Intra-Firm and Inter-Firm Agglomeration:

The Location Decisions of Multi-Unit Firms

by

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ABSTRACT

Agglomeration research has investigated a key research question, i.e., why do firms in a specific industry co-locate geographically? In the agglomeration literature, it has been assumed that each firm has one business establishment in a cluster such that firms always co-locate with competitors. However, it is often observed that firms operate several business establishments in a cluster, so they co-locate not only with competitors (i.e., inter-firm agglomeration) but also with their own business establishments (i.e., intra-firm agglomeration). While inter-firm agglomeration is a counterpart to the traditional concept of agglomeration, intra-firm agglomeration is a new concept in agglomeration research. The separation between intra-firm and inter-firm agglomeration raises two research questions – 1) how does intra-firm agglomeration differ from inter-firm agglomeration? and 2) do firms decide their locations for intra-firm vs. inter-firm agglomeration differently? These questions actually extend the key question in agglomeration research into a new setting in which firms have several business establishments in a cluster. I proposed that firms can extract more benefits but neutralize more threats from agglomeration through intra-firm agglomeration than through inter-firm agglomeration. I further developed research hypotheses to test this argument in a research context in which multi-unit firms decide their new establishments' distances to competitors and their other establishments at the same time. The hypotheses received empirical support in an empirical setting in which 10 large multi-unit hotel firms established new hotels in 20 U.S. cities, and several supplementary analyses show that these results are robust.

TABLE OF CONTENTS

Page

CHAPTER Page

LIST OF TABLES

Table Page

LIST OF FIGURES

Figure Page

CHAPTER 1

INTRODUCTION AND OVERVIEW

Introduction

Why do firms in a specific industry co-locate geographically? [1] Since Marshall (2013) introduced a new phenomenon of geographic co-location between firms in a specific industry (i.e., agglomeration) in the seminal book chapter published in 1890, "The concentration of specialized industries in particular localities," many scholars have investigated this question. Overall, previous studies have provided two competing arguments on the effects of agglomeration on firms' location decisions. On one hand, agglomeration is likely to create positive externalities (e.g., specialized labor, specialized non-labor inputs, knowledge transfer, and heightened demand), consequently attracting more firms to the geographic area (Head, Ries, & Swenson, 1995; Wang, Madhok, & Xiao Li, 2014). On the other hand, agglomeration is also likely to induce localized competition between competitors as a negative externality, eventually lowering survival rates of incumbents and attracting less firms to the geographic area (Baum & Mezias, 1992; Shaver & Flyer, 2000).

To resolve the inconclusive competing arguments, recent studies have investigated unexplored contingencies or examined a potential non-linear effect of agglomeration. For instance, the most dominant approach until now is to introduce a

[1] My dissertation focuses on agglomeration as geographic co-location between firms in a specific industry and agglomeration externalities created by this co-location according to Marshall (2013). There has been another literature on geographic co-location between firms in diverse industries and at different production stages (e.g., economic geography and urban economics) (Fujita & Krugman, 2003; Fujita & Thisse, 2013; Ottaviano & Thisse, 2004; Porter, 1990, 1998), but the previous studies have considered two types of the agglomeration literatures as distinct theoretically (McCann & Folta, 2008). Please see McCann and Folta (2008) for a comprehensive comparison between these two agglomeration literatures.

firm-level heterogeneity as a contingency. While it was originally assumed that positive and negative externalities are equally distributed to all firms in a cluster, firm-level heterogeneity implies that firms in a cluster are exposed to varying levels of positive and negative externalities (Canina, Enz, & Harrison, 2005; Chung & Kalnins, 2001; Kalnins & Chung, 2004; Shaver & Flyer, 2000). Specifically, some firms more likely create positive externalities than others do, but they benefit less from the positive externalities than others do. In spite of recent theoretical developments, however, the agglomeration literature has not still provided enough empirical evidence to reconcile the competing effects of positive and negative externalities. For instance, McCann and Folta (2008) in a review of the agglomeration literature pointed out that the "paradox of the empirical record is that whereas agglomerated firms tend to perform better, they also tend to be less likely to survive" (2008: 550).

Motivation

My dissertation tries to examine an unexplored assumption on the composition of agglomeration as a potential alternative to resolve the paradox mentioned above. Previous studies have assumed that firms have only one establishment in a cluster such that firms always co-locate with competitors. Thus, it is not surprising that geographic co-location between competitors tends to generate positive externalities on one hand but also negative externalities on the other. However, I argue that when firms have several business establishments across geographic markets, they often co-locate not only with competitors but also with their own establishments in a cluster. In fact, as multi-unit firms have become popular, it is often observed that multiple business establishments of the same firm co-locate near each other in some industries i.e., hotels and fast-food

restaurants (Kalnins, 2004). In this case, therefore, agglomeration doesn't mean only geographic co-location with competitors but also with business establishments of the same firm.

If multi-unit firms co-locate with competitors and their own business establishments at the same time, agglomeration can be separated into two types – intra-firm and inter-firm agglomeration. Intra-firm agglomeration refers to geographic co-location with business establishments of the same firm. On the other hand, inter-firm agglomeration refers to geographic co-location with competitors. While inter-firm agglomeration of a multi-unit firm is a counterpart to the traditional concept of agglomeration, intra-firm agglomeration of a multi-unit firm is a new and unexplored concept in the agglomeration literature.

The separation between intra-firm and inter-firm agglomeration of a multi-unit firm raises two interesting questions. The first question is how intra-firm agglomeration differs from inter-firm agglomeration in terms of agglomeration externalities. It is possible that compositional differences between intra-firm and inter-firm agglomeration result in varying levels of positive and negative externalities captured by multi-unit firms. If so, the second question is whether multi-unit firms decide on their business establishments' locations for intra-firm vs. inter-firm agglomeration differently. Given that a multi-unit firm builds a new business establishment in geographic markets where both competitors and its incumbent business establishments are present, it faces choices about the geographic distance of the new establishment relative to competitors and incumbent establishments to maximize positive externalities but to minimize negative

externalities – that is, is the new establishment's location close to competitors or incumbent establishments of the same firm?

My dissertation examines these two questions by comparing intra-firm and inter-firm agglomeration. These questions actually extend the key question in the agglomeration literature (i.e., why do firms, as competitors, in a specific industry co-locate geographically?) into a new setting in which multi-unit firms are also components of agglomeration.

Contributions

My dissertation makes several contributions to the agglomeration literature. First, I introduce a new concept of intra-firm agglomeration which is distinct from inter-firm agglomeration. This distinction is important because the two types of agglomeration are compositionally different so that they can also provide theoretically different implications. Therefore, the traditional concept of agglomeration may mislead us about the effect of agglomeration when one fails to consider the presence of both types of agglomeration in a cluster.

Second, a comparison between intra-firm and inter-firm agglomeration can provide another reason why the agglomeration literature has resulted in the paradox of competing empirical evidence between positive and negative externalities. If firms are exposed to varying levels of positive and negative externalities resulting from intra-firm and inter-firm agglomeration, the two types of agglomeration should be considered to be an important contingency in the agglomeration literature.

Third, my dissertation shows that the location decisions of multi-unit firms are more complex than previous studies have suggested. When multi-unit firms choose their new establishment's location, they should consider geographic distance not only to competitors but also to their own business establishments. This situation opens a possibility that multi-unit firms strategically choose their establishments' distances to competitors and to their own establishments differently to maximize positive externalities and to minimize negative externalities.

Research Context

The research context for my dissertation is new hotel establishments of large multi-unit hotel firms in the U.S. hotel industry. This research context is an attractive setting to study intra-firm and inter-firm agglomeration. First, large multi-unit hotel firms (e.g., Choice Hotel International, Marriott International, Wyndham Worldwide, etc.) usually operate multiple hotel establishments across geographic markets, and they often co-locate near each other. As a result, intra-firm agglomeration of multi-unit hotel firms is easily observed in the U.S. hotel industry. Second, previous studies in the agglomeration literature have used the hotel industry as a research context (Baum & Haveman, 1997; Baum & Mezias, 1992; Canina et al., 2005; Chung & Kalnins, 2001; Kalnins & Chung, 2004; McCann & Vroom, 2010). However, they didn't distinguish intra-firm agglomeration from inter-firm agglomeration. Using the same research context allows me to clarify the differences between the two types of agglomeration.

Organization

The rest of my dissertation is organized as follows. I begin by reviewing the agglomeration literature in Chapter 2. The literature review focuses on agglomeration between firms in a specific industry, producing similar products or providing similar services to customers, and agglomeration externalities created by those firms. Chapter 2 points out the competing arguments and empirical evidence between positive and negative externalities and recent theoretical developments to resolve the inconclusive evidence.

In Chapter 3, I develop a theoretical framework for a comparison between intra-firm and inter-firm agglomeration. I illustrate conceptual differences between two types of agglomeration and then differences of agglomeration externalities captured by multi-unit firms. Based on Chapter 3, Chapter 4 presents research hypotheses to compare geographic distances from a new establishment to competitors (i.e., inter-firm agglomeration) and to establishments of the same parent firm (i.e., intra-firm agglomeration) and potential contingencies in the location decisions of multi-unit firms.

In Chapter 5, I describe research methods to test the hypotheses developed in Chapter 4. Research context, data source, sample selection, measurement of variables, and main and supplementary statistical analyses are discussed. Specifically, I analyze geographic distances from new hotels to incumbents, which were established by 10 major multi-unit hotel firms in major 20 U.S. cities between 1991 and 2013. Chapter 6 summarizes the dissertation in terms of conclusion, contributions, limitation and future research.

CHAPTER 2

LITERATURE REVIEW ON AGGLOMERATION

Types of Agglomeration and Positive Externalities

Marshall (2013) has been considered to be the first work to study agglomeration in a specific industry. According to the seminal book chapter published in 1890, "The concentration of specialized industries in particular localities," Marshall (2013) observed that specialized industries, producing similar or almost identical products, were often localized in a few places or even one place in Europe and that the products in the particular places were diffused over other parts of Europe. Marshall (2013) initially introduced several location advantages (e.g., physical conditions, the patronage of courts, the deliberate invitation of rulers, etc.) to explain why specialized industries tended to be localized. In addition, more importantly, Marshall (2013) suggested four specific advantages resulting from agglomeration in specialized industries – three advantages from a production perspective and one advantage from a customer perspective. This categorization of the types of the advantages laid a theoretical foundation for future studies on agglomeration. Following this categorization, the agglomeration literature has come to distinguish between supply-side and demand-side agglomerations and calls those advantages positive externalities (or agglomeration externalities) (McCann & Folta, 2008).

Supply-side agglomeration refers to the situation in which geographic co-location between firms in a specific industry creates positive externalities from a production perspective (McCann & Folta, 2008). Specifically, supply-side agglomeration is associated with three types of positive externalities – 1) specialized labor, 2) specialized

non-labor inputs, and 3) knowledge spillover. First, agglomeration allows co-located firms to access to specialized workers. As more firms co-locate to produce similar products in a specific industry, more new or skillful workers may be attracted to the localized industries, eventually creating a local labor market. Then, new firms or incumbents find it relatively easy to hire experienced and specialized workers in the agglomerated area (Marshall, 2013).

Second, agglomeration can give co-located firms more opportunities to access specialized non-labor inputs. Geographic co-location between firms in a specific industry is likely to attract specialized suppliers to the agglomerated area. Because those suppliers mostly serve the co-located firms producing similar products, they can provide more specialized inputs to the co-located firms. Furthermore, the specialized inputs are more often used in the agglomerated area, so suppliers can have quicker return on investment to the specialized inputs (e.g., expensive specialized machinery) or achieve economies of scale in producing the specialized inputs. This eventually lowers input costs for the co-located firms (Marshall, 2013).

Third, agglomeration facilitates knowledge transfer between co-located firms. Geographic proximity provides the co-located firms more opportunities to acquire information and to learn knowledge from each other. Co-located firms find it relatively easy to hire each other's employees, consequently transferring key tacit knowledge from firm to firm. In addition, co-located firms often contact and communicate through diverse formal and informal channels (e.g., strategic alliances, business meetings, social networks between managers, etc.), which have been considered to be major means of knowledge transfer (Ganesan, Malter, & Rindfleisch, 2005; Inkpen & Tsang, 2005; McCann & Folta, 2008).

In contrast to supply-side agglomeration, demand-side agglomeration refers to a situation in which positive externalities are created by geographic co-location from a customer perspective. Demand-side agglomeration is associated with only one specific positive externality – heightened demand (Marshall, 2013). As firms co-locate to provide similar products or services to customers in local areas, this co-location tends to reduce search costs for customers, consequently heightening demand. If local areas are known for specific products or services, customers can save their search costs because they can directly visit the right local area without visiting other areas. Furthermore, the co-location between firms in a specific industry may signal customers about the level of demand in local areas and provide legitimacy to firms in these areas when product or service uncertainty is high (McCann & Folta, 2009). For example, travelers may prefer areas where more hotels are co-located. The concentrated hotels may signal that many other travelers choose these local areas for lodging and that these local areas are safe or convenient places to stay for travelers. Thus, when travelers have relatively less information about local areas, they tend to decide to stay at one of the hotels in the agglomerated area.

