016	0.0001	0.6692	0.2225	0.0026
Focal firm	Presence in other countries i.w. by distance		-1.5861	0.2024	<.0001	-4.4666	0.5981	<.0001
Present customer	Presence in host or target country	x low cap intensity of customer						
	Presence in other countries i.w. by distance	x low cap intensity of customer						
Potential customer	Presence in host or target country	x low cap intensity of customer						
	Presence in other countries i.w. by distance	x low cap intensity of customer						
Focal firm	Presence in other countries i.w. by distance	x low cap intensity of customer						
Present customer	Presence in host or target country	x high uncertainty of customer profitability						
	Presence in other countries i.w. by distance	x high uncertainty of customer profitability						
Potential customer	Presence in host or target country	x high uncertainty of customer profitability						
	Presence in other countries i.w. by distance	x high uncertainty of customer profitability						
Focal firm	Presence in other countries i.w. by distance	x high uncertainty of customer profitability						
Present customer	Presence in host or target country	x high cap intensity of focal firm						
	Presence in other countries i.w. by distance	x high cap intensity of focal firm						
Potential customer	Presence in host or target country	x high cap intensity of focal firm						
	Presence in other countries i.w. by distance	x high cap intensity of focal firm						
Focal firm	Presence in other countries i.w. by distance	x high cap intensity of focal firm						
Average wage of workers			0.000165	0.000062	0.0082	0.000127	0.000126	0.313
GDP			6.68E-13	4.17E-14	<.0001	6.95E-13	7.39E-14	<.0001
Institution			0.7664	0.1123	<.0001	0.4328	0.2164	0.0455
Average tariff on imported goods			-0.0126	0.031	0.6831	-0.0575	0.0534	0.2817
Logged distance in km			-0.1039	0.0785	0.1853	-0.351	0.1266	0.0055
Firm FE			Yes			Yes		
Year FE			Yes			Yes		
N of obs			48237			22316		
N of events			1110			235		
N of firms			233			92		
Model			Conditional logit			Firth logit		
-2 Log likelihood			4528.849			1259.219		
LR test			<0.0001			<0.0001		

Table 1-6: Conditional logit results of location choice for sales and service subsidiaries (continued)

Dependent variable			Capital intensity of customers						
			Presence			Entry			
Explanatory variables			coeff	s.e	p-value	coeff	s.e.	p-value	
Present customer	Presence in host or target country		0.0858	0.0279	0.0021	0.0814	0.0637	0.2014	
	Presence in other countries i.w. by distance		0.9066	0.1513	<.0001	0.9069	0.4209	0.0312	
Potential customer	Presence in host or target country		0.3169	0.042	<.0001	0.3093	0.0863	0.0003	
	Presence in other countries i.w. by distance		-0.2616	0.1786	0.1429	-0.1453	0.4673	0.7559	
Focal firm	Presence in other countries i.w. by distance		-1.232	0.2348	<.0001	-3.2505	0.6559	<.0001	
Present customer	Presence in host or target country		x low cap intensity of customer	-0.0148	0.0314	0.636	-0.0288	0.069	0.6761
	Presence in other countries i.w. by distance		x low cap intensity of customer	-0.6384	0.1782	0.0003	-0.7674	0.4563	0.0926
Potential customer	Presence in host or target country		x low cap intensity of customer	-0.0744	0.0464	0.1088	-0.1183	0.091	0.1938
	Presence in other countries i.w. by distance		x low cap intensity of customer	0.8304	0.2128	<.0001	1.0071	0.517	0.0514
Focal firm	Presence in other countries i.w. by distance		x low cap intensity of customer	-0.8677	0.3533	0.0141	-4.797	1.3163	0.0003
Present customer	Presence in host or target country		x high uncertainty of customer profitability						
	Presence in other countries i.w. by distance		x high uncertainty of customer profitability						
Potential customer	Presence in host or target country		x high uncertainty of customer profitability						
	Presence in other countries i.w. by distance		x high uncertainty of customer profitability						
Focal firm	Presence in other countries i.w. by distance		x high uncertainty of customer profitability						
Present customer	Presence in host or target country		x high cap intensity of focal firm						
	Presence in other countries i.w. by distance		x high cap intensity of focal firm						
Potential customer	Presence in host or target country		x high cap intensity of focal firm						
	Presence in other countries i.w. by distance		x high cap intensity of focal firm						
Focal firm	Presence in other countries i.w. by distance		x high cap intensity of focal firm						
Average wage of workers			0.000194	0.000063	0.0021	0.000171	0.000128	0.1813	
GDP			6.51E-13	4.28E-14	<.0001	6.17E-13	7.86E-14	<.0001	
Institution			0.7187	0.1131	<.0001	0.3673	0.2188	0.0932	
Average tariff on imported goods			-0.0152	0.0314	0.6276	-0.0724	0.0552	0.1896	
Logged distance in km			-0.1272	0.08	0.1116	-0.3165	0.1303	0.0152	
Firm FE			Yes			Yes			
Year FE			Yes			Yes			
N of obs			47368			22008			
N of events			1096			233			
N of firms			233			90			
Model			Conditional logit			Firth logit			
-2 Log likelihood			4437.632			1225.018			
LR test			<0.0001			<0.0001			

Table 1-6: Conditional logit results of location choice for sales and service subsidiaries (continued)

Dependent variable			Uncertainty of customer profitability					
			Presence			Entry		
Explanatory variables			coeff	s.e	p-value	coeff	s.e	p-value
Present customer	Presence in host or target country		0.1173	0.0295	<.0001	0.0212	0.0557	0.7042
	Presence in other countries i.w. by distance		0.5149	0.1713	0.0026	0.1019	0.335	0.761
Potential customer	Presence in host or target country		0.3353	0.046	<.0001	0.4349	0.0894	<.0001
	Presence in other countries i.w. by distance		-0.00603	0.1958	0.9754	0.4856	0.3967	0.2209
Focal firm	Presence in other countries i.w. by distance		-1.429	0.2591	<.0001	-2.2389	0.612	0.0003
Present customer	Presence in host or target country		x low cap intensity of customer					
	Presence in other countries i.w. by distance		x low cap intensity of customer					
Potential customer	Presence in host or target country		x low cap intensity of customer					
	Presence in other countries i.w. by distance		x low cap intensity of customer					
Focal firm	Presence in other countries i.w. by distance		x low cap intensity of customer					
Present customer	Presence in host or target country		x high uncertainty of customer profitability					
	Presence in other countries i.w. by distance		x high uncertainty of customer profitability					
Potential customer	Presence in host or target country		x high uncertainty of customer profitability					
	Presence in other countries i.w. by distance		x high uncertainty of customer profitability					
Focal firm	Presence in other countries i.w. by distance		x high uncertainty of customer profitability					
Present customer	Presence in host or target country		x high cap intensity of focal firm					
	Presence in other countries i.w. by distance		x high cap intensity of focal firm					
Potential customer	Presence in host or target country		x high cap intensity of focal firm					
	Presence in other countries i.w. by distance		x high cap intensity of focal firm					
Focal firm	Presence in other countries i.w. by distance		x high cap intensity of focal firm					
Average wage of workers			0.000173	0.000063	0.0062	0.000171	0.000129	0.1847
GDP			6.43E-13	4.3E-14	<.0001	5.73E-13	7.92E-14	<.0001
Institution			0.7322	0.1136	<.0001	0.3246	0.2184	0.1371
Average tariff on imported goods			-0.0246	0.0319	0.44	-0.0905	0.0561	0.107
Logged distance in km			-0.0876	0.081	0.2794	-0.2695	0.1311	0.0398
Firm FE			Yes			Yes		
Year FE			Yes			Yes		
N of obs			47368			22008		
N of events			1096			233		
N of firms			231			90		
Model			Conditional logit			Firth logit		
-2 Log likelihood			4433.076			1189.696		
LR test			<0.0001			<0.0001		

Table 1-6: Conditional logit results of location choice for sales and service subsidiaries (continued)

Dependent variable			Capital intensity of focal firms					
			Presence			Entry		
Explanatory variables			coeff	s.e	p-value	coeff	s.e	p-value
Present customer	Presence in host or target country		0.1354	0.029	<.0001	0.0413	0.0919	0.653
	Presence in other countries i.w. by distance		0.9683	0.2056	<.0001	0.0177	0.6145	0.977
Potential customer	Presence in host or target country		0.1382	0.0415	0.0009	0.2118	0.0886	0.0168
	Presence in other countries i.w. by distance		0.2998	0.2316	0.1955	1.367	0.6638	0.0395
Focal firm	Presence in other countries i.w. by distance		-5.93	0.6691	<.0001	-11.7218	2.3235	<.0001
Present customer	Presence in host or target country	x low cap intensity of customer						
	Presence in other countries i.w. by distance	x low cap intensity of customer						
Potential customer	Presence in host or target country	x low cap intensity of customer						
	Presence in other countries i.w. by distance	x low cap intensity of customer						
Focal firm	Presence in other countries i.w. by distance	x low cap intensity of customer						
Present customer	Presence in host or target country	x high uncertainty of customer profitability						
	Presence in other countries i.w. by distance	x high uncertainty of customer profitability						
Potential customer	Presence in host or target country	x high uncertainty of customer profitability						
	Presence in other countries i.w. by distance	x high uncertainty of customer profitability						
Focal firm	Presence in other countries i.w. by distance	x high uncertainty of customer profitability						
Present customer	Presence in host or target country	x high cap intensity of focal firm	-0.0478	0.0325	0.1421	0.0128	0.095	0.8924
	Presence in other countries i.w. by distance	x high cap intensity of focal firm	-0.5201	0.223	0.0197	0.23	0.6331	0.7165
Potential customer	Presence in host or target country	x high cap intensity of focal firm	0.1366	0.0472	0.0038	0.1098	0.0991	0.2681
	Presence in other countries i.w. by distance	x high cap intensity of focal firm	-0.0833	0.2544	0.7432	-0.9307	0.6933	0.1794
Focal firm	Presence in other countries i.w. by distance	x high cap intensity of focal firm	4.5902	0.6597	<.0001	7.9559	2.3765	0.0008
Average wage of workers			0.000184	0.000063	0.0035	0.000164	0.000128	0.2016
GDP			6.64E-13	4.29E-14	<.0001	5.47E-13	8.43E-14	<.0001
Institution			0.7284	0.1132	<.0001	0.3387	0.2191	0.1222
Average tariff on imported goods			-0.0251	0.0315	0.4259	-0.0801	0.0553	0.1479
Logged distance in km			-0.1629	0.0804	0.0428	-0.258	0.1317	0.0502
Firm FE			Yes			Yes		
Year FE			Yes			Yes		
N of obs			46283			22008		
N of events			1093			233		
N of firms			228			90		
Model			Conditional logit			Firth logit		
-2 Log likelihood			4386.251			1225.162		
LR test			<0.0001			<0.0001		

CHAPTER 2

MANAGERIAL INTEGRATION AFTER ACQUISITION

ABSTRACT

Operational integration after acquisition is crucial for the success of acquisition. Though our knowledge on post-merger integration has been enriched by case studies, little empirical analysis has been done. Focusing on managerial integration as a critical mechanism for operational integration, this study confirms that firms are more likely to adopt this mechanism if business areas of acquirers and acquired firms (targets) are inter-related. Also, though managerial integration decreases over time after acquisitions, the effect of relatedness remains. This study contributes to post-merger integration research by demonstrating the importance of managerial integration for coordinating inter-related operations, as well as the continuity of the importance over time.

INTRODUCTION

Classic transaction cost theory (e.g. Coase, 1937; Williamson, 1991) argues that firms control and coordinate other organizations through the ownership, or the fiat derived from the ownership. Though it is a compelling explanation for the boundary of the firm, the ownership is not the sufficient condition for control and coordination, or operational integration inside the firm. This issue is particularly salient in the context of acquisitions, and significant researches have been done to understand how to achieve desirable operational integration after mergers and acquisitions (e.g. Haspeslagh & Jemison, 1991; Schweizer, 2005; Ranft & Lord, 2002; Puranam, Singh, & Chaudhuri, 2009). Building on those researches about post-merger integration processes, this study develops our knowledge on operational integration by focusing on transfer of managers between acquirers and acquired firms (or targets) as a critical, but understudied mechanism of operational integration.

Previous studies on post-merger integration processes found the following factors to be critical for successful operational integration: the degree and speed of integration (Schweizer, 2005; Puranam et al., 2009; Ranft & Lord, 2002), organization culture of acquirers and targets (Schweizer, 2005), management of human resources including top managers of targets (Ranft & Lord, 2002; Graebner, 2004), and communications among people from acquirers and targets (Ranft & Lord, 2002). However, one limitation of these studies is that they are mostly based on case studies (Puranam's works as notable exceptions). Although case studies provide rich context to understand the phenomena in detail, their generalizability should be supported by quantitative analysis. The current study overcomes this limitation by examining sizable data about post-merger integration process.

The mechanism of integration process studied in this paper is transfer of top managers. As upper echelon literature (e.g. Hambrick & Mason, 1984; Finkelstein &

Hambrick, 1990) argues, firms are controlled by a top management team (TMT) consisted of managers with bounded rationality. Influenced by the composition of managers with individual characteristics, TMTs of different firms reach different decisions, and firms implement different actions. Consistent with this theory, anecdotal evidence repeatedly supports the importance of TMT compositions in post-merger integrations processes, emphasizing the importance of transfer of managers, or managerial integration between acquirers and targets in particular (Schweizer, 2005; Ranft & Lord, 2002). This study examines three kinds of managerial integration: dual assignment of a manager in both acquirer and target, transfer of manager from target to acquirer (up from target), and transfer of manager from acquirer to target (down to target).

Empirical analysis shows the following findings. First, relatedness of the operation by acquirer and target leads to higher degree of managerial integration. Second, the level of managerial integration decreases as more time elapses after acquisition. And third, although the level of managerial integration becomes lower as time elapses, the association between the relatedness and the higher level of integration remains. These findings support the importance of managerial integration as noted by previous studies. Furthermore, they suggest how managerial integration should change over time. As integration is a process, this implication is critical for our understanding of post-merger integration.

Relationships with previous studies in terms of empirical context deserve to be mentioned. To observe transfer of managers, the sample is limited to acquisitions that did not result in “organizational integrations” during the sample period. Though most of post-merger integration researches have the same issue, it is a limitation in the generalization of this study. However, “organizational integrations” after acquisitions are rather rare according to available data. In Puranam et al. (2009)’s sample of acquisitions of small technology-based firms by large established firms, about 50% of targets survived as separate entities. In the

whole universe of acquisitions that includes large targets, the proportion of surviving targets should be much higher. In 44,052 acquisitions reported by Zephyr database during 2000-2006, 73% of acquirers and targets are separately identified by ORBIS database after 2006. Considering the possibility that IDs are not perfectly matched between Zephyr and ORBIS, the actual rate of targets' survival should be even higher.

This study contributes to several streams of literatures. First, it enriches our knowledge of acquisitions in general, and post-merger integration process in particular. Antecedent characteristics such as organizational "fit" between acquirer and target may explain success of acquisitions to some extent (Datta, 1991), but post-merger integration process is still extremely important. This study is the first empirical study showing firms' engagement in transfer of managers over time as an action for integration.

Second, this study more generally contributes to organization design literature by showing a way to achieve differentiation and integration selectively. Subunits within a firm confront two requirements of differentiation and integration to cope with different environments of their activities and to coordinate with other subunits at the same time (e.g. Lawrence & Lorsch, 1967; Bartlett & Ghosbal, 1987; Ghoshal & Bartlett, 1990; Gulati, Lawrence, & Puranam, 2005). Hierarchy is one solution (e.g. March & Simon, 1958; Galbraith, 1977), but within hierarchy there are further varieties in coordination mechanisms such as impersonal, personal, and group coordination modes (Van de Ven, Delbecq, & Koenig Jr, 1976) as well as transfer of managers (Edström & Galbraith, 1977). Confirming arguments by previous works, this study empirically shows that relatedness between organizations lead to more intensive transfer of managers that facilitates integration. In addition, it is demonstrated that the integration is managed differently throughout different phases of inter-organizational relationships: integration can be maintained by lower intensity of managerial integration as relationships mature.

The next section theoretically explains the research questions, and three hypotheses are posited. The following section empirically examines the hypotheses with providing information on the sample, empirical model, variables, results and robustness checks. The final section concludes.

THEORY AND HYPOTHESES

Operational Integration

King, Dalton, Daily, and Covin (2004) conducted meta-analysis of previous studies on the relation between acquisition characteristics and post-acquisition performance of acquirers, and found insignificant relationship. According to their analysis, the insignificant relationship is due to missing critical variables. The following studies, therefore, search for further antecedent characteristics of acquisitions such as prior relationships between acquirers and targets (Zaheer, Hernandez, & Banerjee, 2010) as well as post-merger integration process (Haspeslagh & Jemison, 1991; Schweizer, 2005; Zollo & Singh, 2004; Ranft & Lord, 2002; Birkinshaw, Bresman, & Håkanson, 2000; Puranam et al., 2009; Puranam, Singh, & Zollo, 2006; Puranam & Srikanth, 2007; Graebner, 2004). The latter argues that an acquirer has to successfully coordinate acquired operation with their own in order to gain synergy value from an acquisition. For example, they may need to eliminate redundant capacity of production, share a common sales channels for acquired product lines, or transfer acquired knowledge to product development teams of acquirers for further exploitations of the knowledge. In other words, ownership integration is not sufficient. Effective operational integration is necessary for generating value from acquisitions.

Operational integration is carried out by sharing common language for communication, knowledge of each other (Zaheer et al., 2010 about effect of prior alliance experiences), and authority over interrelated operations, as well as introducing incentive

systems, and setting procedure to coordinate across different operations. In addition, interactions between members of organization promote socialization (Edström & Galbraith, 1977), and nurture group identity (Kogut & Zander, 1996). Operational integration is further supported by these contextual factors.

Operational integration is particularly important when operation of target is closely related to that of acquirer (Zhou, 2013; Zhou & Wan, forthcoming). In those cases, there are greater overlap of activities and resources that need to be combined and rationalized. Also, there are greater amount of activities and resources that are interrelated.

However, actual process of post-merger operational integration is not understood well. Particularly, the gap in empirical analysis is serious. Though multiple case studies have contributed detailed insights (e.g. Haspeslagh & Jemison, 1991; Schweizer, 2005; Ranft & Lord, 2002; Birkinshaw et al., 2000), there are only a few empirical studies (Puranam et al., 2006; Puranam & Srikanth, 2007; Puranam et al., 2009). As a result, very limited number of mechanisms (i.e. absorption of acquired organization, or “structural integration”) for operational integration have been examined. This study targets this gap, and examines a mechanism that has not been studied empirically: managerial integration.

Managerial integration

Managerial integration is one of critical strategies to achieve operational integration. Ranft and Lord (2002) cited a comment of a target’s manager;

I’m a firm believer that when you make an acquisition [...], you need to mix it [top management team] up a little bit. [...] You need to know what they [acquirer] are doing. We really don’t know that yet. We’ve had a number of integration meetings together, but we still don’t really understand why they do what they do, and they don’t know what we do.

In addition, there are anecdotal evidences that integration manager sent from acquirer to target plays central role for integration (Schweizer, 2005). Likewise, managers appointed from targets to acquirers not only facilitate implementation of coordination plan, but also find potential synergies that have not been recognized by the acquirers.

Upper echelon literature provides theoretical support to the argument. Managers are limited by bounded rationality, and their perceptions are influenced by managers' interpretation of situations based on their selective perceptions, limited field of vision, and cognitive base and values (Hambrick & Mason, 1984; Finkelstein & Hambrick, 1990; Carpenter, Geletkanycz, & Sanders, 2004). Post-merger integration context even further exaggerates this bounded rationality. Post-merger integration is a task in extreme uncertainty. Previously separated by firm boundaries, both parties do not know what partners are doing, what resources they have, and how they with each other. In such an uncertain context, managers need to rely more on their personal perceptions rather than objective information, and effects of TMT are manifested (Carpenter & Fredrickson, 2001). Based on this argument, managerial integration is extremely important after acquisitions.

And relatedness of operations of acquirer and target further magnify the necessity of managerial integration. The more related operations with each other, the more need for coordination of activities and resources (Zhou, 2013; Zhou & Wan, forthcoming). Thus, the level of managerial integration should be greater if business areas of acquirer and target are interrelated. This study examines three forms of managerial integration: dual assignment, transfer of managers from acquirer to target, and transfer of managers from target to acquirer. The first set of hypotheses are the following.

Hypothesis 1: TMTs of an acquirer and a target are more likely to be integrated either by dual assignment of managers, transfer of managers down

to the target, or transfer of managers up from the target if their operations are interrelated.

Decrease in Managerial Integration over Time

Since operational integration is a process rather than one-time action, an essential question is how integration mechanisms are managed over time. For example, Birkinshaw et al. (2000) reported a case where human integration paved the way to task integration. Also, Puranam and Srikanth (2007) argued that organizational integration contributes to leveraging target firm's knowledge, but disrupts their on-going activities. These findings clearly indicate the significance of timing. As an integral part of integration process, managerial integration should be also conducted in a timely manner.

In this study, I hypothesize that the level of managerial integration decreases over time for the following reasons. First, the need for top managers' involvement becomes lower as situation becomes more certain. Involvement of top managers is particularly important if relationships between targets and acquirers are uncertain and rapidly changing. It is because top managers have capability and knowledge for considering broader effects of decisions on entire organization, as well as authority to make decisions timely (Rajan & Wulf, 2006). As integration proceeds and managers and employees become better able to predict what will happen, the situation can be managed by managers with narrower scope of knowledge and responsibilities (Bloom, Sadun, & Van Reenen, 2012).

Second, acquirers and targets learn how to coordinate with each other during the integration process (Nelson & Winter, 1982; Cyert & March, 1963). They learn routines, resources, and culture of each organization, and codify them as rules for coordination. Or, new routines can be established for coordination without codification. In any ways, personal coordination mechanisms can be replaced by impersonal mechanisms over time.

Third, top managers are more critical for nurturing group culture immediately after acquisition. Acquisition causes extreme uncertainty in affected organizations. Direct interaction with them, or even merely appearance of them helps resolve uncertainty substantially, and develop trust and group culture. Therefore, here posit the second set of hypotheses.

Hypothesis 2: TMTs of an acquirer and a target become less likely to be integrated by either dual assignment of managers, transfer of managers down to the target, or transfer of managers up from the target as time elapses after acquisition.

Continuous Effect of Relatedness

Though the absolute level of managerial integration decreases over time, relative level of integration with related target compared with unrelated target should continue to be higher for the following reasons. First, related targets are more likely to experience uncertainty for prolonged period. Because coordinating related operations is a complex task, the process takes longer time with trials and errors. Also, the nature of inter-relatedness requires target to face uncertainties originating from not only their own operational environment, but also other inter-related counterparts'. Under prolonged uncertainty, impersonal coordination remains difficult, and nurturing group culture through interaction with top managers keeps important.

Second, even if the level of uncertainty is similar, managers with broader scope of knowledge and authority are more important in coordinating with related target. Because an issue in the target may affect other parts of the firm, acquirers need to manage such target with broader managerial scope. Therefore, third set of hypotheses are the following.

Hypothesis 3: TMTs of an acquirer and a target stay more likely to be integrated over time by either dual assignment of managers, transfer of

managers down to the target, or transfer of managers up from the target if their operations are interrelated.

EMPIRICAL ANALYSIS

Data and Sample

The data of acquisitions are from Zephyr database. Zephyr is a product published by Bureau van Dijk, and it covers acquisitions worldwide. In addition to the comprehensive coverage, its strength is in its link to another database published by the same company, ORBIS. Because ORBIS reports names of managers of public and private firms including subsidiaries of firms worldwide, it allows us to create a data set about acquisition and managerial integration.

The sample is consisted of acquisitions reported by Zephyr from 2000 to 2008 for the analysis of managerial integration as of 2008, and from 2000 to 2010 for the analysis of managerial integration as of 2010. Acquisitions explained as restructuring, management buy-out, institutional acquisitions, and the like are removed to limit the sample to those facing the challenge of operational integration. Also, the sample is limited to acquisitions that resulted in new establishments of control in a clear way. This screening is necessary to identify when the integration process started. For example, if an acquirer owned 60% of ownership in a target at time $t-1$, and increased the ownership share to 100% at time t , it is not clear whether the integration started at time t , or the target was already integrated at time $t-1$. The timing of integration is similarly unclear if an acquirer owned 30% of ownership at time $t-1$, and 50% at time t . To avoid such ambiguity, acquisitions are included in the sample if ownership of acquirers is below 50% before acquisitions, and above or equal to 95% after acquisitions. After combining information on managers from ORBIS and dropping observations without manager information, 33,664 acquisitions remain in the sample.

Empirical model

The empirical model estimates the likelihood that managerial integration happens in each observation period. The unit of observation is acquisition-observation period, and the likelihood is estimated by the following linear probability model.

$$T_{m,h,t} = \beta_0 + \beta_1 X_h + \beta_2 Y_{h,t} + \beta_3 X_h Y_{h,t} + \varepsilon_{m,h,t}$$

where $T_{m,h,t}$ is a dummy variable representing the event of type m of managerial integration concerning acquisition h at year t . This study examines managerial integration as of 2008 and 2010, so t is year 2008 or 2010. X_h is the explanatory variable in Hypothesis 1, a dummy variable for relatedness of business area between acquirer and target of acquisition h . And $Y_{h,t}$ is the explanatory variable in Hypothesis 2, and signifies time elapsed since acquisition at time t . The interaction term $X_h Y_{h,t}$ is the explanatory variable for Hypothesis 3.

Variables

Dual assignment of manager. The first dependent variable is dual assignment of manager in TMTs of both acquirer and target. Lists of managers are derived from ORBIS disks published in early 2009 and 2011 that record information at the end of 2008 and 2010. This variable is one if at least one manager is recorded as a manager of acquirer as well as target in the same year.

As ORBIS reports names of managers without identification codes, identical managers need to be found by matching names by the following steps. First, full names of managers are compared, and identical managers are detected if managers are matched by full names. Second, combinations of first and last names are compared with dropping middle names, and managers are identified by matching first and last names combined. This step is necessary because ORBIS sometimes reports middle names in addition to first and last

names, and comparing reported full name fails to capture the same managers when they are reported by the first, middle, and last names in one firm, and by only the first and last names in the other. Lastly, when the first name of a manager is only one letter, combination of the first letter of the first name and the whole last name is compared. This step allows to capture managers whose initial letter of the first name is reported as the first name.

Transfer of managers down to target. This is the second dependent variable. Transfer of managers is defined by comparing different vintages of ORBIS disks. For example, transfer of managers between 2006 and 2008 is detected by comparing 2007 and 2009 vintages that report information as of 2006 and 2008 respectively. Transfer of managers down to target is determined to have happened if at least one of managers of acquirer in 2006 was not in TMT of a target in 2006, but became a member of TMT of the target in 2008. Managers are identified by the name matching procedure explained above. Transfer of managers between 2008 and 2010 is found by the same steps using ORBIS vintages of 2009 and 2011 reporting information as of 2008 and 2010.

Transfer of managers up from target. This third dependent variable is a dummy variable that is one if there is at least one manager in target in year 2006 (or 2008) was not included in TMT of acquirer in the same year, but became a member of it in year 2008 (or 2010). Transfers are defined by using the same data and name matching procedure utilized for *Transfer of managers down to target*.