The differences between the two types of agglomeration lead to the conclusion that researchers need to be careful to identify the type of agglomeration and the associated positive externalities as a research topic because "[a]nswers to fundamental questions in the agglomeration research stream differ" across or even within the supply-side and the demand-side agglomerations (McCann & Folta, 2009: 387). For example, manufacturing and R&D-intensive industries (e.g., biotechnology industry) might be a proper research context to study supply-side agglomeration, because specialized labor,

specialized inputs and knowledge transfer (i.e., the positive externalities in supply-side agglomeration) are key factors to reduce input costs and to improve innovation capabilities in those industries. However, heightened demand (i.e., the positive externality in demand-side agglomeration) near manufacturing factories is not as important as the other positive externalities described above, because commodity-like products are relatively easy to transport across geographic markets in those industries (Alcácer & Chung, 2014). On the other hand, retail and service industries (e.g., fast-food restaurants and hotels) may be a proper research context to study demand-side agglomeration, because firms find it difficult to serve customers who don't visit local areas in those industries. In this case, customer attraction to local areas is a critical factor for co-located firms to survive in retail and service industries. In addition to the difference between supply-side and demand-side agglomeration, Alcácer and Chung (2014) further argued that there are differences even between the positive externalities within supply-side agglomeration. Specifically, they suggested that specialized labor and knowledge transfer in supply-side agglomeration are more localized than specialized inputs. Following this logic, Alcácer and Chung (2014) studied the location decisions of foreign establishments in U.S. manufacturing industries and found that specialized labor and knowledge transfer have stronger effects on a foreign firm's establishment decision in local markets than specialized non-labor inputs.

In sum, agglomeration in my dissertation refers to geographic co-location of firms in a specific industry. Agglomeration is likely to create some positive externalities for co-located firms, and the types of agglomeration can be separated into supply-side and demand-side agglomeration according to the positive externalities. Because

characteristics of the positive externalities between or even within the types of agglomeration differ, researchers need to clearly address a specific type of agglomeration and positive externalities as a research topic.

Empirical Studies on Positive Agglomeration Externalities

Early studies on agglomeration attempted to establish a theoretical foundation to explain how positive externalities are key causes of strategic outcomes (e.g., location decisions and performance) above and beyond simple location advantages. While Marshall (2013) initially introduced several location advantages (i.e., physical conditions, the patronage of courts, the deliberate invitation of rulers, etc.) to explain why firms co-locate in a specific industry, he further argued that agglomeration subsequently creates some positive externalities (i.e., specialized labor, specialized non-labor inputs, knowledge spillovers, and heightened demand). Thus, it is not surprising that agglomeration studies have considered the positive externalities as additional motivations for firms to co-locate geographically above and beyond location advantages. For instance, Head et al. (1995) studied Japanese manufacturing plants that made greenfield investments in the U.S. during the 1980s. Head and colleagues found that Japanese manufacturing firms were more likely to choose the U.S. states where more Japanese plants in the same industry already existed. The effect of Japanese firm-specific agglomeration was still strong and significant after controlling for the industry and U.S. state effects as indicators of location advantages (e.g., natural resources of the U.S. states). Thus, Head and colleagues concluded “Japan-specific agglomeration appears to exert a strong influence on location decisions” beyond location advantages (Head et al., 1995: 243). Wang et al. (2014) also studied the effect of agglomeration on

location decisions at different industry life-cycles in Ontario's winery industry between 1865 and 1974. Wang and colleagues found that agglomeration (i.e., the number of wineries in the Census Subdivision) attracted more new wineries in the growing phase of industry life-cycle after controlling for grape supply as one of location advantages. Therefore, the positive externalities created by agglomeration have received relatively strong theoretical and empirical support as causes of firm-level location decisions above and beyond the simpler and more traditional location advantages.

Introduction of Negative Externalities

On the other hand, some early studies also started raising questions about whether agglomeration creates only advantages for co-located firms (i.e., only positive externalities). These studies regarded the geographic distance between firms as an indicator of competition. They argued that agglomeration tends to increase localized competition and that increased localized competition is a disadvantage specifically linked to agglomeration. The agglomeration literature later came to refer to the disadvantages of agglomeration as negative externalities. Overall, studies on negative externalities have shown that agglomeration is less likely to occur if increased competition is expected and that co-located firms can sometimes perform worse as the level of agglomeration increases.

In the economics field, Hotelling (1929) is widely known as an influential work that describes how the location decisions of firms are sometimes used to reduce competition between firms. Hotelling (1929) studied how two firms in a duopoly decide their locations in a linear market in which demand and transportation costs are uniformly

distributed and products are homogeneous. Describing the distance between firms as a form of product differentiation, Hotelling (1929) argued that two firms would not co-locate closely because product differentiation (i.e., geographic distance) allows them to avoid price competition even when they offer otherwise homogeneous products. This study evoked huge research attention to location decisions between firms, and researchers soon extended Hotelling's model into different settings. For example, Hamilton, Thisse, and Weskamp (1989) conducted theoretical analyses of Hotelling's model not only in price competition (i.e., a Bertrand competition model) but also in production competition (i.e., a Cournot competition model). Hamilton and colleagues found that two firms closely co-locate only in production competition but not in price competition. From these results, Hamilton and colleagues concluded that agglomeration only occurs in production competition but not in price competition. However, recent studies challenged these results and further sharpened the theoretical model by introducing different shapes of markets or different demand distributions (Gupta, Lai, Pal, Sarkar, & Yu, 2004; Pal, 1998). For instance, Pal (1998) showed that agglomeration is less likely to occur between firms even in production competition if a market shape is circular. Although there are some inconclusive results in theoretical analyses, the key implication of these studies is that agglomeration tends to create localized competition as a negative externality. If competition is expected, firms are likely to locate far from competitors in order to reduce inter-firm competition.

In management, scholars have also found some negative effects of agglomeration on firm performance in early studies. Baum and Mezias (1992) studied the effect of agglomeration on a firm's survival in the Manhattan hotel industry between 1898 and

1990. They found that Manhattan hotels were more likely to experience low survival rates as they located in more geographically concentrated areas. Baum and Mezias (1992) concluded that this finding resulted from increased localized competition. For instance, hotels might fiercely compete over limited customers during the off season if the hotels suffer from low levels of occupancy. In addition, as more hotels co-locate in concentrated areas, they may suffer more from scare resources (e.g., increased rents due to limited property availability). In this case, firms in concentrated areas tend to survive less as the level of agglomeration increases. Similarly, Ingram and Roberts (2000) studied friendship networks between hotel managers and competition in the Sydney hotel industry. Although Ingram and Roberts (2000) didn't provide a formal hypothesis for the effect of agglomeration on performance, the results showed that agglomeration (i.e., geography-localized density) was negatively related to hotel yield (i.e., revenue per available room), which is often used to measure performance in the hotel industry. Similar to studies published in economics journals, the findings of early studies by management researchers also imply that firms perform worse if agglomeration increases localized competition as a negative externality.

In sum, recent studies have tried to balance between the positive and the negative effects of agglomeration by introducing the concept of negative externalities. McCann and Folta (2009) summarized negative externalities of agglomeration (e.g., congestion costs, input costs, or localized competition) in detail and compared them with positive externalities as well. However, as I reviewed the literature, it became clear that localized competition has dominated research on negative externalities.

Recent Theoretical Developments

The above review on positive and negative externalities of agglomeration shows the difficulty in drawing simple conclusions regarding the effect of agglomeration on firm-level strategic outcomes. Theory predicts that the effects of agglomeration represent the outcome of the interplay between positive and negative externalities. As the level of agglomeration increases, a firm can benefit from positive externalities on one hand but suffer from negative externalities on the other. Empirical evidence has also led to some competing findings. Theoretical developments have recently taken place to resolve some of these inconclusive results in multiple ways.

Firm-Level Heterogeneity

The most dominant approach to resolve the balance between positive and negative externalities was to introduce a firm-level heterogeneity into agglomeration research. It was originally assumed that agglomeration is inherently a cluster-level phenomenon such that all firms within a cluster are under the same influence of positive or negative externalities. However, recent studies have challenged this relatively strong and unrealistic assumption by suggesting that firms are heterogeneous in terms of contribution to and benefit from agglomeration. Some firms may create positive externalities but do not capture positive externalities as much. On the other hand, other firms may just capture positive externalities created by others but not create positive externalities as much. This asymmetry between contributions and benefits as a firm-level heterogeneity sheds new light on studies in agglomeration.

Shaver and Flyer (2000) studied location decisions and survival of foreign greenfield investments in U.S. manufacturing industries. The authors argued that firms

receive different levels of benefits from positive externalities of agglomeration and that this difference influences their market entry decisions. Specifically, assuming that large firms have the best technologies, human capital, training programs, suppliers, or distributors, Shaver and Flyer (2000) expected that large foreign establishments gain less from agglomeration but provide more benefits to competitors. Consequently, foreign firms are less motivated to enter the U.S. states where many firms already co-locate geographically, as greenfield investments become larger. Shaver and Flyer (2000) empirically supported this argument by showing that industry-specific agglomeration in the U.S. states still attracted more foreign greenfield investments but that this positive effect of agglomeration on market entry was negatively moderated by the size of foreign greenfield investments. Using this finding, Shaver and Flyer (2000) further argued that the negative effect of agglomeration on survival rates might be a misleading result if adverse selection is not taken into consideration. As the level of agglomeration increases, a cluster is likely to consist of more small firms than large firms. Because small firms tend to have weaker technologies, human capital, training programs, suppliers, and distributors, they may experience higher failure rates than large firms. The authors concluded that agglomeration is characterized by adverse selection, so a firm-level heterogeneity should be considered as an important contingency in agglomeration research.

Chung and Kalnins (2001) also suggested the asymmetry between firm-level agglomeration contributions and benefits as a form of a firm heterogeneity. In the Texas hotel industry, Chung and Kalnins (2001) found that small and independent hotels performed better in rural markets as more large and chain affiliated hotels entered those

markets. On the other hand, large and chain affiliated hotels performed worse in rural markets as more small and independent hotels were present. These results showed that agglomeration might lead to positive performance for small and independent hotels but negative performance for large and chain affiliated hotels, because the asymmetry between agglomeration contributions and benefits varies between different hotels.

Kalnins and Chung (2004) similarly studied resource-seeking as a motivation of location decisions in the Texas hotel industry between 1992 and 2000. Assuming that high-resource firms create more positive externalities, Kalnins and Chung (2004) reconfirmed the findings of Shaver and Flyer (2000). Their results showed that high-resource firms (i.e., branded upscale hotels) were less likely to enter geographic areas where many low-resource firms (e.g., unbranded hotels or branded economy hotels) already existed. However, Kalnins and Chung (2004) further found that low-resource firms were more likely to enter geographic areas where many high-resource firms already existed, because low-resource firms seek resource spillovers from those high-resource firms.

Canina et al. (2005) further studied a firm-level heterogeneity linked to different types of strategic orientations – differentiation and low-cost strategic orientations. Canina and colleagues suggested that differentiated firms (e.g., luxury hotels) are more likely contributors to agglomeration externalities while low-cost firms (e.g., economy hotels) are more likely beneficiaries of agglomeration externalities. In their study of the U.S. hotel industry, Canina and colleagues found that differentiated hotels (e.g., luxury hotels) performed worse as they co-located with more low-cost hotels, but low-cost hotels performed better as they co-located with more differentiated hotels.

Overall, the asymmetry between agglomeration contributions and benefits as a firm-level heterogeneity has also received strong theoretical and empirical support. The implication of a firm heterogeneity is that different firms experience different levels of the balance between positive and negative externalities. As the level of agglomeration increases, the balance tilts more toward negative externalities for a contributor but more toward positive externalities for a beneficiary. Therefore, this asymmetry influences a firm's strategic choices and outcomes (e.g., location decisions and performance) in different ways.

A Potential Non-Linear Effect of Agglomeration

Given the competing effects between positive and the negative externalities, it is not surprising that recent studies have also investigated a potential non-linear relationship between the level of agglomeration and firm-level strategic outcomes. Folta, Cooper, and Baik (2006) argued that the effect of positive externalities on firm performance might be monotonic so that it is positive but at diminishing rates. On the other hand, the effect of negative externalities on firm performance is negative and linear. Taken together, Folta et al. (2006) predicted that the effect of negative externalities outweighs the effect of positive externalities at some point, consequently expecting a non-linear relationship between the level of agglomeration and firm-level performance. They analyzed a sample of U.S. biotechnology firms between 1973 and 1998 and found some empirical support for the predicted non-linear effects of agglomeration. However, the non-linear effects were either monotonic or inverted U-shaped, depending on the type of firm performance measured.

McCann and Vroom (2010) similarly studied price responses of incumbents confronting new entrants in the Texas hotel industry. McCann and Vroom (2010) argued that positive and negative externalities created by new entrants depend on the size of new entrants. As new entrant size becomes larger, the new entrants are likely to create more positive externalities. For instance, if larger hotels are established, they will spend more on advertising and eventually attract more customers to the market. Thus, incumbents are expected to increase prices because they expect that the large new entries represent an opportunity to benefit from newly-created positive externalities. However, McCann and Vroom (2010) also argued that new entrants also increase localized competition as a negative externality. As new entrants are larger, they add too many rooms, thus making overcapacity a problem in local markets. Thus, the authors expected that the marginal costs of negative externalities would outweigh the marginal benefits from positive externalities at some point. Following this logic, McCann and Vroom (2010) found an inverted U-shaped relationship between entrant size and incumbent prices.