Relatedness in business area of acquirer and target. This variable is the first explanatory variable measuring inter-relatedness between acquirer's and target's operations. Concretely, this is a dummy variable that is one if target's core business area is the same as one of business areas of acquirer. Overlap of business area is a proxy of inter-relatedness of the two firms' operations for the following reasons. First, if an acquired operation is in the

same business area, it is likely that there are redundancies to be eliminated or gaps to be filled in their activities including marketing, production capacity, and product development. Second, it is likely that both firms can share common resources such as sales channels, production facilities, and components. And third, two firms operating in the same business area are likely to own intellectual property or technological knowledge that can be redeployed to the partner. Inter-relatedness in these aspects demand significant degree of coordination for the two firms to achieve synergy. Data of business areas are from ORBIS. To find the overlap, primary NAICS of target is compared with primary and secondary NAICS of acquirer.

Time elapsed since acquisition. The second explanatory variable measures the number of years elapsed since acquisition. This variable is greater if an acquisition is older.

Control variables. Several characteristics of acquisition, acquirer, and country of target that may be associated with managerial integration outcome are controlled.

Deal size of acquisition is logged value of acquisition reported by Zephyr. Although deal values can be influenced by competition among bidders (e.g. Giliberto & Varaiya, 1989), they generally reflect acquired firm's values evaluated by acquirers. Since integration of highly evaluated resources or operations is critical, this variable should be positively associated with managerial integration.

Acquirer size is measured by logged total asset of acquirer at each time period, and the data are from ORBIS. Firms grow with delegating decision-making authorities and functions to subordinates (Chandler, 1962; Bloom et al., 2012). As a result, larger firms should be more decentralized, and managerial integration is executed not at the headquarters of acquirers, but at a lower level of organizational hierarchy.

Other financial metrics, acquirer's ratio of liability as well as profitability are included. If acquirer's financial slack is limited and they are not generating abundant cash flow, their behaviour might become more conservative, and managerial integration may be affected. These financial metrics are derived from ORBIS.

In addition, several country characteristics of targets are controlled. Country size of target is logged GDP reported by World Bank. Rule of law of target's country is the measure reported by World Governance Indicators. Development of countries measured by these variables may directly or indirectly affect the managerial integration. For example, if a country is more developed, acquirers may want to develop important functions with closely supporting the development by managerial integrations. Or, as a result of successful developments of such critical functions in those countries, it may be necessary for acquirers to integrate them locating in developed countries. Finally, cross-border acquisition is a dummy variable that is one if target's country is different from acquirer's. When target is in a foreign county, it is less likely that their operations are overlapped and require coordination compared with domestic acquisitions conditional on other factors being equal. Moreover, transfer of managers between distant locations is more costly. These factors should lead to lower frequency of managerial integration in cross-border acquisitions.

Acquirers' Industry-specific or country-specific factors that are consistent across the analysis period are further controlled by industry and country fixed effects.

Table 2-1 and 2-2 show definitions, descriptive statistics, and correlations of variables.

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Insert Table 2-1 and 2-2 about here
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Results

Table 2-3 shows results of the regression. Likelihood of each form of managerial integration is estimated in each model. Coefficients of control variables show interesting association between acquisition characteristics and managerial integration. Deal value is positively related, and acquirer size is negatively related to managerial integration. They suggest that acquirers are making efforts to integrate and utilize important and valuable operation or resources of targets. However, as acquirer becomes larger, the role and responsibility of such integration should be delegated from TMT of acquirer to lower level of managers. Acquirer's reliance on liability is negatively associated with managerial integration, which suggests that integration of target is an expansion strategy, and it is more frequently pursued by firms with financial slack. In addition, cross-border acquisitions see less managerial integration. Managerial integration across border is more costly, and it is difficult for managers of acquirers to work in TMT of foreign target. Therefore, managerial integration is compromised.

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Insert Table 2-3 about here
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Model 1-3 examines Hypotheses 1 and 2. Model 1 and 3 supports the Hypotheses 1a and 1c respectively, that is, as business areas of acquirers and targets are interrelated, they are more likely to engage in managerial integration. Hypothesis 1b about transfer of managers down to target is not supported by insignificant coefficient. Hypotheses 2a, 2b, and 2c are strongly supported by negative and highly significant coefficients of time elapsed since acquisition showing targets of older acquisitions are no longer integrated at as high degree as those of new acquisitions. Either because coordination between acquirer and target could be codified, or its responsibility could be delegated to lower level in the organization, TMTs of acquirers do not lead the integration any longer.

Model 4-6 test hypothesis 3. Supporting the hypotheses, coefficients of interactions between managerial integration and time elapsed after acquisitions are not negative, and even positive in the estimation of managerial transfer to target. Taken together with the independent effects of managerial integration and time elapsed after acquisitions, the results indicate that managerial integration is greater if acquirer and target are interrelated in their business areas, and the greater integration continues to exist over years. The persistent effects of relatedness support the argument that related operations entail constant changes and adaptations of each other, and require continuous information processing.

However, coefficients for estimating managerial transfer to target call for a special attention since they tell a more nuanced story. Model 2 says that relatedness is not associated with likelihood of managerial transfers down to target in average, but with interaction term of relatedness and time elapsed since acquisition, the main effect of relatedness is negative and significant, and the interaction effect is positive and significant in Model 5. This means that transfer of managers to target is less frequent with related target than unrelated target immediately after acquisition, but it becomes more frequent over time. It is difficult to reach a definitive conclusion, but a possible interpretation is that transfer of managers to target is closely related to application of existent coordination schemes. When interrelated, designing coordination schemes is a complex task requiring detailed knowledge about operations of both organizations. As such, it takes more time to design coordination schemes, and application of them starts later than unrelated acquisition cases. In related acquisitions, acquirers learn targets' operation to design coordination schemes first, and apply the schemes to targets by transferring managers later. In unrelated acquisitions, on the other hand, coordination schemes are much simpler, and available briefly after acquisitions, and managers are transferred to target to implement the coordination without spending so much

time for designing them. Of course, purposes of such transfer is not limited to it, but it might be a factor driving the result.

Robustness Check

To check the robustness, I conducted multiple analyses. First, though linear probability model has advantage in the ease of interpretation, non-linear estimation models are preferred by some studies. Thus, to check the robustness to a non-linear estimation model, conditional logit model is adopted with the same variables. Fixed effect for acquirers' industry-country interaction is adopted. The results are shown in Table 2-4. Coefficients are consistent with the main results.

Second, as the sample includes broad range of industries, the results may be industry specific. To examine industry variations, I split the sample into four industry categories, manufacturing, distribution, service, and others, and run the same regression for each subsample. Results in Table 2-5 shows weaker, but generally consistent results. Notably, service provider acquirers behave most consistently while distributor acquirers do not seem to be influenced by relatedness. This may be because distribution activities are so much standardized and codified that coordination of related operations would not require so much interactions between the two parties.

Third, the main analysis examines managerial integration in 2008 and 2010, and financial crisis in 2008-2009 might affect managerial integration in 2010 much more than 2008. Main analysis included a dummy variable to control this effect. But to examine further, I split the sample by year, and check managerial integration in each year separately. Results in Table 2-6 show similar associations in both years.

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Insert Table 2-4, 2-5, 2-6 about here

CONCLUSION

This study examined managerial integration between acquirers and targets after acquisitions to understand the post-merger integration process. Empirical analysis found that the relatedness between acquirer and target leads to greater managerial integration, and though the level of managerial integration becomes lower over time, the association between the relatedness and managerial integration remains.

These findings provide the first empirical evidence about the importance of managerial integration after acquisitions. As previous studies on post-merger integration process argued, ownership integration is not enough for operational integration. Adopting integration mechanisms like transfers of managers, firms are actively developing operational integration acquisitions.

Another contribution of this study is that the change of integration process over time is documented. Most of studies on post-merger integration were limited in their observation period, and they did not examine how integration mechanisms stay in place, get modified, and get removed over time. This study finds that managerial integration is gradually removed over time.

An interesting, though not fully explained, finding is that between inter-related acquirers and targets, transfers down to the targets are less common than in other cases immediately after acquisitions, but they become more frequent later (Model 5). One possible interpretation is that a major purpose of transfers down to targets is executing and monitoring coordination, and if operations of acquirers and targets are interrelated, it is difficult to determine plans for coordination. Therefore, acquirers of related acquisitions spend some time to develop coordination plans before executing the plans with managerial transfer

whereas acquirers of unrelated acquisitions execute simple coordination plans (e.g. introduction of reporting formats) immediately after acquisitions. However, this paper leaves the test of this hypothesis for future study.

A limitation of this study is that the nature of acquisitions is not specified. In exchange for the large sample size, detailed information about acquisition deals were not available. Future study may collect more detailed information of deals (e.g. purpose of acquisitions), and reveal more detailed mechanisms.

Table 2-1: Definitions and summary statistics of variables

Variable	Obs	Mean	Std. Dev.	Min	Max	Definition
Simultaneous assignment	36,632	0.375	0.484	0		1 Dummy variable that is one if at least one manager is a TMT member of both acquirer and target
Transfer down to target	28,597	0.122	0.328	0		1 Dummy variable that is one if at least one manager of target is newly included in TMT of acquirer
Transfer up from target	28,597	0.057	0.231	0		1 Dummy variable that is one if at least one manager of acquirer is newly included in TMT of target
Deal size	15,353	9.982	2.220	-0.315	17.828	Logged deal value in thousand EUR
Acquirer size	36,629	12.876	2.514	2.398	20.497	Logged total asset of acquirer in thousand USD
Acquirer ratio of liability	36,467	0.621	0.356	0	24.931	Liability over total asset of acquirer
Acquirer profitability	36,632	0.100	0.100	-0.300	0.790	EBITDA over total asset of acquirer
Country size of target	36,345	14.430	1.419	7.813	16.545	Logged GDP of target's country
Rule of law of target	36,628	1.503	0.558	-1.207	1.977	Rule of law of target's country
Cross-border acquisition	36,632	0.305	0.460	0		1 Dummy variable for cross-border acquisition
Time elapsed since acquisition	36,632	3.450	2.488	0	10	Number of years elapsed since acquisition
Relatedness	36,632	0.470	0.499	0		1 Dummy variable that is one if target's core business is included in acquirers business areas

Table 2-2

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1 Simultaneous assignment	1											
2 Transfer down to target	0.350	1										
3 Transfer up from target	0.225	0.057	1									
4 Deal size	-0.094	0.032	0.114	1								
5 Acquirer size	-0.279	-0.054	0.034	0.653	1							
6 Acquirer ratio of liability	-0.011	-0.026	-0.010	0.014	0.012	1						
7 Acquirer profitability	-0.066	-0.027	-0.009	0.113	0.223	-0.037	1					
8 Country size of target	-0.027	0.077	0.052	0.254	0.175	-0.007	0.040	1				
9 Rule of law of target	0.158	0.045	0.012	-0.022	-0.130	-0.019	-0.056	0.079	1			
10 Cross-border acquisition	-0.295	-0.115	-0.045	0.132	0.232	-0.043	0.059	-0.172	-0.048	1		
11 Time elapsed since acquisition	-0.063	-0.157	-0.042	0.041	0.073	0.004	0.030	0.084	0.061	0.009	1	
12 Relatedness	0.036	0.016	0.038	0.128	0.069	-0.013	0.008	0.014	0.012	-0.020	0.021	1

Table 2-3: Main results

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Dependent variable	Simul assign	Transfer to target	Transfer from target	Simul assign	Transfer to target	Transfer from target
Deal size	0.0397** (18.02)	0.0167** (8.97)	0.0165** (11.90)	0.0398** (18.04)	0.0168** (9.02)	0.0164** (11.89)
Acquirer size	-0.0476** (-21.11)	-0.0184** (-9.51)	-0.00972** (-6.73)	-0.0476** (-21.10)	-0.0184** (-9.50)	-0.00973** (-6.74)
Acquirer ratio of liability	-0.0350** (-3.42)	-0.0215* (-2.47)	0.00139 (0.21)	-0.0351** (-3.42)	-0.0217* (-2.49)	0.00142 (0.21)
Acquirer profitability	-0.0237 (-0.62)	0.00352 (0.19)	-0.0206 (-1.48)	-0.0229 (-0.60)	0.00356 (0.20)	-0.0206 (-1.49)
Country size of target	-0.0485** (-13.15)	0.0127** (3.89)	-0.00230 (-0.94)	-0.0485** (-13.15)	0.0128** (3.90)	-0.00229 (-0.94)
Rule of law of target	0.0744** (7.27)	0.00633 (0.74)	0.00710 (1.08)	0.0744** (7.27)	0.00647 (0.75)	0.00706 (1.08)
Cross-border acquisition	-0.231** (-26.42)	-0.0599** (-8.04)	-0.0352** (-6.39)	-0.231** (-26.40)	-0.0596** (-8.01)	-0.0353** (-6.40)
Year 2010	0.0393** (5.15)	-0.0376** (-5.83)	-0.00750 (-1.56)	0.0393** (5.16)	-0.0376** (-5.84)	-0.00751 (-1.56)
Relatedness	0.0289** (3.92)	0.00157 (0.25)	0.0113* (2.43)	0.0130 (0.94)	-0.0247* (-2.03)	0.0180* (1.97)
Time elapsed since acquisition	-0.0106** (-6.55)	-0.0194** (-14.39)	-0.00444** (-4.41)	-0.0125** (-5.81)	-0.0224** (-12.37)	-0.00365** (-2.69)
Relatedness x Time elapsed				0.00396 (1.36)	0.00618* (2.51)	-0.00158 (-0.86)
Acquirer's country FE	Yes	Yes	Yes	Yes	Yes	Yes
Acquirer's industry FE	Yes	Yes	Yes	Yes	Yes	Yes
r2_a_within	0.101	0.0515	0.0191	0.101	0.0519	0.0191
N	15187	11998	13084	15187	11998	13084

t statistics in parentheses

+ p<0.1, * p<0.05, ** p<0.01"

Likelihood of three forms of managerial integration are estimated by linear probability model with fixed effects for acquirer's country and industry.