Lastly, Wang et al. (2014) studied industry life-cycles as a contingency in the relationship between agglomeration and survival rates and new establishments in the Ontario winery industry. Wang et al. (2014) found that the effect of agglomeration on survival rates of Ontario wineries was only positive at the mature phase but not statistically significant at the growth phase. On the other hand, they also found that the effect of agglomeration on the establishment of new wineries was only positive during the growth phase but not statistically significant at the mature phase. This finding implies that agglomeration externalities vary at different phases of product life-cycles. Specifically, positive and negative externalities are higher at the mature phase than at the growing phase.

Multiple Product Dimensions

The last approach used in an attempt to resolve the inconclusive results between positive and negative externalities is to introduce multiple product dimensions in agglomeration research. As I reviewed above, early studies, especially those published in economics journals, consistently assumed homogeneous products and considered only distance as a form of product differentiation (Hotelling, 1929). However, Baum and Haveman (1997) relaxed the assumption of product homogeneity and added two more product dimensions – price and size – to geographic distance. Specifically, Baum and Haveman (1997) studied location decisions in the Manhattan hotel industry between 1898 and 1990 and found that new hotels co-located closely to incumbent hotels which were "similar on one product dimension (price) to benefit from the positive externalities, but different on another product dimension (size), to avoid localized competition and create complementary differences" (1997: 304). Put differently, these multiple product dimensions were used to disentangle positive externalities from negative ones. Therefore, Baum and Haveman (1997) concluded that firms can benefit from positive externalities and lessen negative externalities (e.g., localized competition) at the same time by coordinating multiple product dimensions.

Summary

Early studies in agglomeration research tried to answer a key research question – why do firms in a specific industry co-locate geographically? They laid a theoretical foundation based on the assumption that positive externalities of agglomeration, above and beyond other location advantages, are key causes for firms to co-locate. Marshall

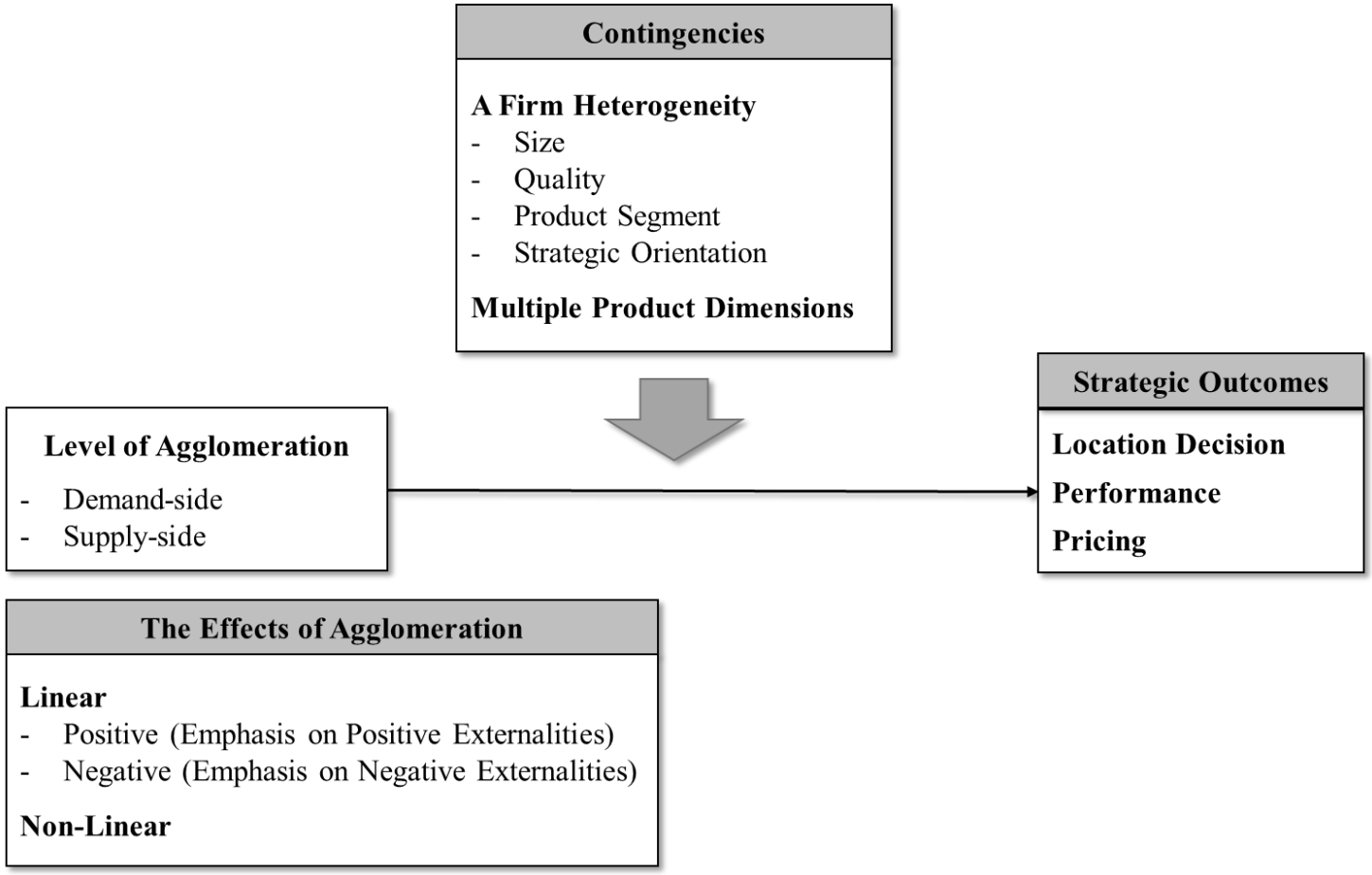
(2013) initially introduced the concept of agglomeration and some location advantages as causes of agglomeration. Then, he further suggested that agglomeration itself is likely to provide four specific advantages from production and customer perspectives (i.e., positive externalities). Following this legacy, later studies have categorized agglomeration into supply-side and demand-side agglomeration according to the types of positive externalities generated.

However, some studies have raised questions about whether agglomeration is always good for co-located firms. Some evidences suggested that agglomeration is likely to increase localized competition (i.e., negative externalities), so firms in densely concentrated areas are less likely to survive. To solve the inconclusive competing effects between the positive and the negative externalities, recent studies have extended agglomeration theory into unexplored assumptions (e.g., firm heterogeneity and multiple product dimensions) on one hand or explored potential non-linear effects on the other hand.

The most dominant approach among prior research is to introduce firm-level heterogeneity. A firm-level heterogeneity implies that firms operating in the same cluster can be exposed to varying levels of positive and negative externalities. Thus, it is expected that a firm's strategic outcomes (e.g., location decisions and performance) differ not only between agglomerations but also within agglomeration. Until now product quality and size of firms have mostly been considered as indicators of externality contributors and beneficiaries.

Figure 1 is a comprehensive model of the reviewed agglomeration studies. It integrates both early studies and recent theoretical developments in the agglomeration literature discussed above.

Figure 1. Comprehensive Model of Agglomeration Studies



CHAPTER 3

THEORETICAL FRAMEWORK

A Multi-Unit Firm as a Component of Agglomeration

The literature review reveals one challenge, with regard to my dissertation, that the current agglomeration literature faces. Previous studies assume that a firm has only one business establishment in a cluster. In this case, a firm is a single-unit firm, or a multi-unit firm has only one business establishment in a cluster. This assumption implies that a firm always co-locates with competitors in a cluster. However, as multi-unit firms have become common in many industries, several business establishments of the same firm often co-locate near each other (Kalnins, 2004). In my dissertation, a unit is defined as a business establishment, and a multi-unit firm is a parent firm operating several business establishments (see *Core Concepts* section below for a full definition). For instance, a parent hotel firm often has multiple hotel establishments, and some of them are observed in the same geographic markets. Similarly, a parent fast-food firm often has multiple fast-food restaurants in the same geographic markets. In this case, it is possible that each hotel or fast-food restaurant co-locates not only with competitors but also with other units of the same parent firm in a cluster. In this case, agglomeration doesn't mean only co-location with competitors but also co-location with other units of the same parent firm.

The introduction of a multi-unit firm as a component of agglomeration implies that agglomeration of a multi-unit firm can be separated into two types – intra-firm agglomeration and inter-firm agglomeration. Intra-firm agglomeration refers to geographic co-location of a unit with other units of the same firm. On the other hand,

inter-firm agglomeration refers to geographic co-location of a unit with competitors. While inter-firm agglomeration of a multi-unit firm is a counterpart to agglomeration between competitors, intra-firm agglomeration of a multi-unit firm is a new and unexplored concept in the agglomeration literature.

The separation between intra-firm and inter-firm agglomerations of a multi-unit firm raise several interesting questions – 1) how does intra-firm agglomeration differ from inter-firm agglomeration in terms of agglomeration externalities? and 2) does a multi-unit firm decide its location for intra-firm vs. inter-firm agglomeration differently? These questions actually extend the key question in the agglomeration literature (i.e., why do firms co-locate geographically?) into a new setting in which a multi-unit firm is a composition of agglomeration. Given the conceptual equivalence between the traditional concept of agglomeration (i.e., geographic co-location with competitors) and inter-firm agglomeration of a multi-unit firm, it is expected that previous findings can apply to inter-firm agglomeration. However, it is in question that the same findings can apply to intra-firm agglomeration too.

This dissertation tries to investigate this difference between intra-firm and inter-firm agglomeration by studying the location decisions of multi-unit firms. In this chapter, I develop a theoretical framework for intra-firm and inter-firm agglomeration. My main argument is that a multi-unit firm can extract more agglomeration benefits on one hand but neutralize more threats of localized competition created by agglomeration on the other, if it co-locates with its other units (i.e., intra-firm agglomeration) than with competitors (i.e., inter-firm agglomeration). Given the competing forces between positive and negative externalities, therefore, the balance may tilt more toward positive

externalities for intra-firm agglomeration but more toward negative externalities for inter-firm agglomeration. This argument implies that a multi-unit firm willingly tries to co-locate more closely with its units than with competitors.

Core Concepts

I define several core concepts here for further theory development. By unit I refer to a business establishment, e.g., a single retail store or manufacturing plant (Greve & Baum, 2001). Thus, a multi-unit firm means a parent firm having several business establishments (Greve & Baum, 2001). For instance, as I noted earlier, a parent hotel firm often operates several hotels across geographic markets, and each hotel provides almost identical service (i.e., lodging) to customers. In addition, a parent fast-food firm often operates multiple restaurants across geographic markets, and each restaurant provides very similar (or identical) foods to customers.

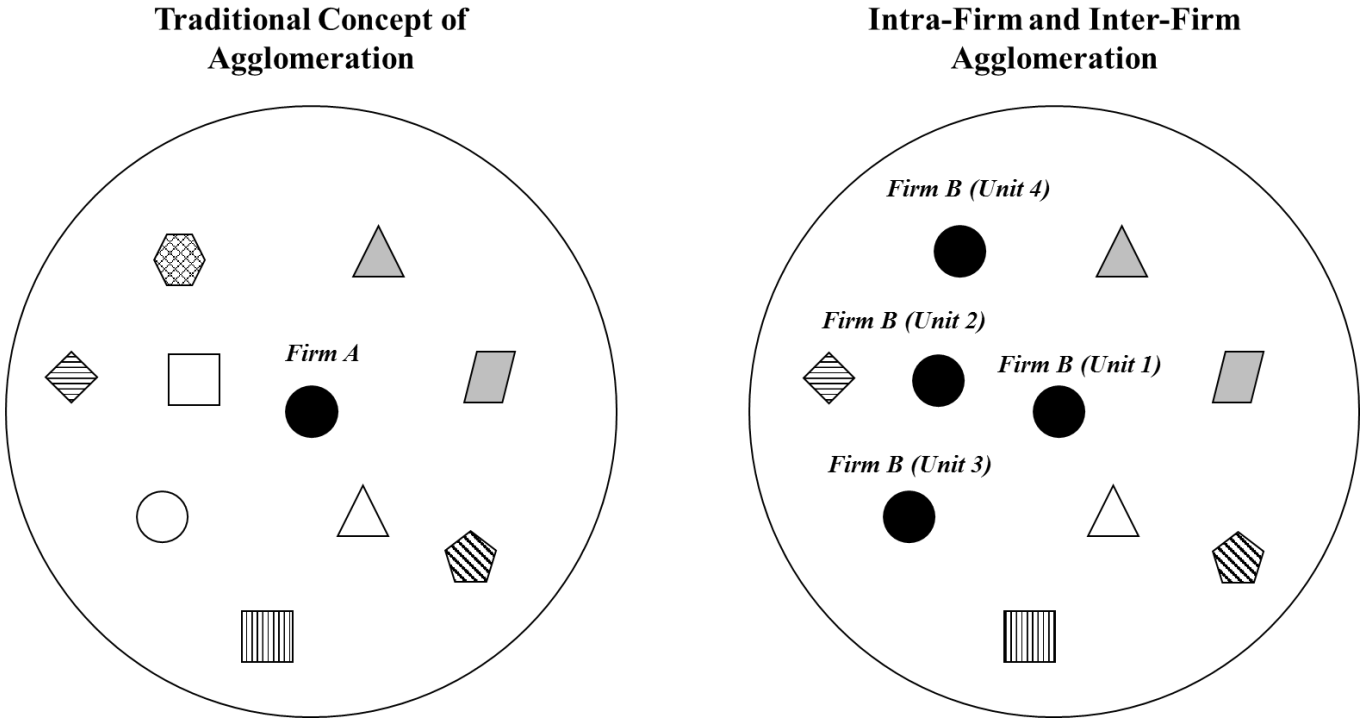
Given this definition of a unit and a multi-unit firm, intra-firm agglomeration refers to geographic co-location of a unit with other units of the same parent firm. For instance, multiple hotels of a parent hotel firm may co-locate near each other, and fast-food restaurants of a parent fast-food firm often co-locate near each other in geographic markets. Although a parent firm can also have several subsidiaries or chain brands that target different product segments to reduce competition between units or to occupy a wide customer base, intra-firm agglomeration still means geographic co-location of a unit with other units regardless of different subsidiaries or chain brands. For instance, Marriott International as a parent hotel firm often has not only several hotels of one chain brand (e.g., Courtyard) but also other hotels of different chain brands (e.g.,

Residence Inn and Springhill Suites) in geographic markets. Then, it is often observed that one hotel of Courtyard closely co-locates not only near hotels (i.e., units) of Residence Inn and Springhill Suites but also near other Courtyard hotels (i.e. units).