Table 2-4: Robustness check by adopting conditional logit model

	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
Dependent variable	Simul assign	Transfer to target	Transfer from target	Simul assign	Transfer to target	Transfer from target
Deal size	0.256** (16.65)	0.182** (7.93)	0.306** (10.88)	0.256** (16.68)	0.184** (8.00)	0.305** (10.85)
Acquirer size	-0.291** (-18.25)	-0.193** (-7.96)	-0.205** (-6.91)	-0.291** (-18.25)	-0.192** (-7.90)	-0.205** (-6.92)
Acquirer ratio of liability	-0.123* (-2.11)	-0.260* (-1.97)	-0.00651 (-0.06)	-0.123* (-2.12)	-0.253+ (-1.93)	-0.00665 (-0.06)
Acquirer profitability	-0.156 (-0.64)	-0.0305 (-0.13)	-0.0805 (-0.37)	-0.148 (-0.61)	-0.0366 (-0.15)	-0.0830 (-0.38)
Country size of target	-0.320** (-11.51)	0.124** (2.58)	-0.110* (-2.13)	-0.321** (-11.54)	0.124* (2.57)	-0.109* (-2.11)
Rule of law of target	0.683** (7.03)	0.291+ (1.74)	0.598** (3.03)	0.683** (7.02)	0.293+ (1.75)	0.597** (3.03)
Cross-border acquisition	-1.379** (-21.70)	-0.723** (-6.93)	-0.649** (-5.22)	-1.379** (-21.69)	-0.722** (-6.89)	-0.649** (-5.22)
Year 2010	0.208** (4.44)	-0.355** (-5.05)	-0.101 (-1.22)	0.208** (4.46)	-0.354** (-5.02)	-0.101 (-1.22)
Relatedness	0.198** (4.19)	-0.00372 (-0.05)	0.182* (2.09)	0.0423 (0.48)	-0.427** (-3.34)	0.287+ (1.75)
Time elapsed since acquisition	-0.0579** (-5.59)	-0.221** (-13.04)	-0.0482* (-2.55)	-0.0774** (-5.54)	-0.287** (-11.80)	-0.0342 (-1.29)
Relatedness x Time elapsed				0.0383* (2.09)	0.120** (3.95)	-0.0257 (-0.76)
Acquirer country x industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood	-5548.3	-2668.2	-1896.9	-5546.1	-2660.3	-1896.6
N	12105	8173	7816	12105	8173	7816

t statistics in parentheses

+ p<0.10, * p<0.05, ** p<0.01"

Likelihood of three forms of managerial integration are estimated by conditional logit model with fixed effects for acquirer's country by industry.

Table 2-5: Robustness check by splitting sample by industry

	Model 13	Model 14	Model 15	Model 16	Model 17	Model 18	Model 19	Model 20	Model 21	Model 22	Model 23	Model 24
Sample	Manufacturer acquirers						Distributor acquirers					
Dependent variable	Simul assign	Transfer to target	Transfer from target	Simul assign	Transfer to target	Transfer from target	Simul assign	Transfer to target	Transfer from target	Simul assign	Transfer to target	Transfer from target
Deal size	0.0381** (10.57)	0.0176** (5.79)	0.0158** (6.51)	0.0383** (10.63)	0.0178** (5.84)	0.0158** (6.53)	0.0494** (7.68)	0.0162** (2.83)	0.0179** (4.49)	0.0497** (7.73)	0.0163** (2.84)	0.0180** (4.51)
Acquirer size	-0.0507** (-13.43)	-0.0157** (-4.78)	-0.0142** (-5.42)	-0.0509** (-13.46)	-0.0158** (-4.81)	-0.0142** (-5.43)	-0.0439** (-6.37)	-0.0155* (-2.46)	-0.0153** (-3.42)	-0.0434** (-6.30)	-0.0154* (-2.44)	-0.0152** (-3.39)
Acquirer ratio of liability	-0.0698** (-2.97)	-0.0780** (-3.32)	0.00744 (0.40)	-0.0705** (-3.00)	-0.0790** (-3.36)	0.00703 (0.37)	-0.00581 (-0.12)	-0.0413 (-0.87)	-0.0415 (-1.23)	-0.00505 (-0.10)	-0.0410 (-0.86)	-0.0411 (-1.22)
Acquirer profitability	-0.171** (-2.61)	-0.0287 (-0.80)	0.0259 (0.89)	-0.170** (-2.60)	-0.0293 (-0.82)	0.0257 (0.88)	0.281* (2.05)	0.0876 (0.94)	-0.00223 (-0.03)	0.282* (2.06)	0.0872 (0.94)	-0.00230 (-0.03)
Country size of target	-0.0586** (-11.20)	0.0102* (2.22)	-0.00588 (-1.60)	-0.0585** (-11.18)	0.0102* (2.22)	-0.00590 (-1.61)	-0.0504** (-4.30)	0.0244* (2.24)	-0.000674 (-0.09)	-0.0507** (-4.32)	0.0243* (2.22)	-0.000760 (-0.10)
Rule of law of target	0.0821** (5.72)	0.00987 (0.84)	0.0119 (1.23)	0.0819** (5.71)	0.00994 (0.84)	0.0119 (1.23)	0.1000** (3.24)	0.0250 (0.93)	0.00550 (0.29)	0.101** (3.27)	0.0250 (0.92)	0.00546 (0.29)
Cross-border acquisition	-0.238** (-17.56)	-0.0581** (-5.04)	-0.0401** (-4.38)	-0.237** (-17.49)	-0.0575** (-4.99)	-0.0399** (-4.36)	-0.259** (-9.65)	-0.0874** (-3.65)	-0.0341* (-2.04)	-0.259** (-9.65)	-0.0876** (-3.65)	-0.0341* (-2.04)
Year 2010	0.0204+ (1.68)	-0.0292** (-2.80)	-0.00437 (-0.52)	0.0204+ (1.68)	-0.0293** (-2.80)	-0.00435 (-0.52)	0.0609** (2.81)	-0.0325+ (-1.69)	-0.00487 (-0.36)	0.0612** (2.83)	-0.0326+ (-1.69)	-0.00493 (-0.36)
Relatedness	0.0266* (2.22)	0.00246 (0.24)	0.0132 (1.63)	-0.0138 (-0.60)	-0.0254 (-1.26)	-0.00122 (-0.08)	0.00804 (0.37)	0.0202 (1.06)	0.000127 (0.01)	-0.0507 (-1.24)	0.00594 (0.16)	-0.0121 (-0.45)
Time elapsed since acquisition	0.00288 (1.13)	-0.0122** (-5.71)	-0.00139 (-0.81)	-0.00124 (-0.38)	-0.0150** (-5.47)	-0.00282 (-1.28)	-0.0144** (-2.98)	-0.0191** (-4.51)	-0.00518+ (-1.73)	-0.0214** (-3.37)	-0.0208** (-3.67)	-0.00658+ (-1.65)
Relatedness x Time elapsed				0.00976* (2.08)	0.00631 (1.60)	0.00324 (1.03)				0.0147+ (1.69)	0.00336 (0.43)	0.00288 (0.53)
Industry x country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted within R square	0.126	0.0398	0.0172	0.126	0.0402	0.0172	0.0964	0.0461	0.0173	0.0973	0.0455	0.0168
N	5437	4118	4530	5437	4118	4530	1888	1511	1628	1888	1511	1628

t statistics in parentheses

+ p<0.10, * p<0.05, ** p<0.01

Likelihood of three forms of managerial integration are estimated by linear probability model with fixed effects for acquirer's country and industry.

Table 2-5 (continued)

	Model 25	Model 26	Model 27	Model 28	Model 29	Model 30	Model 31	Model 32	Model 33	Model 34	Model 35	Model 36
Sample	Service provider acquirers						Other acquirers					
Dependent variable	Simul assign	Transfer to target	Transfer from target	Simul assign	Transfer to target	Transfer from target	Simul assign	Transfer to target	Transfer from target	Simul assign	Transfer to target	Transfer from target
Deal size	0.0397** (10.10)	0.0182** (5.38)	0.0168** (7.18)	0.0398** (10.11)	0.0183** (5.38)	0.0168** (7.17)	0.0420** (8.09)	0.0164** (3.95)	0.0184** (5.61)	0.0421** (8.11)	0.0170** (4.08)	0.0182** (5.54)
Acquirer size	-0.0522** (-13.53)	-0.0215** (-6.44)	-0.00768** (-3.31)	-0.0522** (-13.54)	-0.0214** (-6.44)	-0.00772** (-3.33)	-0.0422** (-7.36)	-0.0195** (-4.10)	-0.00439 (-1.16)	-0.0422** (-7.35)	-0.0193** (-4.06)	-0.00455 (-1.20)
Acquirer ratio of liability	-0.0326** (-2.59)	-0.0147 (-1.27)	-0.00462 (-0.56)	-0.0326** (-2.59)	-0.0146 (-1.26)	-0.00479 (-0.58)	-0.0352 (-0.92)	-0.0226 (-0.66)	-0.00158 (-0.06)	-0.0362 (-0.95)	-0.0288 (-0.84)	0.00157 (0.06)
Acquirer profitability	0.0819 (1.33)	0.0127 (0.45)	-0.0547** (-2.70)	0.0806 (1.31)	0.0130 (0.46)	-0.0553** (-2.73)	-0.0446 (-0.50)	0.0247 (0.70)	-0.000753 (-0.03)	-0.0426 (-0.47)	0.0226 (0.64)	0.000504 (0.02)
Country size of target	-0.0474** (-6.38)	0.00885 (1.28)	0.000373 (0.08)	-0.0474** (-6.37)	0.00889 (1.29)	0.000358 (0.08)	-0.0224* (-2.09)	0.0148 (1.61)	0.00126 (0.17)	-0.0221* (-2.05)	0.0160+ (1.74)	0.000707 (0.10)
Rule of law of target	0.0713** (2.95)	0.00921 (0.44)	-0.00340 (-0.23)	0.0708** (2.93)	0.00949 (0.45)	-0.00388 (-0.26)	0.0512* (2.04)	-0.0110 (-0.54)	0.00699 (0.43)	0.0506* (2.01)	-0.0123 (-0.60)	0.00761 (0.47)
Cross-border acquisition	-0.238** (-15.16)	-0.0577** (-4.19)	-0.0254** (-2.71)	-0.238** (-15.17)	-0.0576** (-4.19)	-0.0255** (-2.72)	-0.188** (-8.00)	-0.0652** (-3.45)	-0.0513** (-3.43)	-0.188** (-7.99)	-0.0646** (-3.43)	-0.0519** (-3.47)
Year 2010	0.0560** (4.13)	-0.0445** (-3.87)	-0.0117 (-1.48)	0.0560** (4.13)	-0.0445** (-3.87)	-0.0117 (-1.47)	0.0388* (2.13)	-0.0385** (-2.58)	-0.00687 (-0.58)	0.0392* (2.15)	-0.0380* (-2.55)	-0.00729 (-0.62)
Relatedness	0.0472** (3.69)	-0.00312 (-0.29)	0.0177* (2.34)	0.0596* (2.50)	-0.0113 (-0.53)	0.0309* (2.09)	0.0208 (1.14)	0.00555 (0.37)	0.00333 (0.28)	-0.00998 (-0.30)	-0.0698* (-2.42)	0.0403+ (1.75)
Time elapsed since acquisition	-0.0228** (-7.89)	-0.0294** (-12.06)	-0.00596** (-3.52)	-0.0212** (-5.44)	-0.0304** (-9.16)	-0.00435+ (-1.89)	-0.0141** (-3.62)	-0.0154** (-4.88)	-0.00657** (-2.62)	-0.0186** (-3.27)	-0.0258** (-5.56)	-0.00144 (-0.39)
Relatedness x Time elapsed				-0.00324 (-0.62)	0.00200 (0.45)	-0.00323 (-1.04)				0.00758 (1.09)	0.0174** (3.05)	-0.00859+ (-1.87)
Industry x country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted within R square	0.107	0.0725	0.0222	0.107	0.0724	0.0222	0.0686	0.0441	0.0221	0.0687	0.0479	0.0232
N	5054	4101	4527	5054	4101	4527	2796	2255	2386	2796	2255	2386

t statistics in parentheses

+ p<0.10, * p<0.05, ** p<0.01

Table 2-6: Robustness check by splitting sample by year

	Model 37	Model 38	Model 39	Model 40	Model 41	Model 42	Model 43	Model 44	Model 45	Model 46	Model 47	Model 48
Sample	Managerial integration as of 2008						Managerial integration as of 2010					
Dependent variable	Simul assign	Transfer to target	Transfer from target	Simul assign	Transfer to target	Transfer from target	Simul assign	Transfer to target	Transfer from target	Simul assign	Transfer to target	Transfer from target
Deal size	0.0375** (12.52)	0.0154** (5.09)	0.0211** (9.71)	0.0376** (12.54)	0.0154** (5.10)	0.0211** (9.71)	0.0429** (12.96)	0.0174** (7.63)	0.0124** (6.90)	0.0429** (12.96)	0.0175** (7.68)	0.0124** (6.89)
Acquirer size	-0.0465** (-15.08)	-0.0262** (-8.46)	-0.0120** (-5.34)	-0.0465** (-15.07)	-0.0262** (-8.44)	-0.0120** (-5.35)	-0.0506** (-14.96)	-0.0111** (-4.64)	-0.00816** (-4.30)	-0.0506** (-14.95)	-0.0111** (-4.64)	-0.00817** (-4.30)
Acquirer ratio of liability	-0.0375** (-2.93)	-0.0280* (-2.15)	-0.00423 (-0.44)	-0.0378** (-2.95)	-0.0281* (-2.15)	-0.00423 (-0.44)	-0.0304+ (-1.74)	-0.0142 (-1.01)	-0.00505 (-0.45)	-0.0304+ (-1.74)	-0.0144 (-1.02)	-0.00505 (-0.45)
Acquirer profitability	0.00788 (0.16)	0.000416 (0.01)	-0.0491* (-2.11)	0.00897 (0.18)	0.000523 (0.02)	-0.0492* (-2.11)	-0.0189 (-0.31)	-0.00417 (-0.19)	0.00862 (0.49)	-0.0187 (-0.31)	-0.00419 (-0.20)	0.00860 (0.49)
Country size of target	-0.0543** (-10.64)	0.00655 (1.11)	-0.00444 (-1.05)	-0.0543** (-10.64)	0.00656 (1.11)	-0.00443 (-1.04)	-0.0423** (-7.80)	0.0155** (4.16)	-0.000482 (-0.16)	-0.0423** (-7.80)	0.0155** (4.16)	-0.000470 (-0.16)
Rule of law of target	0.0802** (5.53)	0.0283* (1.98)	0.0168 (1.59)	0.0803** (5.54)	0.0284* (1.99)	0.0168 (1.59)	0.0733** (4.94)	-0.0152 (-1.47)	-0.00156 (-0.19)	0.0733** (4.94)	-0.0150 (-1.45)	-0.00161 (-0.19)
Cross-border acquisition	-0.222** (-18.75)	-0.0555** (-4.46)	-0.0353** (-3.92)	-0.222** (-18.74)	-0.0556** (-4.46)	-0.0353** (-3.92)	-0.239** (-18.16)	-0.0595** (-6.62)	-0.0367** (-5.23)	-0.239** (-18.15)	-0.0590** (-6.56)	-0.0368** (-5.25)
Year 2010	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)
Relatedness	0.0247* (2.47)	-0.00971 (-0.97)	0.0152* (2.09)	0.00808 (0.47)	-0.0190 (-1.08)	0.0175 (1.37)	0.0342** (3.08)	0.0119 (1.57)	0.00783 (1.30)	0.0273 (1.07)	-0.0211 (-1.20)	0.0145 (1.04)
Time elapsed since acquisition	-0.00892** (-3.98)	-0.0400** (-17.94)	-0.00481** (-2.98)	-0.0115** (-3.70)	-0.0414** (-13.23)	-0.00445+ (-1.95)	-0.0120** (-5.10)	-0.00388* (-2.41)	-0.00420** (-3.27)	-0.0127** (-3.93)	-0.00705** (-3.18)	-0.00355* (-2.01)
Relatedness x Time elapsed				0.00519 (1.18)	0.00278 (0.64)	-0.000691 (-0.22)				0.00139 (0.30)	0.00657* (2.09)	-0.00134 (-0.53)
Acquirer's country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Acquirer's industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted within R square	0.0971	0.0863	0.0252	0.0971	0.0862	0.0250	0.106	0.0240	0.0127	0.106	0.0245	0.0126
N	8233	5482	5884	8233	5482	5884	6911	6464	7149	6911	6464	7149

t statistics in parentheses

+ p<0.1, * p<0.05, ** p<0.01"

Likelihood of three forms of managerial integration are estimated by linear probability model with fixed effects for acquirer's country and industry.

CHAPTER 3

CONTROL AND COORDINATION THROUGH HOLDING COMPANIES

ABSTRACT

This study examines how firms control and coordinate their subsidiaries through holding companies (HCs) by studying assignments and transfers of managers between the headquarters (HQ) and subsidiaries. Main arguments are two-fold. First, control and coordination (CC) have two facets: design and revision of CC schemes, and application of the CC schemes. The pattern of managerial assignments and transfers reflects the role of subsidiaries in relation to these two facets of CC. Second, HC structure, by specializing in a certain activities and being assigned well-defined authority over them, changes allocation of the roles in relation to the two facets of CC within firms in the following ways. 1) HC, as the centre of HC group, is more tightly controlled and coordinated by the HQ (in the both facets of CC), 2) subordinates of HC are less controlled and coordinated by the HQ (at least in the facet of designing CC scheme), and 3) HC and its subordinates become less controlled and coordinated by the HQ (in the both facets of CC) during financial crisis because HC structure enables the HQ to save managerial resources by delegation. Data on assignments and transfers of managers within listed firms worldwide support the arguments. The refined understanding of CC enables this study to explain important organizational mechanisms such as transfer of managers and HC.

INTRODUCTION

Adopting hierarchy, firms control and coordinate variety of operations (e.g. Rajan & Zingales, 2001; Bloom, Sadun, & Van Reenen, 2012; Zhou, 2013). However, implementing effective control and coordination (CC) is a challenging task since each subunit of the firm faces differentiated environments (Lawrence & Lorsch, 1967), competitive market demands intensive coordination (Ghoshal & Bartlett, 1990), firms should adapt to rapidly changing environment (Teece, Pisano, & Shuen, 1997), and the cognitive capacity of top management team is limited (Hambrick & Mason, 1984; Ocasio, 1997).

This study examines the role of holding companies (HCs) in controlling and coordinating hierarchical organizations. A HC is an intermediary subsidiary (Birkinshaw, Braunerhjelm, Holm, & Terjesen, 2006; Zhou, 2015) that controls a group of subsidiaries specialized in a certain area. The specialization can be defined by geography, product line or brand, or function. As is explained in detail later, HCs facilitate CC by the headquarters (HQ) in a way that cannot be defined simply as centralization nor decentralization (Bloom, Sadun, & Van Reenen, 2010; Bloom et al., 2012). In a sense, HCs promote centralization and decentralization at the same time.

Empirically, CC is analysed by examining three forms of managerial integration between HQ and a subsidiary: 1) dual assignment of a manager in both HQ and a subsidiary, 2) transfer of a manager from HQ to a subsidiary (down to a subsidiary), and 3) transfer of a manager from a subsidiary to HQ (up from a subsidiary). While dual assignment implies operational integration in general, transfer of a manager in the two different directions suggests more nuanced relationships. Because transfer of managers entails transfer of knowledge (Boeker, 1997; Williams, Chen, & Agarwal, forthcoming; Song, Almeida, & Wu, 2003), the direction of managerial transfer signifies the direction of knowledge transfer, and the use of knowledge at destination organization. This is an essential element for developing

a refined concept of CC, and understanding the nuanced relationships between HQ and subsidiaries.

To develop hypotheses corresponding to the two directions of managerial transfer, it is necessary to unpack the concept of CC. There are two facets of CC: one is designing or revising schemes of CC, and the other is applying the schemes to implement CC. Transfer of managers up from a subsidiary is likely to happen if the following two conditions are met: 1) CC scheme is designed at HQ, and 2) the design requires local knowledge that is inter-related with other knowledge from other part of organization. Unless the both conditions are satisfied, transfer of managers from a subsidiary to HQ is not instrumental. On the other hand, transfer of managers from HQ to a subsidiary (down to a subsidiary) happens for broader reasons including applying available CC schemes, learning local knowledge that may or may not be inter-related with other part of organization.

Empirical analysis provides the following findings. If a subsidiary is a HC, the subsidiary is more likely to be integrated by all the three forms of managerial integration. More interestingly, if a subsidiary is owned by a HC (subordinates of HC), the subsidiary is more likely to see dual assignment, and transfer of a manager down to the subsidiary, but less likely to see transfer of a manager up from the subsidiary. These results support hypotheses based on the understanding of CC mentioned above. Namely, 1) HCs accomplish high level of integration among HC and subordinates of HC (HC group) with consistent application of CC schemes. 2) At the same time, subordinates of HC become less inter-related with subsidiaries out of HC group, and 3) HC group as a whole remains inter-related with others. In addition, 4) during financial crisis, both HCs and subsidiaries of HCs are not particularly more integrated by HQ.

This study contributes to our knowledge on hierarchical organization by refining the concept of CC. CC is a critical mechanism to understand the firm (Lawrence & Lorsch, 1967;

Bartlett & Ghosbal, 1987; Grant, 1996; Van de Ven, Delbecq, & Koenig Jr, 1976), but it has been understood either too broadly or too narrowly. Strategy literature, on one hand, conceptualizes CC broadly as a mechanism to “achieving unity” (Lawrence & Lorsch, 1967; Zhou, 2013) without entangling the mechanism further. On the other hand, researches in economics (Aghion, Bloom, & Van Reenen, 2014 for a review) emphasize the use of local information based on contract theory, and do not explain the implementation of coordination. This study provides a more comprehensive as well as articulated view of CC by examining the pattern of managerial assignments and transfers.

In addition, the role of HC in relation to CC is presented. Though HC is a prevalent business practice with significant implications, there are not many studies on it to date. And when it is studied, researches (Benito, Lunnan, & Tomassen, 2011; Birkinshaw et al., 2006; Laamanen, Simula, & Torstila, 2012; Baaij & Slangen, 2013) are driven mainly by empirical interest in their location choices without arguing its role in organization enough. One reason why HC has not been studied and understood well may be the limitation in data availability, but another reason could be that understanding about its role has not been developed enough. Once characteristics of HC are understood, more study would be done to develop our knowledge on the important organizational mechanisms.

Furthermore, from a more practical viewpoint, this study suggests HC as a mechanism for CC. Previous studies argued integrator roles (Mohrman, 1993; Stan & Puranam, forthcoming), allocation of supervisory roles (Zhou, 2015), and group identities (Kogut & Zander, 1996; Dyer & Nobeoka, 2000) as mechanisms for CC. HC is an addition to these.

The rest of this paper is organized as follows. The next section develops hypotheses with theoretically understanding HC structure and transfer of managers, and refining the concept of CC. The following section explains empirical analysis to test the hypotheses, and the last section concludes.

THEORY AND HYPOTHESES

Control and Coordination

Control and coordination (CC) is a process of achieving unity of tasks done by subunits of organization (Lawrence & Lorsch, 1967; Van de Ven et al., 1976). Standard response to the demand for CC is hierarchy (Chandler, 1962; Bartlett & Ghosbal, 1987; Rajan & Wulf, 2006). In a hierarchical organization, supervisory agent such as HQ oversees related operations of its subordinates, and control and coordinate them (Zhou, 2013).

However, CC is challenging in practice for the following reasons. First, each tasks are highly differentiated in terms of its environment (e.g. market demand) and its goal (e.g. annual sales target, lean production, and basic research for future products). As tasks are more differentiated from each other, CC is more difficult (Lawrence & Lorsch, 1967).

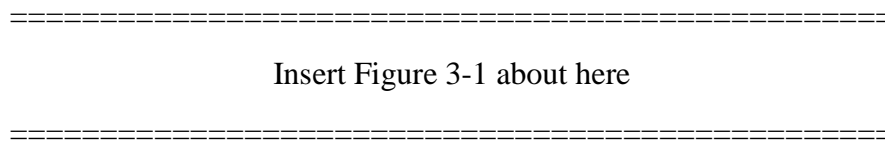
Second, demand for CC has become greater as firms grow larger and more internationalized (Bartlett & Ghosbal, 1987). Third, subunits are not only differentiated, but also dynamically changing (Teece et al., 1997; Helfat, 1997). And lastly, top management teams (TMTs) are limited in their scope of attention and cognitive capacity and perspective (Hambrick & Mason, 1984; Ocasio, 1997).

Holding Company Structure

To tackle the challenge of effective CC, firms adopt variety of devices (Van de Ven et al., 1976). First, decentralization of CC not only release HQ from cognitive or physical burden, but also improves the use of local knowledge available at each business unit (Bloom et al., 2010, 2012; Grant, 1996). Second, personal interactions through group conferences across subunits or transfer of personnel facilitate communication and socialization among people related to CC (Edström & Galbraith, 1977). Third, integrator role including teams for information sharing not only promotes inter-unit information flows, but also ameliorates superstitious learning (Stan & Puranam, forthcoming; Young-Hyman, 2016; Dyer &

Nobeoka, 2000). And forth, shared group culture is another important mechanism for knowledge flow and CC (Bartlett & Ghosbal, 1987; Kogut & Zander, 1996)

HC is an additional mechanism facilitating CC. HCs are intermediary agents (Birkinshaw et al., 2006; Zhou, 2015) characterised by their controlling subordinates in certain specific activities. The specialization can be by geography (e.g. Toyota Motor Europe), by product line (e.g. Moet Hennessy of LVMH group), or by function (e.g. Repsol International Finance). Such specialization contributes to improved managerial attention and results in greater integration among HC and its subordinates (HC group). Also, as the centre of grouped operation, HC is closely integrated by HQ. And lastly, being grouped by specialization, subordinates of HC are less inter-related with subsidiaries out of HC group. Figure 1 conceptually summarize these three characteristics of HC structure.



Transfer of Managers and Two Facets of Control and Coordination

Transfer of managers is a crucial mechanisms for CC. It provides managers with opportunities to learn local operations on-site (e.g. Schweizer, 2005; Ranft & Lord, 2002). Also, it promotes socialization among managers and nurtures common group culture as well as shared goals (Aoki, 1990). In addition, transfer of personnel involves transfer of tacit knowledge that requires repeated interactions and strong ties otherwise (Hansen, 1999; Song et al., 2003). At the TMT level in particular, transfer of managers change the scope and perception of TMTs, and lead to renewal of strategy (Boeker, 1997). In sum, transfer of managers facilitates CC by learning by managers, socialization, knowledge transfer, and renewed perception of managers. Though these arguments explain the association between CC and transfer of managers *in general*, they do not inform about *the direction* of the transfer.

Answering the question about *the direction* hinges on understanding CC. CC is broadly defined as a process of achieving unity of operations in strategy literature. Though there are several attempts to theoretically articulate the concept, for instance, by distinguishing characteristics of knowledge required for CC (Grant, 1996), number of people organizing CC (Van de Ven et al., 1976), and existence of formal authority (Young-Hyman, 2016), they are not useful for understanding the direction of managerial transfer.

This study argues that there are two facets of CC. One is generating scheme of CC. Scheme of CC is a plan for CC on the issues such as each subunit's scope of activities, rules of interactions among subunits, and authorities that resolve unexpected problems. It includes broad mechanisms from impersonal to personal and group-oriented, from those without communications (e.g. pre-planned rules and routines) to those requiring communication (e.g. group problem solving). On designing CC scheme, managers need to understand operation of subunits. The operations of subunits are either more inter-related with those of other subunits (group 1), or less inter-related with them (group 2). Transfer of managers up from a subsidiary helps designing CC schemes only with group 1.