In contrast, inter-firm agglomeration refers to geographic co-location of a unit with competitors, whether a competitor is a multi-unit firm or a single-unit firm. For instance, it is the case that Courtyard (Marriot International), Embassy Suites (Hilton Worldwide) and Holiday Inn (Intercontinental Hotels Group) co-locate near each other in geographic markets.

Figure 2 illustrates the differences between the traditional concept of agglomeration and the concept of intra-firm and inter-firm agglomeration in my dissertation. The figure on the left side represents the traditional concept of agglomeration that each firm is a single-unit firm or that a multi-unit firm has only one business establishment in a cluster. In this case, agglomeration means geographic co-location only with competitors. For instance, *Firm A* (a black circle) at the center of a cluster is a single-unit firm, and it co-locates only with competitors. On the other hand, the figure on the right side shows a situation that a multi-unit firm has several units in a cluster. For instance, *Unit 1* of *Firm B* (a black circle) at the center of a cluster co-locates not only with other three units (i.e., *Unit 2, Unit 3 and Unit 4*) but also with competitors. That is, *Unit 1* of *Firm B* has both intra-firm and inter-firm agglomeration in a cluster.

Figure 2. Comparison between a Single-Unit Firm and a Multi-Unit Firm as a Composition of Agglomeration



Note: Each shape and color represents a unit or a firm. When the shape and the color are same, it means that those units belong to the same a multi-unit firm.

Intra-Firm vs. Inter-Firm Agglomeration

The compositional difference between intra-firm and inter-firm agglomeration implies that a multi-unit firm may be under different influences of positive and negative externalities. As I reviewed in Chapter 2, previous studies in the agglomeration literature have suggested that geographic co-location between firms creates positive externalities (i.e., specialized labor, specialized input, knowledge transfer, and heightened demand) on one hand and negative externalities (i.e., localized competition) on the other. Then, it was assumed that agglomeration is inherently a cluster-level phenomenon such that all firms within a cluster are under the same influence of positive or negative externalities. Given the positive and negative externalities created in a cluster, however, I expect that a multi-unit firm can extract more benefits from positive externalities and neutralize more threats of negative externalities, when it co-locates with its other units (i.e., intra-firm agglomeration) than with competitors (i.e., inter-firm agglomeration).

Appropriation of Positive Externalities

Given the positive externalities created in a cluster, it has been assumed that firms within a cluster are under the same effect of positive externalities (Marshall, 2013; McCann & Folta, 2009). In other words, positive externalities are equally distributed among firms within a cluster. However, I argue that appropriation capabilities of a multi-unit firm can vary through intra-firm and inter-firm agglomeration. I define the appropriation capabilities as a multi-unit firm's abilities to capture benefits from positive externalities created in a cluster. Specifically, I expect that compared with inter-firm agglomeration, intra-firm agglomeration improves appropriation capabilities such that a multi-unit firm can extract more benefits from positive externalities.

When a multi-unit firm's unit co-locates with competitors (i.e., inter-firm agglomeration), appropriation of positive externalities is mostly based on two mechanisms – 1) geographic proximity and 2) reciprocal cooperation between competitors. First, a firm is more likely to benefit from positive externalities as it is geographically closer to competitors. In the hotel industry, for instance, if a hotel's rooms are already filled, customers that intended to stay at that hotel may look for alternative hotels nearby. In this case, the geographic proximity to that hotel may influence the customers' decisions to choose one of the adjacent hotels. However, it is not clear whether the customers actually choose a focal hotel among other adjacent hotels, so appropriation of positive externalities occurs by chance. Another mechanism is the reciprocal cooperation between a focal firm and competitors. A focal firm and competitors can actively cooperate to appropriate positive externalities reciprocally. In the hotel industry, for instance, it is well known that hotel managers have used two popular cooperation practices to extract more benefits from positive externalities – the referral practice and the call-around practice (Kalnins, 2006). The referral practice means that hotel managers send overflowed customers to other hotels reciprocally. Similarly, Ingram and Roberts (2000) studied friendship-based cooperation between Sydney hotels and showed that friendship ties between hotel managers facilitated the use of the referral practice reciprocally. Put differently, hotel managers refer overflow customers only to hotels where their friend managers work. Hotel managers also widely use the call-around practice meaning that they call each other to share key information, such as occupancy rates. This information helps hotel managers to decide adjacent hotels to which they will send overflow customers. However, this reciprocal cooperation

is mostly based on trust between competitors. In this case, the risk of opportunistic behaviors is relatively high, so competitors can provide wrong information or just receive more referred customers than those they actually refer (Kalnins, 2006).

When a multi-unit firm's units co-locate near each other (i.e., intra-firm agglomeration), appropriation of positive externalities is also mostly based on two mechanisms – 1) geographic proximity and 2) formal cooperation within a multi-unit firm. Geographic proximity influences appropriation of positive externalities for intra-firm agglomeration in the same way as inter-firm agglomeration. On the other hand, another mechanism is different in that formal cooperation occurs between a focal unit and other units that belong to the same multi-unit firm. This formal cooperation may substantially improve appropriation capabilities of a multi-unit firm for the following two reasons. First, when a multi-unit firm's units co-locate near each other, it can intentionally help its units to capture benefits from positive externalities. In the hotel industry, for instance, if adjacent other hotels of the same parent firm have the availability to provide rooms, a focal hotel may mostly send overflow customers to those hotels and have no reason to send them to competitor hotels. Second, formal cooperation within a multi-unit firm tends to reduce the risk of opportunistic behaviors between co-located units. In the hotel industry, for instance, a parent hotel firm is likely to have the integrated reservation system and to share information through the formal reporting lines and company policy. Thus, a focal hotel has more precise information, such as occupancy rates, of co-located hotels of the same firm and knows the hotels to which it refers overflow customers. Thus, a multi-unit firm can deploy the referral practice and the call-around practice more effectively to appropriate positive externalities of intra-firm agglomeration.

In sum, this comparison between intra-firm and inter-firm agglomeration implies that a multi-unit firm can extract more benefits from positive externalities through intra-firm agglomeration than through inter-firm agglomeration. When a multi-unit firm's units co-locate near each other, it can improve appropriation capabilities through formal cooperation. In contrast, when it co-locates with competitors, it mostly relies on reciprocal cooperation that is more exposed to the risk of opportunistic behaviors than formal cooperation. My argument here is not to say that a multi-unit firm cannot capture benefits from positive externalities through inter-firm agglomeration, but that it can capture more through intra-firm agglomeration than through inter-firm agglomeration in the given positive externalities created in a cluster.

Protection from Negative Externalities

Given negative externalities created in a cluster, it has also been assumed that negative externalities are equally distributed among firms within a cluster (McCann & Folta, 2009). However, I argue that protection capabilities of a multi-unit firm can vary through intra-firm and inter-firm agglomeration. I define protection capabilities as a multi-unit firm's abilities to neutralize or to avoid threats from negative externalities created in a cluster. Since it has been known that increased localized competition (a major negative externality) is a threat to a firm's survival (Baum & Mezias, 1992), firms may try to protect themselves from localized competition. I expect that compared with inter-firm agglomeration, intra-firm agglomeration improves protection capabilities such that a multi-unit firm can better neutralize or avoid threats from negative externalities.

When a multi-unit firm co-locates with competitors (i.e., inter-firm agglomeration), protection from negative externalities is mostly based on one

mechanism – tacit coordination of inter-firm competition. When competitors co-locate near each other, localized competition arises as a form of inter-firm competition. The inter-firm competition literature suggests that a firm's performance depends on competitive actions and responses (Ketchen, Snow, & Hoover, 2004; Smith, Ferrier, & Ndofor, 2001). In addition, as the intensity of competition increases, a firm is likely to experience lower performance (Porter, 1980, 1985). Then, one way to protect co-located firms from increased localized competition is to coordinate their competitive activities tacitly in order to reduce the intensity of competition between them (e.g., tacit coordination). Tacit coordination is different from explicit coordination in that competitors cannot share information and coordinate their competitive activities formally (Friedman, 1983). In tacit coordination, competitors tend to recognize or learn their strategic intentions by competitive interactions in markets (Friedman, 1983). However, it is well known that tacit coordination tends to be unstable and that competitors often face escalated competition (e.g., price war) as a result of the destabilized tacit coordination (Feuerstein, 2005). Thus, although tacit coordination may protect co-located firms from negative externalities, they are still under threats from localized competition as a negative externality.

On the other hand, when a multi-unit firm's units co-locate near each other (i.e., intra-firm agglomeration), protection from negative externalities is mostly based on another mechanism – formal coordination of intra-firm competition. In contrast to inter-firm agglomeration, intra-firm agglomeration is likely to provoke competition between units of the same multi-unit firm (i.e., intra-firm competition). The intra-firm

competition literature suggests that competition between units within a multi-unit firm exists when their businesses are overlapped. Phelps and Fuller (2000) suggested that there are three types of intra-firm competition in multinational enterprises (MNEs): 1) competition for intermediate products or services, 2) competition for capabilities, and 3) competition for charters or mandates. Of the three, competition for charters or mandates is related to the phenomenon of intra-firm agglomeration. A charter, or mandate, is defined as a responsibility for a specific business domain or product market (Birkinshaw & Lingblad, 2005). For instance, Galunic and Eisenhardt (1996, 2001) argued that multi-divisional firms often have overlapped business domains or turf between divisions. Then, these overlaps sometimes make the divisions compete with each other for achieving the charter against other divisions. Although this type of intra-firm competition mostly results in the gain or the loss of charters for units, intra-firm competition has been perceived as advantageous to a multi-unit firm in general. Kalnins (2004) summarized four advantages of intra-firm competition in favor of multi-unit firms: 1) improvement of efficiency and resourcefulness between divisions, 2) entry deterrence to rival firms, 3) protection from cooperation between divisions against headquarters, and 4) enhanced profits from intra-firm competition. In the franchised fast-food industry, for instance, franchisors usually receive revenue-based royalty fees from franchised restaurants. Thus, if competition between franchised restaurants increases revenues, multi-unit franchisors can receive more royalty fees from the increased revenues. Furthermore, intra-firm competition between franchisees in local areas deters rival franchisors or franchisees of rival franchisors from opening new fast-food restaurants in those areas.

Drawing on the advantages of intra-firm competition in favor of multi-unit firms, Phelps and Fuller (2000) suggested that intra-firm competition is often led and coordinated by headquarters of MNEs. This intra-firm coordination by headquarters tends to improve protection capabilities from negative externalities. On one hand, headquarters can facilitate competition among their units to achieve the advantages of intra-firm competition. On the other hand, if intra-firm competition is so severe that it actually has a negative impact on performance not only at unit-level but also at firm-level, headquarters can intervene to reduce intra-firm competition. This formal coordination by headquarters is effective, because headquarters can shares precise information internally and because headquarters have more control on competitive activities of their units. Therefore, a firm with intra-firm agglomeration is more likely to neutralize or to avoid the negative externalities.

In sum, this comparison between intra-firm and inter-firm agglomeration implies that a multi-unit firm can neutralize or avoid more threats from negative externalities through intra-firm agglomeration than through inter-firm agglomeration. When a multi-unit firm's units co-locate near each other, it can improve protection capabilities through formal coordination of intra-firm competition. In contrast, when it co-locates with competitors, it mostly relies on tacit coordination of inter-firm competition. I argue that formal coordination more effectively coordinate competitive activities between units within a firm than tacit coordination does competitive activities between competitors. Again, my argument here is not to say that a multi-unit firm cannot protect itself from negative externalities through tacit coordination of inter-firm agglomeration, but that it can protect more through formal coordination of intra-firm agglomeration than through

tacit coordination of inter-firm agglomeration in the given negative externalities created in a cluster.