The other facet of CC is application of available CC scheme. Once CC scheme is designed or if CC scheme is already available, CC is accomplished by applying it. At this phase, CC is local adjustments of schemes and monitoring of implementations, and it is done at each subunits. It leads to transfer of managers down to subsidiaries, but not so much transfer up from subsidiaries.

This distinction of CC mechanisms corresponds to a well-established distinction between CC by plan and CC by feedback (March & Simon, 1958). When a superior agent or manager controls and coordinates subordinate organizations, a simple way of CC is applying a pre-planned scheme. However, as managers are not perfectly rational and informed, effective CC by them often requires on-going communication with subordinate organizations

to update their knowledge (Edström & Galbraith, 1977). In CC by plan, application of CC scheme is the main tasks while generation of CC scheme is relatively an easy task. In CC by feedback, on the other hand, designing CC scheme requires a lot of investigations of and communications with subordinate organizations. Therefore, designing CC schemes is a significant work in addition to their applications.

In summary, while transfer of managers down to subsidiaries happens both for designing and applying CC schemes, transfer of managers up from subsidiaries happens mainly for designing CC schemes of highly inter-related subunits. Table 3-1 summarizes the relationships between the characteristics of CC and relevant direction of managerial transfers.

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Insert Table 3-1 about here

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Based on these arguments, three sets of hypotheses are developed. The first set of hypotheses are related to managerial integration and transfer between HQ and HC. As explained above, HC is responsible for operations of HC group as a whole. To be an intermediary agent that is responsible for such a sizable group of operation, HC is a crucial point of CC. Therefore, HQ and HC are more likely to be integrated by dual assignment of managers and by transfer of managers down to subsidiaries to facilitate effective CC. In addition, since operation of HC group as a whole should be inter-related with operations of other subsidiaries (e.g. through budget allocation across divisions), transfer of knowledge from HC is useful for designing CC schemes. Therefore, transfer up from HC should happen more frequently than from other subsidiaries, too.

Hypothesis 1: If a subsidiary is a HC, dual assignment of managers/ transfer of managers down from the HQ/ transfer of managers up from the subsidiary to the HQ is more likely to happen

The second set of hypotheses are about managerial integration and transfer between HQ and subordinates of HC. A feature of HC structure is that the roles and activities of HC subordinates are well specified. As a result, application of CC schemes is less costly because their well-specified roles and activities enables standardization and formalization of CC schemes that are applied to HC subordinates. At the same time, HC structure facilitates designing CC schemes, and enables it without intensive knowledge transfer from subordinates of HC.

Reflecting the characteristics of CC concerning HC subordinates, transfer of managers shows distinctive patterns. Ease of CC scheme applications leads to greater frequencies of dual assignment and transfer down to subsidiaries of managers. In addition, ease of CC scheme design results in less transfer of managers up from subsidiaries.

Hypothesis 2a: The likelihood of dual assignment of a manager to both the HQ and a subsidiary is greater if the subsidiary is a subordinate of an HC

Hypothesis 2b: The likelihood of transfer of a manager down from the HQ is greater if the subsidiary is a subordinate of an HC

Hypothesis 2c: The likelihood of transfer of a manager up from a subsidiary is lesser if the subsidiary is a subordinate of an HC

Impact of Financial Crisis

Financial crisis is a significant disruption to operation of firms, and it changes the priority of management. Facing limited liquidity in the capital market and drastic fall in market demand, survival becomes an urgent goal. Even if a firm holds enough financial slack, disruption in value chains caused by exit of some intermediate firms may pose an emergent challenge. In addition, uncertainty in future demand may force firms to become much more conservative in their strategy (Singh & Mahmood).

Under such a situation, firms utilize their limited capacity of attention for urgent matters for survival including financial liquidity, business portfolio restructuring, and top management leadership. CC is, in turn, done by more simplified and impersonal mechanisms such as formalized rule, fixed financial budget, or established routines at the time. Managerial integration and transfer are less frequent during crisis.

In this context of HQ's focusing on urgent issues, HC plays a unique role. With clear definition of its scope and responsibility, HC group can be managed with less intervention of HQ. Accordingly, decrease in managerial integration and transfer between HQ and HC as well as subordinates of HC is greater than other subsidiaries during financial crisis.

Hypothesis 3: The likelihood of dual assignment to both the HQ and a subordinate, transfer down from the HQ to a subsidiary, transfer up from a subsidiary to the HQ is decreased during financial crisis if the subsidiary is an HC or a subordinate of an HC

Overall, HC facilitates CC in a way that is neither simply centralization nor decentralization. HC itself is more integrated by HQ. However, the relationships between HQ and subordinates of HC is more nuanced. Subordinates of HC may be more integrated by HQ in the sense that HQ applies available scheme of CC more consistently. At the same time, however, they are more decentralized in the sense that HQ is less likely to acquire knowledge from them when they design scheme of CC. Furthermore, HC group becomes more independent than other subsidiaries during financial crisis. During financial crisis, HQ prioritize management of urgent and irregular issues, and HC group helps HQ save managerial resources required for normal CC.

EMPIRICAL ANALYSIS

Data, Variables, and Sample

For empirical analysis, information about organizational structure of listed firms is collected from ORBIS. ORBIS is a database published by Bureau van Dijk, and its unique strength is the broad coverage of firms worldwide. Based on local registries and public data, the database covers public as well as private firms. Also, it reports subsidiaries of each firm (if any). Starting from listed firms, I searched their subsidiaries, and then subsidiaries of those subsidiaries. After repeating this procedure, I could construct hierarchical structure of each listed firm. Subsidiaries are defined by majority ownership. To understand simple effects of HC, sample of subsidiaries are limited to 1) those that are not controlled by a holding company (i.e. none of subsidiaries between the HQ and the focal subsidiary in the hierarchy is a HC), 2) those that are HCs with at least three controlling subsidiary, and 3) those that are controlled by one HC (i.e. only one of subsidiaries between the HQ and the focal subsidiary in the hierarchy is a HC). In other words, subsidiaries controlled by more than one HC are excluded. It is because the complexity caused by multiple HCs cannot be interpreted clearly. Also, HCs controlling less than three subsidiaries are excluded because their roles may be different from typical HCs discussed in this paper. HCs with small number of subordinates do not introduce significant modularity.

I collected data on hierarchical structure in 2006, 2008, and 2010 by using ORBIS disks published in 2007, 2009, and 2011. The sample is limited to manufacturing firms.

To test the hypotheses, the following linear probability model is examined.

$$M_{p,s,t} = \beta_0 + \beta_1 X_{s,t} + \beta_2 Y_{s,t} + \beta_3 X_{s,t} I_t + \beta_4 X_s I_t + \beta_5 Z_{p,s,t} + \varepsilon_{p,s,t}$$

Where $M_{p,s,t}$ represents dependent variables related to managerial integration, $X_{s,t}$ and $Y_{s,t}$ are dummy variables signifying a HC and a subordinate of a HC respectively. I_t is the financial crisis variable for the third set of hypotheses, and $Z_{p,s,t}$ represents control variables.

Three dependent variables related to managerial integration are defined by the following procedures. ORBIS reports names of top managers. In the original sample of HQ and subsidiaries, 5.1 managers are reported by a firm in average.

Dual assignment of manager. The first dependent variable is dual assignment of manager in TMTs of both HQ and a subsidiary. Lists of managers are derived from ORBIS disks published in early 2009 and early 2011 that record information at the end of 2008 and 2010. This variable is one if at least one manager is recorded as a manager of HQ as well as subsidiary in the same year.

As ORBIS reports names of managers without identification codes, identical managers need to be found by matching names by the following steps. First, full names of managers are compared, and identical managers are detected if managers are matched by full names. Second, combinations of first and last names are compared with dropping middle names, and managers are identified by matching first and last names combined. This step is necessary because ORBIS sometimes reports middle names in addition to first and last names, and comparing reported full name fails to capture the same managers when they are reported by the first, middle, and last names in one firm, and by only the first and last names in the other. Lastly, when the first name of a manager is only one letter, combination of the first letter of the first name and the whole last name is compared. This step allows to capture managers whose initial letter of the first name is reported as the first name.

Transfer of managers down to subsidiary. This is the second dependent variable. Transfer of managers is defined by comparing different vintages of ORBIS disks. For example, transfer of managers between 2006 and 2008 is detected by comparing 2007 and 2009 vintages that report information in 2006 and 2008 respectively. Transfer of managers down to subsidiary is determined to have happened if at least one of managers of HQ in 2006 was not in TMT of a subsidiary in 2006, but became a member of TMT of the subsidiary in

2008. Managers are identified by the name matching procedure explained above. Transfer of managers between 2008 and 2010 is found by the same steps using ORBIS vintages of 2009 and 2011 reporting information in 2008 and 2010.

Transfer of managers up from subsidiary. This third dependent variable is a dummy variable that is one if there is at least one manager in subsidiary in year 2006 (or 2008) was not included in TMT of HQ in the same year, but became a member of it in year 2008 (or 2010). Transfers are defined by using the same data and name matching procedure utilized for *Transfer of managers down to subsidiary*.

Holding company. The first explanatory variable is a dummy variable that is one if the focal subsidiary is a holding company. ORBIS reports the activity of each firm by industry codes including NACE rev.1.1. A subsidiary is regarded as a holding company if its NACE rev1.1 is 7415 or its company name includes “Holding”. Holding companies are further categorized as *geographically-specialized HC (geo-HC)*, *functionally-specialized HC (function-HC)*, and *product-line HC (product-HC)* for additional analyses. A HC is a *geo-HC* if its controlling subordinates are from one country or region (Americas, EMEA, or APAC) while its immediate parent controls subsidiaries from more than one country or region. A HC is a *function-HC* if it is not a geo-HC and its controlling subordinates are engaged in only one activity defined by NACE rev 1.1. A HC is a *product-HC* if it is not geo-HC and its subordinates are engaged in multiple activities to form one integral business unit as HC group.

HC subordinate. The second explanatory variable is a dummy variable that is one if the focal subsidiary is controlled by a holding company. This variable captures not only subsidiaries immediately owned by a HC, but also those indirectly owned by a HC.

A number of control variables are added. Concerning parent firm, *Firm size* is consolidated firm size measured by logged total asset. *Profitability* is consolidated firm

profitability measured by EBITDA over total asset. *Geographical scope* is a number of regions (i.e. America, EMEA, and APAC) the focal firm is operating. Host country characteristics are controlled by *Market size*, *Rule of law*, and *Distance from HQ* that are calculated by logged GDP, Rule of law index from World Governance Indicators, and logged km of geographical distance from HQ. Lastly, subsidiary characteristics are controlled by the following variables. *Subsidiary size* (logged total asset of subsidiary), *Subsidiary age* (logged age of subsidiary), subsidiary activities (dummy for *Manufacturing*, *Research*, *Distribution*, *Service*, *Finance*), dummy for *Wholly-owned subsidiaries* (total shareholding of more than 95% by the HQ), *number of subordinates*, and *Organizational distance from HQ* (1+number of subsidiaries between the HC and the focal subsidiary on organization hierarchy chart). Data on Market size and Rule of law are from World Bank and World Governance Indicators, respectively. Other variables are based on data from ORBIS. After dropping observations with missing or unreasonable (i.e. profitability lower than -0.3 or higher than 0.8) values, 33,109 observations (unit of analysis is subsidiary-year) remain. Table 3-1 summarizes the definitions of variables, and descriptive statistics. Table 3-3 shows correlations among them. Lastly, firm fixed effects are employed to control unobservable characteristics of each firm.

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 Insert Table 3-2 and 3-3 about here
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Results

Some interesting associations between control and dependent variables are found in Model 1-3. Market size and rule of law in host countries are both positively associated with dual assignment and transfer to HQ though they are not associated with transfer to subsidiary. This is consistent with the argument about two facets of CC. Subsidiaries in developed countries should play more central roles for a firm and inter-related with other subsidiaries Hence its CC scheme is more likely to be designed at HQ with information input to HQ.

Among subsidiary controls, subsidiary size, age, number of subordinates are positively associated with managerial integration as expected. This suggests that large and older subsidiaries are more likely to be central for a firm. Also, research subsidiaries see more integration, and more transfer of managers to HQ. It reflects the fact that research function creates new knowledge that can be applied to broad range of subsidiaries controlled by the HQ.

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Insert Table 3-4 about here
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Model 4-6 show results concerning the first two sets of hypotheses. Hypotheses 1a-c are supported by the positive and significant coefficients of HC. Note that the coefficient is not significant in Model 6, but it becomes significant when the effect of financial crisis is controlled in Model 9. As a centre of HC group whose operation as a whole is important for a firm and related with other part of firm's operations, HC is closely controlled and coordinated by the HQ in relation to both facets of CC. Coefficients of Subordinate of HC turns out to be positive and significant, supporting Hypotheses 2a-i and 2b-i rather than 2a-ii and 2b-ii. It suggests that the HC's effect of facilitating consistent CC is greater than its effect of making HQ's intervention less necessary. Consistent with Hypothesis 2c, Subordinate of HC is negatively associated with transfer of managers to HQ in Model 6. Specializing in a certain activity, subordinates of HC are less inter-related with other subsidiaries outside of HC group, which leads to less need for designing CC scheme at HQ.

Model 7-9 show results related to the third set of hypotheses. As predicted by the hypotheses, the degree of managerial integration is particularly lowered during financial crisis. Coefficients of interaction terms between HC and year 2010, and between subordinate of HC and year 2010 are all negative and significant except Model 9. The magnitude of the negative effects is as large as to cancel the main (positive) effects of HC structure. It means

that integration of HC group is no longer greater than other subsidiaries. During crisis, HC group operate as independently as other subsidiaries.

Robustness Check

To validate the reliability of the results, I check the robustness in several ways. First, the effect of HC may be limited to certain types of HC. To examine the issue, I categorized HC into three groups, product-line HC, geographically-focused HC, and functionally-focused HC. Results in Table 3-5 show that all types of HC contribute to the results generally.

Second, conditional logit model is adopted instead of linear probability model because the dependent variables are binary, and, though it is controversial, some researchers prefer non-linear model. The results are shown in Table 3-6, and are consistent with the main results.

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Insert Table 3-5 and 3-6 about here
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CONCLUSION

This study aims at examining the role of HCs in hierarchy. To understand HCs, concept of CC is examined and two facets of it – designing CC schemes and applying them – are identified. Based on the refinement of CC concept, characteristics of HCs are defined. First, HC as a pivot of a group specialized in a certain activity is more intensively integrated by HQ in terms of the both facets of CC. Second, while subordinates of HCs are intensively integrated by HQ in terms of application of CC schemes, they are less likely contribute to designing CC schemes. Further, HC structure enables HQ to save managerial resources by lowering the degree of integration, and letting HC group operate more independently during crisis. This study contributes to organization theory by refining the concept of CC. Though CC is a central mechanism in the organization, previous studies understood it too narrowly or too broadly. Unpacking two facets of CC, this study explains an important organizational

mechanism: assignments and transfers of managers. Another contribution of this study is clarifying the role of HC. Widely used in practice, HC plays unique and important role for CC in organizations. Tightly integrated within, it is intensively controlled through application of CC schemes. On the other hand, specialized in a certain activity, HQ does not design CC scheme for each of HC subordinates. This nuanced role of HC should be understood further by future studies. One limitation of this study is that the purpose of managerial assignment and transfer is not explicitly clear. It is broadly agreed that CC is a main purpose, but other reasons such as tapping talented manager, and rewarding managers by promotions cannot be excluded. However, it is hard to believe any purpose other than CC would systematically drive the empirical results.

Figure 3-1: Three characteristics of HC

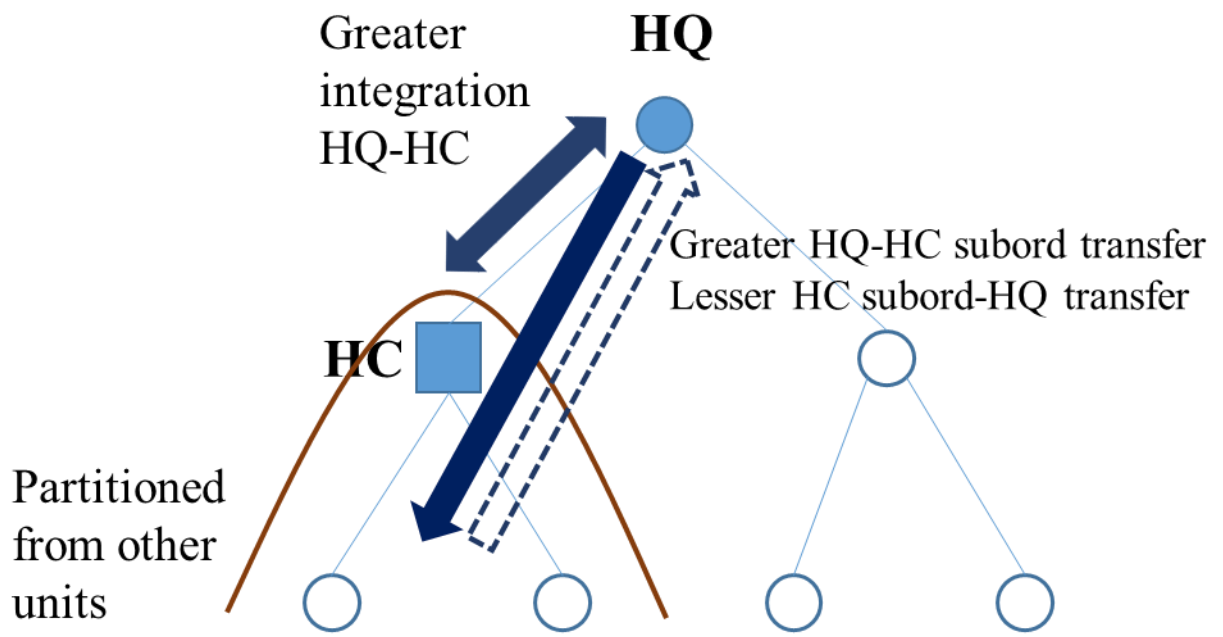


Table 3-1: Relationships between characteristics of CC and relevant direction of transfer

		Facet of CC	
		Design of CC scheme	Application of CC scheme
Inter-relatedness of operation	Inter-related	Up from subsidiary Down to subsidiary	Down to subsidiary
	Independent	No transfer for CC	No transfer for CC

Table 3-2: Definitions and descriptive statistics of variables

Variable names	Definition	Obs	Mean	Std. Dev.	Min	Max
<i>Parent</i>						
Firm size	Log total asset of the consolidated firm	33109	15.169	2.353	6.458	20.497
Profitability	EBITDA over total asset of the consolidated firm	33109	0.115	0.074	-0.300	0.767
Geographical scope	Number of regions with operation (America, EMEA, and APAC)	33109	2.679	0.654	1	3
<i>Host country</i>						
Market size	Log GDP of host country	33109	14.037	1.012	7.982	16.545
Rule of law	Rule of law index	33109	1.471	0.515	-1.645	1.977
Distance from the HQ	Log km of distance from the HQ	33109	5.009	3.713	0	9.844
<i>Subsidiary</i>						
Subsidiary size	Log total asset of subsidiary	33109	9.886	2.765	0	20.392
Subsidiary age	Log age of subsidiary	33109	3.064	0.741	0	5.421
Manufacturing subsidiary	Dummy for manufacturing subsidiary (by NACE rev.1.1)	33109	0.390	0.488	0	1
Research subsidiary	Dummy for research subsidiary (by NACE rev.1.1)	33109	0.010	0.099	0	1
Distribution subsidiary	Dummy for distribution subsidiary (by NACE rev.1.1)	33109	0.299	0.458	0	1
Service subsidiary	Dummy for service subsidiary (by NACE rev.1.1)	33109	0.190	0.393	0	1
Financial subsidiary	Dummy for financial subsidiary (by NACE rev.1.1)	33109	0.063	0.242	0	1
Wholly owned subsidiary	Dummy for subsidiary owned by >95% shareholding	33109	0.802	0.399	0	1
Domestic subsidiary	Dummy for domestic subsidiary	33109	0.337	0.473	0	1
N of subordinates	Number of subordinates that subsidiary controls	33109	4.953	26.023	0	580
Org distance from the HQ	1+Number of subsidiaries between the HQ and the focal subsidiary on org chart	33109	1.826	0.996	1	7

Table 3-3: Correlations among variables

Variable names	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 Firm size	1																
2 Profitability	0.0625	1															
3 Geographical scope	0.5506	0.0944	1														
4 Market size	-0.0329	-0.0297	0.0162	1													
5 Rule of law	-0.1203	0.0143	0.0186	-0.0039	1												
6 Distance from the HQ	0.2224	0.0704	0.3251	-0.0608	-0.0557	1											
7 Subsidiary size	0.3707	0.0236	0.2108	0.0247	-0.1756	0.0524	1										
8 Subsidiary age	0.1065	0.0213	0.0945	0.0599	0.0107	-0.0814	0.2028	1									
9 Manufacturing subsidiary	-0.0401	-0.0099	-0.0266	0.0421	-0.1369	-0.0628	0.1748	0.1745	1								
10 Research subsidiary	-0.0127	-0.0354	-0.0068	0.0158	0.0283	-0.0063	-0.0287	-0.0494	-0.0795	1							
11 Distribution subsidiary	0.0111	0.0564	0.0365	-0.1164	0.0139	0.1993	-0.1158	-0.0007	-0.5222	-0.0651	1						
12 Service subsidiary	-0.0382	-0.0299	0.0056	0.0898	0.0997	-0.063	-0.0477	-0.1593	-0.3875	-0.0483	-0.3171	1					
13 Financial subsidiary	0.0911	-0.0305	0.0276	-0.0378	0.0803	-0.0632	0.0019	-0.0546	-0.2065	-0.0257	-0.169	-0.1254	1				
14 Wholly owned subsidiary	-0.0973	0.0169	-0.0411	-0.0249	0.145	-0.0429	-0.1599	-0.0683	-0.0445	-0.0005	0.0572	-0.0046	-0.0021	1			
15 Domestic subsidiary	-0.2215	-0.0754	-0.321	0.0945	0.0392	-0.961	-0.031	0.0664	0.0683	0.0101	-0.2115	0.0732	0.0615	0.0055	1		
16 N of subordinates	0.1105	-0.0314	0.0637	0.0419	-0.0422	-0.1385	0.3353	0.2411	0.0627	-0.0154	-0.0963	0.0611	-0.0101	-0.1911	0.1427	1	
17 Org distance from the HQ	0.3393	0.0003	0.2058	0.0428	0.0335	0.1499	-0.0353	0.0254	0.0069	-0.0054	0.0011	-0.0524	0.0194	0.0178	-0.1706	-0.0954	1

Table 3-4: Main results

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Dependent variables	Simul. assign	Transfer to subsidiary	Transfer to the HQ	Simul. assign	Transfer to subsidiary	Transfer to the HQ	Simul. assign	Transfer to subsidiary	Transfer to the HQ
Firm size	-0.0278+ (-1.71)	-0.000119 (-0.01)	-0.0189+ (-1.77)	-0.0261 (-1.60)	0.00105 (0.10)	-0.0194+ (-1.81)	-0.0266 (-1.63)	0.00163 (0.15)	-0.0193+ (-1.80)
Profitability	-0.0104 (-0.19)	-0.172** (-4.75)	-0.104** (-2.89)	-0.00861 (-0.16)	-0.170** (-4.71)	-0.105** (-2.90)	-0.0140 (-0.26)	-0.176** (-4.86)	-0.107** (-2.97)
Geographical scope	0.0143 (1.13)	0.00309 (0.36)	0.00370 (0.44)	0.0137 (1.08)	0.00297 (0.35)	0.00360 (0.43)	0.0123 (0.97)	0.00161 (0.19)	0.00297 (0.35)
Market size	0.0130** (5.91)	-0.000393 (-0.26)	0.00697** (4.68)	0.0121** (5.49)	-0.000772 (-0.51)	0.00702** (4.71)	0.0119** (5.42)	-0.000916 (-0.61)	0.00693** (4.64)
Rule of law	0.0312** (6.66)	-0.00191 (-0.60)	0.0109** (3.53)	0.0289** (6.16)	-0.00270 (-0.84)	0.0105** (3.40)	0.0289** (6.18)	-0.00265 (-0.83)	0.0105** (3.40)
Distance from the HQ	-0.0120** (-3.20)	-0.00262 (-0.98)	0.00127 (0.49)	-0.0117** (-3.14)	-0.00267 (-1.00)	0.00138 (0.54)	-0.0117** (-3.13)	-0.00272 (-1.02)	0.00135 (0.52)
Subsidiary size	0.0129** (15.42)	0.00241** (4.28)	0.00441** (7.97)	0.0121** (14.42)	0.00207** (3.64)	0.00441** (7.86)	0.0122** (14.48)	0.00208** (3.65)	0.00441** (7.87)
Subsidiary age	0.0171** (5.96)	0.00601** (3.12)	0.00385* (2.01)	0.0178** (6.17)	0.00592** (3.07)	0.00424* (2.21)	0.0177** (6.15)	0.00578** (3.00)	0.00417* (2.17)
Manufacturing subsidiary	0.0147 (1.51)	0.00831 (1.32)	0.00166 (0.27)	0.0164+ (1.69)	0.00869 (1.38)	0.00209 (0.33)	0.0165+ (1.70)	0.00889 (1.41)	0.00217 (0.35)
Research subsidiary	0.0694** (3.02)	-0.00320 (-0.20)	0.0295+ (1.90)	0.0712** (3.10)	-0.00294 (-0.19)	0.0300+ (1.93)	0.0716** (3.12)	-0.00261 (-0.17)	0.0302+ (1.94)
Distribution subsidiary	-0.0261** (-2.62)	-0.00509 (-0.78)	-0.00945 (-1.46)	-0.0251* (-2.52)	-0.00478 (-0.74)	-0.00924 (-1.43)	-0.0249* (-2.51)	-0.00467 (-0.72)	-0.00919 (-1.42)
Service subsidiary	0.0356** (3.48)	0.00369 (0.55)	0.00218 (0.33)	0.0204+ (1.94)	0.000227 (0.03)	-0.000888 (-0.13)	0.0206+ (1.96)	0.000425 (0.06)	-0.000832 (-0.12)
Financial subsidiary	0.0132 (1.12)	0.000846 (0.11)	-0.00395 (-0.51)	0.0103 (0.88)	0.000301 (0.04)	-0.00451 (-0.58)	0.0112 (0.96)	0.00105 (0.13)	-0.00400 (-0.52)
Wholly owned subsidiary	0.00306 (0.60)	0.000946 (0.28)	-0.000787 (-0.24)	0.00241 (0.47)	0.000437 (0.13)	-0.000558 (-0.17)	0.00245 (0.48)	0.000494 (0.15)	-0.000494 (-0.15)
Domestic subsidiary	0.0550* (2.14)	0.00194 (0.11)	0.0191 (1.09)	0.0579* (2.26)	0.00199 (0.11)	0.0201 (1.14)	0.0582* (2.27)	0.00181 (0.10)	0.0200 (1.13)
N of subordinates	0.00220** (20.13)	0.000678** (10.83)	0.0000683 (1.09)	0.00210** (19.06)	0.000659** (10.46)	0.0000594 (0.94)	0.00208** (18.86)	0.000646** (10.25)	0.0000519 (0.82)
Org distance from the HQ	-0.0154** (-6.73)	-0.00109 (-0.72)	-0.00923** (-6.17)	-0.0171** (-6.41)	-0.00388* (-2.22)	-0.00681** (-3.91)	-0.0173** (-6.47)	-0.00404* (-2.31)	-0.00689** (-3.95)
Year 2010	0.0141** (3.80)	-0.00152 (-0.63)	-0.0178** (-7.39)	0.0138** (3.74)	-0.00178 (-0.74)	-0.0176** (-7.31)	0.0220** (5.02)	0.00476+ (1.66)	-0.0144** (-5.05)
HC				0.0601** (6.73)	0.0164** (2.74)	0.00937 (1.57)	0.0804** (7.51)	0.0299** (3.94)	0.0187* (2.47)
Subordinate of HC				0.0165** (2.74)	0.0143** (3.64)	-0.00910* (-2.32)	0.0256** (3.60)	0.0241** (5.06)	-0.00500 (-1.05)
HC x Year 2010							-0.0510** (-3.42)	-0.0291** (-2.91)	-0.0201* (-2.01)
Subord. of HC x Year2010							-0.0213* (-2.43)	-0.0206** (-3.62)	-0.00853 (-1.51)
Constant	0.296 (1.18)	0.0368 (0.22)	0.188 (1.14)	0.289 (1.16)	0.0315 (0.19)	0.190 (1.15)	0.299 (1.19)	0.0266 (0.16)	0.190 (1.15)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
adjusted R squares	0.519	0.206	0.253	0.520	0.206	0.253	0.520	0.207	0.253
N	32264	29228	29560	32264	29228	29560	32264	29228	29560

t statistics in parentheses

p<0.10, * p<0.05, ** p<0.01

Three forms of managerial integration are estimated by linear probability model

Table 3-5: Robustness check (by HC category)