Operational Synergy

In addition, unlike geographic co-location between competitors, geographic co-location between units of the same parent firm can create operational synergy as an advantage of intra-firm agglomeration over inter-firm agglomeration. Operational synergy occurs when operational activities are shared between a firm's business units, in turn increasing operational efficiencies (Chatterjee, 1986). While operational synergy has been considered to be a key benefit in the diversification and mergers & acquisitions (M&As) strategies (Haleblian, Devers, McNamara, Carpenter, & Davison, 2009; Hitt, Tihanyi, Miller, & Connelly, 2006; Wan, Hoskisson, Short, & Yiu, 2011), I expect that operational synergy can be also created when units of the same parent firm closely co-locate.

When a multi-unit firm's units co-locate near each other (i.e., intra-firm agglomeration), the firm's units have opportunities to share key operational activities, potentially creating operational synergy effects. First, the firm's units can participate in co-purchasing key input resources. Because they provide similar products or services to customers in the same geographic markets, they are more likely to use similar input resources. In this case, they can increase their bargaining power against suppliers by co-purchasing key input resources. The increased bargaining power may allow them to lower input costs, in turn increasing operating efficiency. For example, hotels of the same parent firm often relay on online procurement systems to procure key hotel supplies (e.g., ingredients for food services, tissues, bed sets, etc.) from local suppliers

(Kothari, Hu, & Roehl, 2005). In the hotel industry, this co-purchasing practice tends to be used for consistent services across their hotels. Because hotels use the same input resources procured from the same online procurement systems, they are likely to provide similar levels of product or service quality to customers. However, this co-purchasing practice also benefits individual co-located hotels because they can save their input costs by increasing bargaining power and transaction costs by using the common online procurement systems (Kothari et al., 2005). Second, the firm's units can take advantage of resource sharing to increase operational efficiency. Because their locations are close, they can save operating costs by sharing duplicated assets or activities. For example, in the hotel industry, co-located hotels of the same parent firm often have the common transportation vehicles for employees (e.g., transportations for an employee commute) and customers (e.g., transportations between hotels and airports). In addition, they often share their employees because their employees make a contract with the parent firm not with individual hotels. For example, when one hotel needs more employees to serve the large events, co-located hotels of the same parent firm often cooperate and send their employees for the events. These types of resource sharing can reduce fixed costs (e.g., transportation costs, human resource costs, etc.), in turn increasing operational efficiency.

Summary

Taking into account multi-unit firms as components of agglomeration introduces two types of agglomeration – inter-firm and intra-firm agglomerations. Comparison between two types of agglomeration shows several differences. First, there are

compositional differences between intra-firm and inter-firm agglomeration. While a multi-unit firm often co-locates with competitors (i.e., inter-firm agglomeration), it also co-locates with its other units (i.e., intra-firm agglomeration). More importantly, a multi-unit firm can have intra-firm and inter-firm agglomeration at the same time in a cluster. Second, positive and negative externalities are asymmetric between inter-firm and intra-firm agglomerations. Compared with inter-firm agglomeration, intra-firm agglomeration improves more both appropriation capabilities from positive externalities and protection capabilities from negative externalities. Third, unlike inter-firm agglomeration, intra-firm agglomeration tends to create operational synergy by sharing key operational activities and resources.

Taken together, when a multi-unit firm co-locates with its units and competitors in a cluster, a net effect of geographic co-location with its units is more positive than one with competitors. Again, I don't argue that a multi-unit firm cannot benefit from inter-firm agglomeration et al. Instead, my argument is that a multi-unit firm can benefit relatively more from intra-firm agglomeration than from inter-firm agglomeration. Stated differently, if the balance between benefits from positive externalities and threats from negative externalities is considered, intra-firm agglomeration may tilt the balance more toward positive externalities, but inter-firm agglomeration may tilt the balance more toward negative externalities. Table 1 summarizes this comparison between intra-firm and inter-firm agglomeration.

Table 1. Comparison between Intra-Firm and Inter-Firm Agglomerations of a Multi-Unit Firm

	Intra-Firm Agglomeration	Inter-Firm Agglomeration
Definition	• Geographic co-location of a unit with units of the same multi-unit firm	• Geographic co-location of a unit with competitors

Appropriation Capabilities	**High**
	• More appropriation of positive externalities created in a cluster
	• Appropriation mechanisms
	  o Geographic proximity
	  o Formal cooperation between units within a firm
		Low
		• Less appropriation of positive externalities created in a cluster
		• Appropriation mechanisms
		  o Geographic proximity
		  o Reciprocal cooperation between competitors

Protection Capabilities	**High**
	• More protection from negative externalities created in a cluster
	• Protection mechanism
	  o Formal coordination of intra-firm competition within a firm
		Low
		• Less protection from negative externalities created in a cluster
		• Protection mechanism
		  o Tacit coordination of inter-firm competition between competitors

Operational Synergy	**High** • Increased operational efficiencies by sharing key operational activities and saving operational costs	**Low** • No sharing key operational activities
Implications	• Location decision: Closer distance to units of the same multi-unit firm	• Location decision: Farther distance to competitors

Implications

The fact that a multi-unit firm can have several units in a cluster provides several implications for the location decisions of multi-unit firms. First, assuming that a multi-unit firm establishes a new unit in a cluster, it should consider geographic distances from a new unit not only to its own units but also to competitors. Because the balance between positive and negative externalities differs between intra-firm and inter-firm agglomeration, it is possible that a multi-unit firm may choose a new unit's distance to its own units and to competitors differently. Second, the two types of agglomeration can be an important contingency on previous findings in the agglomeration literature. If the traditional concept of agglomeration can be separated into intra-firm and inter-firm agglomeration, it is possible that previous findings were confounded by the competing effects of the two types of agglomeration. In fact, McCann and Folta (2008) in a review of agglomeration research pointed out that the "paradox of the empirical record is that whereas agglomerated firms tend to perform better, they also tend to be less likely to survive" (McCann & Folta, 2008: 550). Different types of agglomeration may be able to partially provide the reason why this paradox has been observed in the agglomeration literature. Lastly, in contrast to a single-unit firm, a multi-unit firm relies on different governance structures for its units. While a single-unit firm mostly operate its unit directly, a multi-unit firm uses either a direct operation or a franchising governance structure (Bradach, 1997; Combs, Ketchen, Shook, & Short, 2011; Combs, Michael, & Castrogiovanni, 2004; Perryman & Combs, 2012; Yin & Zajac, 2004). Therefore, this governance structure choice raises interesting questions about how a multi-unit firm decides a new unit's location according to different governance structures.

In Chapter 4, using the theoretical framework developed in this chapter, I develop hypotheses in order to answer the second question of my dissertation, i.e., does a multi-unit firm decide its location for intra-firm vs. inter-firm agglomeration differently? First, I develop a research hypothesis to test the difference between intra-firm and inter-firm agglomeration in a research context in which a multi-unit firm establishes a new unit with some level of proximity to its incumbent units and those of competitors. Specifically, I compare two geographic distances – one from a new unit to units of the same parent firm and another from a new unit to competitors. Second, I will consider several firm-level heterogeneities as potential contingencies in the distance difference between intra-firm and inter-firm agglomeration according to the previous findings in the agglomeration literature. Specifically, I focus on the asymmetry between contributions and benefits as a firm-level heterogeneity that, as I reviewed in Chapter 2, has received dominant attention in the agglomeration literature. Lastly, as I noted above, multi-unit firms tend to face a choice of governance structures (either direct operation or franchising) for their new units. Drawing on the franchising literature, I will study how the distance difference between intra-firm and inter-firm agglomeration is contingent on governance structures of new units (i.e., either direct operation or franchising).

CHAPTER 4

HYPOTHESES DEVELOPMENT

Geographic Distance from a New Establishment to Incumbents

The location decision of a new establishment provides a proper research context to compare differences between intra-firm and inter-firm agglomeration. When a multi-unit firm plans to establish a new unit in geographic markets, this situation raises an interesting strategic issue if there are both its units and competitors' units in those markets. The strategic issue is how closely a new unit should locate near its own units and competitors' units. If there is no difference between intra-firm and inter-firm agglomeration in terms of agglomeration externalities, the geographic distances of a new unit to its other units and to competitors' units will not be different. In contrast, as I argued earlier, if the balance between positive and negative externalities varies between intra-firm and inter-firm agglomeration, geographic distances of a new unit to its other units and to competitors are expected to capture this difference. As positive externalities are dominant, a multi-unit firm has an incentive to locate more closely to incumbents (either its unit or a competitor's). On the other hand, as negative externalities are more dominant, a firm may locate farther from incumbents (either its unit or competitors'). Therefore, I assume that a multi-unit firm decides its new establishment's location at which the net effect of positive and negative externalities is maximized.

Level of Analysis: A New Establishment

I chose a new establishment as the level of analysis for the hypotheses development. This level of analysis provides several advantages to study differences

between intra-firm and inter-firm agglomeration and their effects on the location decisions of multi-unit firms. First, a new establishment as a level of analysis allows me to identify intra-firm or inter-firm agglomeration easily. If a new establishment and co-located incumbents belong to the same multi-unit firm, it becomes intra-firm agglomeration. In contrast, if they are competitors, whether they are different multi-unit firms or single-unit firms, it is inter-firm agglomeration.

Second, this level of analysis allows me to investigate the effect of heterogeneous characteristics of a new establishment on location decisions. A new establishment of a multi-unit firm can be heterogeneous in terms of quality and size – two factors that have been studied as major attributes of a contributor or a beneficiary in the agglomeration literature. Using these heterogeneities of new establishments, I will further compare the location decisions of multi-unit firms for intra-firm and inter-firm agglomeration.

Lastly, a new establishment as a level of analysis helps to overcome previous challenges to a definitional clarity of agglomeration and its operationalization. While previous studies agree that agglomeration externalities tend to attenuate over geographic distance, there is much less consensus on how far agglomeration externalities extend (McCann & Folta, 2008). This lack of clarity has led to different definitions of boundaries of agglomeration (e.g., U.S. state, U.S. metropolitan statistical areas, U.S. census divisions and U.S. zip codes). Furthermore, these definitions of agglomeration have been mostly based on geographic segmentation for administrative sovereignty (e.g., U.S. states) or statistics (e.g., U.S. metropolitan statistics areas, U.S. census divisions). Thus, these definitions are less likely to reflect realistic geographic scopes to

which the agglomeration externalities extend in different research contexts. Using a new establishment as a level of analysis allows me to overcome this challenge by considering a certain distance range of geographic scopes from a new establishment as the boundary of agglomeration.

Intra-Firm Agglomeration vs. Inter-Firm Agglomeration

The overarching hypothesis of this dissertation is about the effect of intra-firm vs. inter-firm agglomeration on the location decisions of multi-unit firms. Given the competing positive and negative externalities, a multi-unit firm may decide to locate its new units adjacent to incumbents in order to maximize appropriation from positive externalities but to minimize threats from negative externalities. As I noted earlier, I assume that a multi-unit firm decides its new establishment's location at which a net effect of positive and negative externalities is maximized. As geographic distance of a new unit is close to incumbents, positive and negative externalities both are likely to increase. Thus, a multi-unit firm will decide its new unit's location as the place at which the marginal benefit from positive externalities most outweighs the marginal threat from negative externalities. If positive externalities are still dominant, a multi-unit firm has an incentive to locate more closely to incumbents. In contrast, as negative externalities are more dominant, a firm may locate farther from incumbents.

Theoretical comparison between intra-firm and inter-firm agglomerations shows that relative to inter-firm agglomeration, intra-firm agglomeration of a multi-unit firm is more likely to improve appropriation capabilities from positive externalities and protection capabilities from negative externalities. This implies that if geographic

distances of a new unit to its other units and to competitors are identical, a multi-unit firm can extract more benefit from positive externalities but neutralize more threats from negative externalities through intra-firm agglomeration than through inter-firm agglomeration. Then, a multi-unit firm may still have an incentive to locate closer to its incumbent units than to competitors. Although the geographic distance of a new unit to its incumbent units is closer than that to competitors, the new unit may be exposed to similar levels of threats from negative externalities but to higher levels of benefit from positive externalities. Stated differently, the net effect of positive and negative externalities is higher when a new unit of a multi-unit firm is closer to its incumbents than to competitors.

In addition, the comparison between intra-firm and inter-firm agglomerations also shows that relative to inter-firm agglomeration, intra-firm agglomeration tends to create operational synergy by sharing key operational activities and resources. As a new unit's location is closer to incumbent units of the same multi-unit firm, those units are more likely to have opportunities to reduce operating costs and to increase operational efficiency. On the other hand, a similar type of operational synergy doesn't emerge as a new unit's location is closer to competitors. Therefore, multi-unit firms have incentives to establish new units close to their incumbent units but not close to competitors in terms of operational synergy.

Taken together, I expect that a multi-unit firm will establish a new unit closer to its incumbent units than to competitors. Put differently, the geographic distance from a new unit to incumbent units of the same multi-unit firm is shorter than that to competitors.

Hypothesis 1: A multi-unit firm will establish a new unit closer to its incumbent units than to competitors.

Contributor vs. Beneficiary

I further consider potential contingencies in the difference of geographic distances between intra-firm and inter-firm agglomeration. The literature review shows that all firms are not identical in terms of agglomeration contributions and benefits. Some firms contribute to positive externalities without capturing as much, but others just benefit from existing positive externalities without contributing as much. This asymmetry between contributions and benefits as a firm-level heterogeneity is the most dominant approach to resolve the competing arguments between positive and negative externalities. Quality and size have been usually considered as firm-level attributes of contributors or beneficiaries (Chung & Kalnins, 2001; Kalnins & Chung, 2004; Shaver & Flyer, 2000). Similarly, I consider the quality and size of a new establishment as attributes of contributors or beneficiaries and develop hypotheses about the effects of quality and size as a contingency on location decision for intra-firm vs. inter-firm agglomeration.

As a new established unit has high quality and large size, it is more likely to create positive externalities but less likely to benefit from the existing positive externalities. Kalnins and Chung (2004) studied the Texas hotel industry, and argued that branded upscale hotels represent high quality and resources (e.g., advertisement expenses or quality management) to heighten demand (the positive externalities in demand-side agglomeration). Because branded upscale hotels signal to customers a commitment to “an appropriate quality level,” customers are willing to choose these

hotels first when they cannot inspect each hotel directly (Kalnins & Chung, 2004: 692). Thus, branded upscale hotels are more likely to attract customers, and co-located hotels benefit from the heightened demand if branded upscale hotels have excess customers.

Similarly, Shaver and Flyer (2000) argued that large establishment size represents "best technologies, human capital, training programs, suppliers, or distribution" (Shaver & Flyer, 2000: 1175). Thus, a firm with large size may gain less but benefit competitors. Their results supported their argument that a firm was less likely to invest in a large establishment in markets with many competitors. On the other hand, if a new unit has low quality and small size, it is less likely to create additional positive externalities but more likely to benefit from the existing positive externalities. Then, a new unit with low quality and small size will locate closely to incumbents of high quality to benefit from the spillover of positive externalities. Following this logic, Kalnins and Chung (2004) found that branded economy hotels were more likely to be established in markets with many incumbent branded upscale hotels.

Given that high quality and large size are attributes of contributors and low quality and small size are attributes of beneficiaries, I expect that a multi-unit firm will establish a new unit even closer to its incumbent units (i.e., intra-firm agglomeration) than to competitors (i.e., inter-agglomeration) if the new unit is perceived as a contributor relative to a beneficiary.

If a multi-unit firm establishes a new unit with high quality and large size close to competitors (i.e., inter-agglomeration), the firm may gain little from co-location with the competitors but rather strengthen its competitors. Thus, the new establishment with

high quality and large size has no incentive to locate close to competitors. However, a multi-unit firm will establish a new unit close to a competitor if the new unit is perceived as a beneficiary. In this case, a multi-unit firm may gain much from positive externalities created by competitors without strengthening the competitors. Taken together, a multi-unit firm may establish a new unit farther from competitors as the new establishment's quality and size are higher and larger.

On the other hand, if a new unit is perceived as a contributor relative to a beneficiary, a multi-unit firm will establish the new unit close to its other units (i.e., intra-firm agglomeration) for the following two reasons. First, when a new unit of a multi-unit firm is more likely a contributor, its incumbent units can mostly benefit from positive externalities created by the new establishment. In addition, if its incumbent units capture most of the positive externalities, it may reduce a potential spillover of the positive externalities into competitors. In contrast, when a new unit is more likely a beneficiary, it may not create positive externalities for other units. Instead, it tends to benefit from the existing positive externalities created by incumbent units. Put differently, almost the same amount of the positive externalities may be distributed to one more new units as to incumbent units. Second, although a new establishment can induce localized competition between adjacent units (i.e., intra-firm competition) as a negative externality, a multi-unit firm can coordinate competitive activities effectively to protect its units from negative externalities through formal coordination. This argument doesn't mean that a new establishment will not increase localized competition at all. Instead, it means that a multi-unit firm has more capacity to reduce localized

competition between its units. I expect the protection effects from localized competition are similar whether a new unit is a contributor or a beneficiary.

Taken together, I expect that a new establishment's quality and size moderate the geographic distances between intra-firm and inter-firm agglomeration. Incumbent units will benefit more from a new establishment if a new unit is more likely a contributor (i.e., high quality and large size) than a beneficiary (i.e., low quality and small size). On the other hand, if a new unit is more likely a beneficiary, incumbent units will not benefit from the new establishment much but just face more localized competition. This implies that a multi-unit firm may establish a new unit even closer to its incumbent units (i.e., intra-firm agglomeration) than to competitors (i.e., inter-firm agglomeration) as the new establishment's quality and size are higher and larger. This location decision allows its incumbents units to capture much positive externalities created by the new establishment, but also minimizes potential spillovers of the positive externalities into competitors.

Hypothesis 2: A new establishment's quality negatively moderates the relationship (H1) such that a multi-unit firm will establish a new unit even closer to its incumbent units than to competitors, as the new establishment's quality is higher.

Hypothesis 3: A new establishment's size negatively moderates the relationship (H1) such that a multi-unit firm will establish a new unit even closer to its incumbent units than to competitors, as the new establishment's size is larger.

Governance Structure: Franchised vs. Direct Operation

A multi-unit firm tends to face the task of choosing a governance structure (either direct operation or franchising) for multiple units. Previous studies have shown that this governance structure is one potential factor in location decisions (Perryman & Combs, 2012). Thus, I further consider the governance structure as a contingency in the difference of geographic distances between intra-firm and inter-firm agglomeration.

Direct operation and franchising are two types of governance structures a multi-unit firm can choose. Some firms heavily rely on one of the two, but others use both types together in similar proportions (Bradach, 1997; Moon & Sharma, 2014). One of the theoretical approaches that previous studies have used to describe why a multi-unit firm prefers one to another is agency theory (Combs & Ketchen, 2003; Kaufmann & Dant, 1996; Perryman & Combs, 2012; Yin & Zajac, 2004). A multi-unit firm is likely to face agency costs when a unit is directly operated. A multi-unit firm usually hires a manager for its units that are directly operated, and then the agency relationship between a firm and a unit manager by nature occurs for directly operated units (Yin & Zajac, 2004). To protect a multi-unit firm from a unit manager's opportunistic behaviors, a firm needs to monitor the unit manager, consequently increasing monitoring costs (Perryman & Combs, 2012; Yin & Zajac, 2004). On the other hand, this type of agency problem cannot happen in franchised units. When a multi-unit firm chooses franchising as a governance structure, each unit is owned and operated by the same franchisee. Instead, a multi-unit firm usually gains royalty fees that are based on revenues of franchised units (Yin & Zajac, 2004). Because a franchisee as an owner will try to do his or her best to

maximize a unit profitability, franchising can be a potential solution for agency problem between a multi-unit firm and its unit managers (Kaufmann & Dant, 1996).

When a multi-unit firm establishes a new unit near its incumbent units (i.e., intra-firm agglomeration), agency costs are likely to influence its location decisions. A multi-unit firm may want to establish new units close to its incumbent units, so it can reduce monitoring costs for directly operated units (Perryman & Combs, 2012). First, it can reduce investigation costs when a new unit is close to other units. Because multiple units co-locate closely in geographic markets, it can pay more attention to those units than to isolated units. Furthermore, if necessary, it can send inspectors to monitor the co-located units' operation at the same time. Thus, it can save investigation costs by sending a few common inspectors to the co-located units rather than separate inspectors to each unit. Second, although a multi-unit firm doesn't send inspectors directly, it can use other co-located units' operation information as a benchmark to monitor the co-located units. When multiple units co-locate closely, they usually follow similar operation patterns (e.g., operating costs, revenues, etc.). If one of the co-located units has operation information that deviates from other units, it can signal a potential agency problem to the multi-unit firm (Yin & Zajac, 2004). Thus, close co-location with other units can provide better information to protect a multi-unit firm from the potential agency problem in advance. On the other hand, franchised units are relatively free from this type of agency problem between a multi-unit firm and a unit manager, because franchisees as owners operate franchised units to maximize their profits. Following this logic, it is expected that a multi-unit firm is willing to establish a new unit relatively closer to its other units if it is directly owned than if it is franchised.

In addition to the benefit of reducing monitoring costs, for intra-firm agglomeration, direct operation may also provide better appropriation capabilities from positive externalities and protection capabilities from negative externalities through formal cooperation and coordination. First, formal cooperation generates fewer benefits from positive externalities for franchised units than for directly operated units. Although franchising solves the agency problem between a multi-unit firm and a unit manager, it may create another type of agency problem between a multi-unit firm and a franchisee. A multi-unit firm may put more priority on firm-level performance than a franchisee does on unit-level performance. To maximize positive externalities between units, a multi-unit firm may locate a new unit close to other units. However, if a new unit is franchised, a franchisee may not want to do so when it strengthens other units but doesn't benefit from other units. In this case, a franchisee has no incentive to cooperate with other units to maximize firm-level (i.e., franchisor) performance by sacrificing its own unit-level (i.e., franchisee) performance. Furthermore, it is widely assumed that franchised units usually have more discretion in strategic decisions (i.e., pricing, new innovation adoption, promotion, hiring, etc.) than directly operated units (Michael, 2002; Yin & Zajac, 2004). Decision-making is relatively centralized for directly operated units, so unit managers usually follow guidelines on strategic decisions from headquarters (Yin & Zajac, 2004). In contrast, decision-making is relatively decentralized for franchised units, so franchisors often do not need approval from franchisees to coordinate the strategic decisions of franchised units (Yin & Zajac, 2004). In addition, unlike the formal coordination of directly operated units, the formal coordination of key operational activities (e.g., price, quality, and advertising) of

franchised units by franchisors is often considered to be a violation of antitrust law (Michael, 2002). Given the separation of interests between a franchisor and franchisees, the less concentrated decision-making and the potential antitrust issue of the coordination by franchisors, it is possible that franchisees resist participation in formal cooperation to maximize firm-level (franchisor) performance if it requires a sacrifice of the franchised unit's performance.

Second, similarly, formal coordination of intra-firm competition is weaker for franchised units than for directly operated units. As I argued earlier, a multi-unit firm sometimes engages in intra-firm competition between units and formally coordinates the competitive activities between units if necessary. However, a franchisee may not want to compete with other units or to reduce competition with other units for firm-level (i.e., franchisor) performance if it leads to a sacrifice of the franchised unit's performance. Thus, it is possible that a franchisee sometimes resists intra-firm competition or formal coordination of competitive activities led by a multi-unit firm (i.e., franchisor).

When a multi-unit firm establishes its new unit near competitors (i.e., inter-firm agglomeration), I expect that the effect of the governance structure on the location decisions of multi-unit firms will differ from intra-firm agglomeration. As I noted earlier, if a new unit is directly operated, the agency problem between a multi-unit firm and a unit manager arises. However, this type of agency problem may be not associated with the location decisions of multi-unit firms, because close distance to competitors are not related to reduced monitoring costs.

However, if a new unit is franchised, another type of agency problem between a multi-unit firm and a franchisee can influence its location decisions. As I described above, a multi-unit firm usually receives royalty fees that are based on a franchised unit's revenue (Perryman & Combs, 2012; Yin & Zajac, 2004). Thus, a multi-unit firm can maximize its performance as a franchised unit's revenue increases. However, a franchisee may pay more attention to operating performance than to revenue per se. Although a franchised unit increases its revenue by taking aggressive competitive activities against competitors (e.g., price-cutting, promotion, advertisement, etc.), its operating performance can be similar or even decline if operating costs increase as well. Thus, a multi-unit firm (i.e., franchisor) may put more priority on a franchised unit's revenue than its operating performance, while a franchisee may be the opposite, placing more priority on a franchised unit's operating performance.

This misalignment may influence the location decisions of multi-unit firms for new establishments. If a new unit is franchised, a multi-unit firm may choose its location close to competitors. Intensive inter-firm competition tends to increase a new unit's revenue as well as operating costs because of competitive activities (e.g., price-cutting, promotion, advertisement, etc.). While it is not a favorable situation for a franchisee, a multi-unit firm still has an incentive to choose the close distance to competitors for increased revenues of the new establishment. On the other hand, if a new unit is directly owned, a multi-unit firm may choose its location far from competitors. In this case, a multi-unit firm also puts its priority relatively on operating performance instead of just revenue. The close distance to competitors is more likely to provoke intense competition, eventually lowering the new establishment's operating performance.