Dependent variables	Model 10 Simul. assign	Model 11 Transfer to subsidiary	Model 12 Transfer to the HQ	Model 13 Simul. assign	Model 14 Transfer to subsidiary	Model 15 Transfer to the HQ
Firm size	-0.0253 (-1.56)	0.000680 (0.06)	-0.0189+ (-1.76)	-0.0260 (-1.60)	0.00151 (0.14)	-0.0186+ (-1.73)
Profitability	-0.0126 (-0.23)	-0.167** (-4.61)	-0.107** (-2.97)	-0.0216 (-0.39)	-0.169** (-4.66)	-0.112** (-3.09)
Geographical scope	0.0135 (1.07)	0.00302 (0.36)	0.00359 (0.42)	0.0122 (0.96)	0.00140 (0.17)	0.00351 (0.41)
Market size	0.0120** (5.42)	-0.000609 (-0.40)	0.00697** (4.67)	0.0118** (5.34)	-0.000693 (-0.46)	0.00680** (4.55)
Rule of law	0.0288** (6.13)	-0.00266 (-0.83)	0.0106** (3.43)	0.0289** (6.15)	-0.00266 (-0.83)	0.0106** (3.42)
Distance from the HQ	-0.0116** (-3.11)	-0.00285 (-1.07)	0.00145 (0.56)	-0.0116** (-3.09)	-0.00302 (-1.13)	0.00162 (0.63)
Subsidiary size	0.0121** (14.40)	0.00198** (3.47)	0.00445** (7.91)	0.0122** (14.46)	0.00199** (3.49)	0.00445** (7.92)
Subsidiary age	0.0178** (6.18)	0.00586** (3.04)	0.00425* (2.21)	0.0177** (6.15)	0.00568** (2.94)	0.00421* (2.19)
Manufactuing subsidiary	0.0167+ (1.72)	0.00865 (1.38)	0.00196 (0.31)	0.0164+ (1.68)	0.00932 (1.48)	0.00166 (0.26)
Research subsidiary	0.0715** (3.12)	-0.00322 (-0.21)	0.0299+ (1.92)	0.0715** (3.12)	-0.00260 (-0.17)	0.0297+ (1.91)
Distribution subsidiary	-0.0250* (-2.51)	-0.00486 (-0.75)	-0.00943 (-1.46)	-0.0253* (-2.54)	-0.00426 (-0.66)	-0.00968 (-1.50)
Service subsidiary	0.0204+ (1.95)	0.000184 (0.03)	-0.00102 (-0.15)	0.0201+ (1.92)	0.000874 (0.13)	-0.00138 (-0.20)
Financial subsidiary	0.0106 (0.90)	0.0000720 (0.01)	-0.00472 (-0.61)	0.0111 (0.94)	0.00123 (0.16)	-0.00447 (-0.58)
Wholly owned subsidiary	0.00236 (0.46)	0.000362 (0.11)	-0.000561 (-0.17)	0.00243 (0.48)	0.000440 (0.13)	-0.000492 (-0.15)
Domestic subsidiary	0.0585* (2.28)	0.000708 (0.04)	0.0206 (1.17)	0.0590* (2.30)	-0.000166 (-0.01)	0.0217 (1.23)
N of subordinates	0.00209** (18.45)	0.000641** (9.98)	0.0000726 (1.13)	0.00207** (18.24)	0.000625** (9.72)	0.0000647 (1.01)
Org distance from the HQ	-0.0167** (-6.22)	-0.00419* (-2.38)	-0.00663** (-3.77)	-0.0170** (-6.31)	-0.00434* (-2.46)	-0.00674** (-3.84)
Year 2010	0.0139** (3.76)	-0.00187 (-0.78)	-0.0176** (-7.32)	0.0219** (5.01)	0.00489+ (1.71)	-0.0146** (-5.11)
product-HC	0.0644** (4.35)	0.0275** (2.88)	0.00189 (0.20)	0.0769** (4.14)	0.0552** (4.50)	0.00493 (0.40)
geo-HC	0.0601** (5.74)	0.0157* (2.18)	0.0142* (1.99)	0.0817** (6.42)	0.0210* (2.23)	0.0290** (3.10)
function-HC	0.0473+ (1.73)	-0.0245 (-1.35)	0.000233 (0.01)	0.0877** (2.61)	-0.0104 (-0.44)	-0.000980 (-0.04)
Subord. Of product-HC	0.0147+ (1.94)	0.0166** (3.38)	-0.00785 (-1.61)	0.0225* (2.45)	0.0293** (4.85)	-0.0109+ (-1.80)
Subord. Of geo-HC	0.0217** (2.85)	0.00929+ (1.84)	-0.00922+ (-1.84)	0.0299** (3.24)	0.0184** (2.93)	0.00119 (0.19)
Subord. Of function-HC	-0.0130 (-0.72)	0.0371** (3.17)	-0.0226+ (-1.93)	0.0169 (0.69)	0.0245 (1.49)	0.00275 (0.17)
product-HC x Year 2010				-0.0285 (-1.07)	-0.0604** (-3.54)	-0.00620 (-0.36)
geo-HC x Year 2010				-0.0558** (-3.01)	-0.0121 (-0.95)	-0.0311* (-2.45)
function-HC x Year 2010				-0.110* (-2.02)	-0.0336 (-0.94)	0.00432 (0.12)
Subord. Of product-HC x Year 2010				-0.0172 (-1.51)	-0.0266** (-3.64)	0.00646 (0.89)
Subord. Of geo-HC x Year 2010				-0.0201 (-1.57)	-0.0200* (-2.41)	-0.0227** (-2.76)
Subord. Of function-HC x Year 2010				-0.0620+ (-1.81)	0.0240 (1.08)	-0.0487* (-2.20)
Constant	0.279 (1.11)	0.0374 (0.22)	0.182 (1.10)	0.293 (1.17)	0.0286 (0.17)	0.178 (1.08)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
adjusted R squares	0.520	0.206	0.253	0.520	0.207	0.254
N	32264	29228	29560	32264	29228	29560

t statistics in parentheses

p<0.10, * p<0.05, ** p<0.01

Three forms of managerial integration are estimated by linear probability model

Table 3-6: Robustness check (conditional logit model)

Dependent variables	Model 16 Simul. assign	Model 17 Transfer to subsidiary	Model 18 Transfer to the HQ	Model 19 Simul. assign	Model 20 Transfer to subsidiary	Model 21 Transfer to the HQ	Model 22 Simul. assign	Model 23 Transfer to subsidiary	Model 24 Transfer to the HQ
Firm size	-0.234 (-1.39)	0.0961 (0.38)	-0.517+ (-1.87)	-0.221 (-1.31)	0.128 (0.51)	-0.531+ (-1.92)	-0.222 (-1.31)	0.140 (0.55)	-0.571* (-2.06)
Profitability	-0.0352 (-0.06)	-3.229** (-3.74)	-2.391* (-2.21)	-0.0318 (-0.05)	-3.217** (-3.72)	-2.357* (-2.17)	-0.0848 (-0.14)	-3.293** (-3.81)	-2.377* (-2.19)
Geographical scope	0.0990 (0.83)	0.0363 (0.20)	0.178 (0.87)	0.0945 (0.79)	0.0309 (0.17)	0.182 (0.89)	0.0885 (0.74)	-0.0287 (-0.15)	0.174 (0.85)
Market size	0.210** (7.95)	0.0319 (0.64)	0.267** (5.45)	0.202** (7.62)	0.0133 (0.27)	0.272** (5.53)	0.200** (7.53)	0.00839 (0.17)	0.268** (5.45)
Rule of law	0.486** (7.92)	0.153 (1.33)	0.428** (4.14)	0.468** (7.60)	0.128 (1.11)	0.424** (4.09)	0.469** (7.61)	0.131 (1.14)	0.422** (4.06)
Distance from the HQ	-0.202** (-4.35)	-0.0579 (-0.62)	0.0462 (0.59)	-0.197** (-4.24)	-0.0601 (-0.65)	0.0415 (0.53)	-0.197** (-4.23)	-0.0642 (-0.69)	0.0419 (0.54)
Subsidiary size	0.138** (13.83)	0.0916** (5.37)	0.141** (7.93)	0.133** (13.26)	0.0807** (4.69)	0.142** (7.90)	0.133** (13.28)	0.0806** (4.68)	0.142** (7.92)
Subsidiary age	0.178** (5.54)	0.201** (3.56)	0.103+ (1.91)	0.183** (5.66)	0.203** (3.56)	0.108* (1.99)	0.182** (5.65)	0.196** (3.43)	0.108* (1.99)
Manufacturing subsidiary	0.240* (2.08)	0.168 (0.87)	-0.0566 (-0.31)	0.244* (2.12)	0.159 (0.82)	-0.0489 (-0.27)	0.242* (2.11)	0.163 (0.84)	-0.0510 (-0.28)
Research subsidiary	0.645** (2.75)	-0.191 (-0.38)	0.535 (1.57)	0.656** (2.79)	-0.205 (-0.41)	0.535 (1.57)	0.659** (2.80)	-0.196 (-0.39)	0.523 (1.54)
Distribution subsidiary	-0.239* (-2.01)	-0.311 (-1.51)	-0.417* (-2.15)	-0.235* (-1.98)	-0.310 (-1.50)	-0.415* (-2.14)	-0.237* (-1.99)	-0.311 (-1.50)	-0.418* (-2.15)
Service subsidiary	0.343** (2.84)	0.189 (0.94)	-0.0236 (-0.12)	0.226+ (1.82)	0.0813 (0.39)	-0.0767 (-0.38)	0.225+ (1.81)	0.0880 (0.42)	-0.0739 (-0.36)
Financial subsidiary	0.199 (1.46)	0.0276 (0.11)	-0.197 (-0.84)	0.179 (1.31)	-0.00746 (-0.03)	-0.221 (-0.94)	0.187 (1.37)	0.0115 (0.05)	-0.214 (-0.91)
Wholly owned subsidiary	0.0265 (0.47)	-0.00883 (-0.09)	0.00148 (0.02)	0.0187 (0.33)	-0.0190 (-0.19)	0.0102 (0.11)	0.0185 (0.33)	-0.0184 (-0.19)	0.00868 (0.09)
Domestic subsidiary	-0.182 (-0.58)	0.136 (0.22)	0.554 (1.04)	-0.143 (-0.46)	0.137 (0.22)	0.528 (0.99)	-0.138 (-0.44)	0.114 (0.18)	0.532 (1.00)
N of subordinates	0.0222** (12.32)	0.00917** (6.16)	0.00259 (1.43)	0.0208** (11.63)	0.00860** (5.83)	0.00250 (1.37)	0.0207** (11.56)	0.00863** (5.80)	0.00227 (1.24)
Org distance from the HQ	0.161** (4.13)	-0.0390 (-0.61)	-0.469** (-7.08)	0.155** (3.96)	-0.0422 (-0.66)	-0.467** (-7.05)	0.235** (5.10)	0.143+ (1.89)	-0.335** (-4.51)
Year 2010	-0.181** (-6.38)	-0.0460 (-0.94)	-0.353** (-6.71)	-0.223** (-6.62)	-0.152** (-2.59)	-0.279** (-4.70)	-0.225** (-6.67)	-0.161** (-2.74)	-0.284** (-4.78)
HC				0.413** (4.52)	0.485** (3.32)	0.0824 (0.52)	0.596** (5.53)	0.756** (4.44)	0.259 (1.40)
Subordinate of HC				0.235** (3.32)	0.520** (4.19)	-0.302* (-2.43)	0.336** (4.02)	0.809** (5.65)	-0.0419 (-0.30)
HC x Year 2010							-0.454** (-3.16)	-0.653** (-2.89)	-0.441+ (-1.77)
Subord. of HC x Year2010							-0.218* (-2.25)	-0.617** (-3.86)	-0.721** (-3.63)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood	-7114.5	-2589.5	-2630.6	-7101.2	-2577.9	-2627.1	-7094.6	-2567.8	-2619.3
N	23329	12759	11869	23329	12759	11869	23329	12759	11869

t statistics in parentheses

p<0.10, * p<0.05, ** p<0.01

Three forms of managerial integration are estimated by conditional logit model

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