Last, operational synergy created from intra-firm agglomeration also varies across directly operated and franchised units. As I argued earlier, operational synergy tends to be created as co-located units of the same multi-unit firm share operational activities or resources to increase operational efficiencies. However, these types of cooperation are more likely to be promoted between directly operated units than franchised units, because they require coordination between units and the preference to types of performance is also different between directly operated and franchised units. First, formal coordination can be more effectively done between directly operated units than franchised units. Sharing operating activities (e.g., co-purchasing) and resources (e.g., transportation vehicles and human resources) requires coordination. Multi-unit firms usually have more control over operating activities and resources for directly operated units than franchised units. While multi-unit firms tend to have ownership of assets and resources for directly operated units, franchisees do so for franchised units. This control difference allows directly operated units to facilitate more cooperation than franchised units. For example, in the hotel industry, hotels of the same multi-unit firm often share employees when one unit temporarily needs more labor. In the case of directly operated hotels, employees tend to make labor contracts with multi-unit hotel firms rather than individual hotels. Thus, directly operated hotels don't need to pay additional labor fees for the shared employees. On the other hand, in case of franchised hotels, employees tend to make labor contracts with a specific franchised hotel rather than multi-unit hotel firms. Thus, sharing employees between directly-operated hotels and franchised hotels is less likely to occur. Second, the preference to types of performance is also different between directly operated and franchised units. As I argued

earlier, multi-unit firms prefer operational performance for directly operated units while they prefer revenues for franchised units to get more revenue-based royalty fees. Thus, multi-unit firms have an incentive to save costs for directly operated units by sharing operational activities and resources, but they don't for franchised units because operational efficiencies of franchised units are not directly related to revenues. In sum, these differences between directly operated and franchised units imply that a multi-unit firm is more likely to create operational synergy if a new unit is directly operated rather than franchised. To take advantage of operation synergy, a multi-unit firm may want to establish a new unit even closer to its own units than competitors if it is directly operated than if it is franchised.

Taken together, I expect that a multi-unit firm will establish a new unit even closer to its incumbent units than to competitors if it is directly operated than if it is franchised. For intra-firm agglomeration, on one hand, a multi-unit firm will do so to reduce monitoring costs created by the type of agency problem that commonly emerges between a multi-unit firm and a unit manager. On the other hand, a multi-unit firm also will do so because directly operated units can lead to more appropriation and protection capabilities than franchised units. For inter-firm agglomeration, in contrast to a directly operated unit, a franchised unit tends to create a conflict of interest to the types of performance (i.e., revenue vs. operating performance) between a multi-unit firm and a franchisee. In addition, when a new unit is directly operated rather than franchised, operational synergy from intra-firm agglomeration is more likely to be created. Therefore, a multi-unit firm has more incentive to choose the new establishment's

location closer to its incumbents than to competitors when it is directly operated than when it is franchised.

Hypothesis 4: A new unit's governance structure moderates the relationship (H1) such that a multi-unit firm will establish a new unit even closer to its incumbent units than to competitors, if the new unit is directly operated rather than franchised.

Summary

In this chapter, I developed a research hypothesis (i.e., Hypothesis 1) to test the difference of geographic distances between intra-firm and inter-firm agglomeration in the research context in which multi-unit firms establish new units near their own units and competitors' units. If the balance between positive and negative externalities captured by multi-unit firms in an agglomeration area tilts more toward positive externalities for intra-firm agglomeration than for inter-firm agglomeration, I expect that multi-unit firms establish their new units closer to their own units than to competitors.

In addition, I investigated a new unit's quality, size, and governance structure as potential contingencies in the difference of geographic distances between intra-firm and inter-firm agglomeration. First, previous studies in agglomeration research argued that if new established units are perceived as contributors (i.e., high quality and large size), firms are less likely to enter agglomerated areas because the new units just strengthen competitors without capturing agglomeration benefits. However, I also argue that this is not the case for intra-firm agglomeration. Multi-unit firms may establish their new units closer to their own units because their units can capture most of positive externalities newly created by the new units, if they are more likely contributors than beneficiaries.

Taken together, I argue that multi-unit firms establish new units closer to their incumbent units (i.e., intra-firm agglomeration) than to competitors (i.e., inter-firm agglomeration) if the new units are more likely contributors than beneficiaries. Second, previous studies in agglomeration research and franchising research suggests that firms establish new units closer to their own units to reduce monitoring costs if the new units are directly operated than if they are franchised. However, I suggest that this is not the case for inter-firm agglomeration because a conflict of interests to the types of performance (i.e., firm-level performance vs. unit-level performance and revenue vs. operating performance) between a multi-unit firm and a franchisee can emerge. Taken together, I suggest that multi-unit firms establish new units closer to their own units (i.e., intra-firm agglomeration) than to competitors (i.e., inter-firm agglomeration) if they are directly operated than if they are franchised.

CHAPTER 5

RESEARCH METHODS

Empirical Setting: The U.S. Hotel Industry

I chose the U.S. hotel industry as a research context to test the hypotheses. The U.S. hotel industry provides some advantages to study intra-firm and inter-firm agglomeration. First, there are large multi-unit hotel firms, and intra-firm and inter-firm agglomeration are popular phenomena. Large multi-unit hotel firms usually operate multiple hotels or have multiple hotel chain brands across geographic markets. Multiple hotel chain brands usually target different product segments (e.g., luxury, upper upscale, upscale, upper midscale, midscale, and economy class), and each chain brand also has multiple establishments across geographic markets. Thus, intra-firm agglomeration can occur not only between chain brands but also within each chain brand of a multi-unit hotel firm. For instance, 22 hotels of Wyndham Worldwide (hereafter Wyndham) were co-located in Sandy Springs-Roswell area of Atlanta in Georgia in 2010.[2] Those 22 hotels belonged to 8 different hotel chain brands of Wyndham (i.e., Days Inn, Howard Johnson, Microtell Inn & Suites, Ramada, Super 8, Travelodge, Wingate by Wyndham and Wyndham), and the maximum number of hotels by chain brand was 6 by Days Inn. Two hotels of the 22 actually located on the same property, and the next closest distance between two hotels was just 0.1 km. The average distance between a focal hotel and the next closest hotel was 2.3 km.

[2] This data came from the STR census data in 2010. STR uses its own definition of geographic markets, called tracts. Sandy Springs-Roswell is also one of the STR tracts, and the number of hotels in the area was computed according to this information.

Second, the U.S. hotel industry also provides a proper setting to compare the traditional concept of agglomeration with intra-firm and inter-firm agglomeration. Many studies have chosen the U.S. hotel industry as a research context to study agglomeration (Baum & Haveman, 1997; Baum & Mezias, 1992; Canina et al., 2005; Kalnins & Chung, 2004; McCann & Vroom, 2010). However, prior research has not disentangled intra-firm agglomeration from inter-firm agglomeration. Thus, previous findings in this industry can be confounded by the competing effects of intra-firm and inter-firm agglomeration. Using the same research context, I can clarify the differences between the two types of agglomeration.

Third, large multi-unit hotel firms mostly rely on the two types of governance structures (i.e., franchising and direct operation) at different levels. For instance, Extended Stay Hotels mostly relies on direct operation for the governance structure of its units (e.g., chain management), but Choice Hotel International mostly relies on franchising. On the other hand, Marriott International uses both types of governance structures. This firm-level heterogeneity in terms of the governance structure provides a proper setting to test the effect of the governance structure on the location decisions of multi-unit firms.

Data and Samples

The major data source in my dissertation is Smith Travel Research (STR). STR is a private firm that collects hotel information across the world. STR data cover over 98% of U.S. hotels (Canina et al., 2005). Thus, STR data are likely to include almost the entire population of large multi-unit hotel firms that are research subjects of my dissertation.

STR provides each hotel's historical census data since 1990, which includes the establishment date, closed date, room size, product segment (i.e., class), parent company, chain affiliation, governance structure, and address. I used STR year-end historical census data to study location decisions of major U.S. multi-unit hotel firms between 1990 and 2013. A new establishment can be observed by comparing the hotel information between adjacent two years, so the data range actually used for my dissertation is 23 years from 1991 to 2013.

I chose 20 major U.S. cities among the entire population of U.S. cities for my dissertation. Because STR allowed me to access to its historical census data only for 20 major U.S. cities, I used a statistical approach to choose the 20 U.S. cities as a representative of the entire population. First, I matched the STR market list with the U.S. census city list. This match allowed me to identify the city list I can choose for samples. Second, among the matched cities, I computed average population growth rate per city between 2000 and 2010 by using U.S. census population data. Because my dissertation aims to study location decisions of multi-unit firms, samples must include new hotel establishments. I used population growth rate as an indicator of hotel demand growth. I assumed that as population growth rate is higher, more new hotels are established in a focal market. Third, I chose 20 U.S. cities using following criteria: 1) isolated cities rather than metropolitan cities to exclude potential city-level location advantages that attract new hotel establishments, 2) exclusion of cities that experienced external shocks (e.g., Hurricane Katrina at New Orleans) and 3) balance between high and low levels of population growth rates.

Table 2. 20 Cities for Samples

City Name	State Name	Average Population	Average Population Growth Rate
Detroit	Michigan	832,611	-24.8%
Cleveland	Ohio	434,551	-16.7%
Memphis	Tennessee	666,939	-5.9%
Minneapolis	Minnesota	380,202	0.1%
Omaha	Nebraska	406,683	0.4%
Atlanta	Georgia	409,447	1.1%
Kansas City	Missouri	449,563	4.2%
Indianapolis	Indiana	798,010	5.0%
Tucson	Arizona	505,516	7.1%
Louisville	Kentucky	573,426	7.9%
Columbus	Ohio	748,634	10.3%
Nashville	Tennessee	569,293	10.3%
Portland	Oregon	550,396	10.6%
Jacksonville	Florida	784,304	11.9%
Sacramento	California	444,798	14.4%
Oklahoma City	Oklahoma	540,864	14.8%
Colorado Springs	Colorado	388,287	15.9%
Austin	Texas	724,717	17.7%
Albuquerque	New Mexico	500,483	21.3%
Charlotte	North Carolina	653,243	27.1%

Note: Average population and average population growth rate per city were computed between 2000 and 2010 by using U.S. census population estimate data.

I ran a Kolmogorov-Smirnov Test to check whether the chosen 20 U.S. cities are statistically different from major 1,000 U.S. cities. The Kolmogorov-Smirnov Test showed that the chosen 20 cities are not statistically different from major 1,000 cities in terms of population growth rates. Average population growth rate of the chosen 20 cities is 6.64%, with a maximum of 27.14% and a minimum of -24.77%. Table 2 lists the 20 cities with average population and average population growth rates between 2000 and 2010.

Because my dissertation focuses on the location decisions of multi-unit firms in terms of intra-firm and inter-firm agglomeration, I selected large multi-unit hotel firms as the focus of my study. I chose 10 large nationwide multi-unit hotel firms that have multiple chain brands across the 20 city markets. Table 3 shows these 10 large multi-unit hotel firms and their chain brands. These 10 multi-unit hotel firms account for approximately 50% of U.S. hotel observations (53,213 out of 107,174 observations) across the 20 U.S. cities between 1991 and 2013 in the samples. In addition, the total number of new hotel establishments was 2,918, and of them the 10 multi-unit hotel firms established 2,029 new hotels in the sample. Thus, approximately 70% of the total number of new hotel establishments were done by these 10 multi-unit hotel firms in the sample. Therefore, I use the 2,029 new hotel establishments by these 10 multi-unit hotel firms as a final sample to test the hypotheses.

Table 3. List of Large Multi-Unit Hotel Firms in Samples

Multi-Unit Hotel Firm	Chain Brands	
Best Western Company	Best Western Best Western Plus	Best Western Premier
Carlson Hospitality Company	Country Inn & Suites Park Plaza	Radisson
Choice Hotels International	Ascend Collection Cambria Suites Clarion Comfort Inn Comfort Suites Econo Lodge	MainStay Suites Quality Inn Rodeway Inn Sleep Inn Suburban Extended Stay
Extended Stay Hotels	Crossland Economy Studios	Extended Stay America
G6 Hospitality	Motel 6	Studio 6
Hilton Worldwide	Conrad DoubleTree Embassy Suites Hampton Inn Hampton Inn & Suites	Hilton Hilton Garden Inn Home2 Suites Homewood Suites
Intercontinental Hotels Group	Candlewood Suites Crowne Plaza Holiday Inn Holiday Inn Express	Hotel Indigo InterContinental Staybridge Suites
LQ Management LLC	La Quinta Inns & Suites	
Marriott International	Autograph Collection Courtyard Fairfield Inn Gaylord J. W. Marriott Marriott	Marriott Conference Center Renaissance Residence Inn Ritz-Carlton Springhill Suites TownePlace Suites
Wyndham Worldwide	Baymont Days Inn Hawthorn Suites by Wyndham Howard Johnson Knights Inn Microtel Inn & Suites by Wyndham Ramada	Ramada Plaza Shell Vacations Club Super 8 Travelodge Wingate by Wyndham Wyndham Wyndham Garden Hotel Wyndham Vacation Resort

Dependent Variable

I use the geographic distance of a new establishment to incumbents as the dependent variable. I measure it by an average geographic distance (km) from a new establishment to adjacent incumbents within a certain range. This distance-based agglomeration measure has been recommended as an alternative to administrative sovereignty- or statistics-based agglomeration measures (i.e., U.S. states, U.S. metropolitan statistics areas, U.S. census divisions, or U.S. zip codes) (McCann & Folta, 2008). However, it is also important to decide the distance range at which the agglomeration externalities extend from a new establishment. To do so, I reviewed previous agglomeration studies using the hotel industry as a research context. According to Baum and Mezias (1992), I decided to use multiple distance ranges for the robustness check rather than only one distance range. Baum and Mezias (1992) used 3 avenues or 25 streets from a new establishment as the distance range of agglomeration in the Manhattan hotel industry, but they also used several alternative distances for robustness checks. Similarly, I first computed average geographic distance from a new establishment to incumbent hotels within 5 km (approximately 3 avenues if one avenue is assumed as 1 mile or 1.7 km). I also check the robustness of my results by using 3 km as an alternative distance range.

To compute geographic distance, I used longitude and latitude information of each hotel in the STR census data. By using longitude and latitude information between a new establishment and an incumbent, I computed the shortest line between two hotels

and then averaged it for the dependent variable.[3] Average geographic distance was separately measured for intra-firm and inter-firm agglomeration.

Independent Variables

Dummy for Intra-Firm Agglomeration

For hypothesis 1, I used a dummy variable for intra-firm agglomeration. If co-located hotels within 5 km from a new hotel are competitors, the dummy variable is 0. However if they belonged to the same multi-unit firm as a new established hotel, the dummy variable is coded as 1.

Dummy for a New Establishment's Quality

For hypothesis 2a and 3a to test the effect of a new establishment's quality on location decisions, I used a dummy variable to capture a new establishment's quality. Previous studies have shown that when a hotel's class is branded upscale or above, a hotel is perceived as more likely a contributor to incumbent hotels (Kalnins & Chung, 2004). However, if it is lower than branded upscale, it is perceived as more likely a beneficiary (Kalnins & Chung, 2004). According to this approach, a dummy variable for the new establishment's quality was coded 1 if a new established hotel class was upscale or above (i.e., luxury, upper upscale, and upscale). However, it was coded 0 if a new established hotel class was lower than upscale (i.e., upper midscale, midscale, and economy).

A New Establishment's Size

For hypothesis 2b and 3b to test the effect of a new establishment's size on location decisions, I use the number of rooms of the new established hotel in the STR

[3] I used STATA geodist command to compute the shortest distance between two hotels by using longitude and latitude information of each hotel.

census data to capture its size. Because I found that the number of rooms is highly skewed, I log-transformed this variable.

Dummy for a Governance Structure

For hypothesis 4 and 5 to test the effect of a new establishment's governance structure on location decisions, I used a dummy variable for the new establishment's governance structure. If a new established hotel was directly operated by a multi-unit firm (i.e., chain management), it was coded as 1. However, if a new established hotel was franchised, it was coded as 0.

Control Variables

I use several control variables to exclude alternative explanations on the distance decisions of multi-unit firms.

Economy-Related Variables

I control for unobservable economy effects by using year dummy variables. Customer demand for travel can vary across years. When negative external shocks occur in a specific year, customer demand for travel is usually low in that year relative to others (Blake & Sinclair, 2003). Then, it is possible that hotel firms establish a new hotel far from incumbents to avoid competition.

I also tried to control for time-varying economic effects. It has been well known that customer demand for travel is partially influenced by overall standards of living (Graham & Glaister, 2004), population growth, and population age (Metz, 2012). To control for these effects, I use U.S. GDP (Gross Domestic Product) in billions of 2015 dollars, the number of U.S. population in millions, and median age of U.S. population

per year. These data come from U.S. Department of Commerce and U.S. census data. However, these variables unfortunately created multicollinearity among themselves and with year dummy variables. Finally, I decided to exclude U.S. GDP, U.S. population and U.S. population median age variables to avoid multicollinearity.

Market-Related Variables

First, I used city dummy variables to control for city-specific unobservable factors. For example, cities can have different regulations with regard to new hotel establishments, such as floor area ratio to mitigate congestion (Joshi & Kono, 2009). These city-specific regulations can influence geographic distance from a new establishment to incumbents. Thus, I compute 19 city dummy variables for 20 city markets to control for these factors. Second, to control time-varying city effects, I use city population in each year. Some city markets attract more travelers than others, and then multi-unit hotel firms are willing to establish a new hotel closer to incumbents in city markets with high demand for travel. I try to control for this effect by using city-level population. I use population (thousand) information of metropolitan statistical area in U.S. census database. Third, I use location dummy variables to control for location-specific characteristics. Multi-unit hotel firms may be unable to find a property to establish a new hotel in urban and airport areas but have little difficulty in suburban and small town areas. Different location characteristics can influence geographic distance from a new establishment to incumbents. STR data places location characteristics into 6 categories – airport, interstate, resort, small metro or town, suburban and urban areas. I compute 5 location dummy variables for the 6 location categories, and the reference location area is an urban area.

Agglomeration-Related Variables

I control for the number of hotels in each product segment in each geographic market for the following two reasons. Kalnins and Chung (2004) showed that the agglomeration effect is specific to each product segment of hotels (e.g., economy, midscale, upper-midscale, upscale, upper-upscale and luxury). As more hotels with high quality (e.g., upscale or luxury hotels) exist in a certain location, a new hotel is more likely to enter this location to benefit from agglomeration externalities. In turn, as more hotels are present near a new established hotel, average distances to them are shorter. On the other hand, the number of hotels in each product segment represents potential market opportunity. If there are a few hotels in a certain product segment, multi-unit hotel firms may have opportunities to serve customers in this segment by establishing new hotels. To control for these effects, I compute the number of hotels in each product segment in each geographic market. I use STR hotel class information as product segments and STR market tract information as boundaries of agglomeration in the STR census data. STR defines market tract as geographic markets. For instance, there are 93 market tracts in 20 cities in this dissertation's sample. Previous studies also used STR market tract as boundaries of agglomeration (Canina et al., 2005). According to STR hotel class information (i.e., economy, midscale, upper-midscale, upscale, upper-upscale and luxury), I used six variables for the number of hotels in each product segment per market tract.

I also tried to control for ownership-based agglomeration. Previous studies show that geographic co-location also is affected by ownership such as multi-outlet ownership in which a single franchisee has multiple franchised units in the same market (Kalnins &

Lafontaine, 2004; Kaufmann & Dant, 1996; Perryman & Combs, 2012). However, I found that there are no hotels owned by the same franchisee in the same cities in the STR census data. Therefore, I conclude that the ownership-based agglomeration is not a threat to my dissertation's model as an omitted variable.

Firm-Related Variable

Multi-unit hotel firms often have multiple hotel chain brands. For example, Marriot International has 12 chain brands (e.g., Courtyard, Fairfield Inn Marriott, Springhill Suites, TownePlace Suites, etc.) and Wyndham Worldwide has 15 (Days Inn, Ramada, Hawthorn Suites, Howard Johnson, Super 8, Travelodge, etc.) in my dissertation's sample. Hotels of the same chain brand tend to serve customers in the same product segment. Thus, if multi-unit hotel firms already have a certain chain-brand hotels in a geographic market, they are less willing to establish a new hotel with the same chain brand to avoid potential competition with the incumbent. To control for this effect, I compute the number of same brand hotels of a multi-unit hotel firm in each STR market tract.

Establishment-Related Variables

Product differentiation has been considered to be a potential factor to influence geographic distances to incumbents (Baum & Haveman, 1997; Freedman & Kosová, 2012). Following Baum and Haveman (1997), I used price and size distance to control for this effect, based on Euclidean distances. STR assigns one of five price segments to each hotel (i.e., budget, economy, midscale, upscale, and luxury). Similarly, I assign a 5-point Likert scale to STR price segments (i.e., budget=1, economy=2, midscale=3, upscale=4, and luxury=5) and compute price distance of a new establishment to incumbents as follows.

$$Price\ distance_i = \sqrt{\sum_{j \neq i} (P_i - P_j)^2}$$

where P_i is a price segment of a new hotel i, and P_j is a price segment of an incumbent within 5 km from a new hotel i. I also compute size distance of a new establishment to incumbents as follows.

$$Size\ distance_i = \sqrt{\sum_{j \neq i} (S_i - S_j)^2}$$

where S_i is the number of rooms of a new hotel i, and S_j is the number of rooms of an incumbent within 5 km from a new hotel i.

Main Analysis

The research context in my dissertation showed that the same multi-unit hotel firms established new hotels repeatedly between 1991 and 2013. In this case, Ordinary Least Squares (OLS) can generate biased coefficients because of unobserved firm-specific heterogeneities in the error term (Wooldridge, 2006). Thus, I will use fixed-effects models to control for time-invariant unobservable firm heterogeneities. Specifically, I computed 9 firm dummy variables for 10 multi-unit hotel firms in the sample and include these variables in OLS models, which are equivalent to fixed-effects models.

Supplementary Analyses

I conducted several supplementary analyses as robustness checks of the main analysis. First, I used 3 km as an alternative boundary of agglomeration in the supplementary analysis. From my review of the agglomeration literature, I found that 5

km (or approximately 3 miles) has been used as a boundary of agglomeration in the hotel industry setting. While the 5 km boundary is proper to represent the extent to which agglomeration externalities (either positive or negative) extend in rural or suburban areas, it is possible that it is relatively wide for urban areas. To consider this possibility, I computed the average distances from a new hotel to incumbents within 3 km as an alternative dependent variable. I also measured price and size distance by using the 3 km boundary as control variables.

Second, I checked for the possibility that the distance difference between intra-firm and inter-firm agglomeration cancels out when an average distance is used for the dependent variable. It is possible that geographic distances for intra-firm and inter-firm agglomeration have similar average values but different distributions within boundaries of agglomeration. In this case, the average distances as the dependent variable may not capture this difference. Thus, I used a dyadic geographic distance between a new hotel and an incumbent as the dependent variable instead of an average geographic distance.

Third, I used the Tobit model for a robustness check. The dependent variable in my dissertation is an average geographic distance from a new established hotel to incumbents within a 5 km as a boundary of agglomeration. Thus, geographic distances are strictly positive values, but also can be zero. For instance, some hotels often have the same address in the STR census data. I checked the cases of hotels having the same address from a STR hotel expert, confirming that hotels often operate in the same property or building. Thus, if the STR census data show hotels of the same address, it means that a geographic distance between hotels is zero. When a nontrivial fraction of geographic distances is zero, OLS can estimate negative predicted values for an average

geographic distance that is actually strictly positive (Wooldridge, 2006). To consider this censoring problem, I use Tobit models including the same variables of the main OLS fixed-effects models (Maddala, 1987).

Fourth, I checked for a potential sample selection bias in my dissertation's model. Sample selection is one of sources to result in endogeneity (Certo, Busenbark, Woo, & Semadeni, 2016; Heckman, 1979; Wooldridge, 2006). In my dissertation's model, an average geographic distance of a new hotel to incumbents as the dependent variable is observable only after the new hotel is established. In other words, it is possible that a hotel firm decides whether to establish a new hotel in a certain geographic market first and then that it decides a specific location of a new hotel (i.e., geographic distances of a new hotel to incumbents). In this case, a new hotel establishment decision can be considered to be the first stage model, and a geographic distance decision can be the second stage model. If the independent variables influencing a geographic distance decision of a new hotel (i.e., the second stage model) also influence a hotel establishment decision (i.e., the first stage model), sample selection bias can exist (Certo et al., 2016; Wooldridge, 2010). To consider the potential sample selection bias in my dissertation's model, I use a Heckman two-stage model (Heckman, 1979). The first stage model is the new hotel establishment decisions of a multi-unit hotel firm in geographic markets. I measured whether each multi-unit hotel firm established new hotels in each STR market tract in each year. I coded 1 if a multi-unit hotel firm established new hotels in each STR market in each year, and 0 if not. There are 93 STR market tract and 10 multi-unit hotel firms between 1991 and 2013 (23 years) in the sample, so the total observation for the first stage model is 21,390. I used a probit model for the first stage model using the

independent variables of the second stage model as well as two exclusion restrictions – the number of hotel failures and the number of hotels of a multi-unit hotel firm in a geographic market. If many hotels are close in a geographic market, it shows that the market is not attractive for establishing a new hotel. Thus, I computed the number of closed hotels in each STR market tract in each year. In addition, as a multi-unit hotel firm already has more hotels in a geographic market, it is more likely to establish a new hotel because it understands the market and benefits from intra-firm agglomeration. Accordingly, I also computed the number of hotels of each multi-unit hotel firm in each STR market tract in each year. Using estimates of the first stage probit model, I computed the inverse Mills ratio (IMR) and include it to the second stage OLS fixed-effects model (Heckman, 1979). Because the second stage model tends to suffer from heteroskedasticity when IMR is included (Wooldridge, 2010), I used Huber-White standard errors to correct for potential heteroscedasticity.

Summary

This chapter describes research methods to test the hypotheses developed in Chapter 4. I provided the reasons for choosing the U.S. hotel industry as the research context and the procedure for selecting 20 major U.S. cities from the STR (data provider) database. I also introduced variables, their measurements, main analysis and supplementary analyses for testing the hypotheses.

CHAPTER 6

RESULTS

Descriptive Statistics

Appendix A reports descriptive statistics of the sample for the main analysis, including mean values, minimum values, maximum values, and correlation coefficients for all the variables. I initially found a total of 2,081 new hotel establishments, but I finally used 1,290 of them because of missing values of the independent variables and no incumbent hotels within a 5 km from the new hotel. Because I computed an average geographic distance from a new hotel to incumbent competitors and the same parent firm's hotels separately, there is a total of 1,680 observations for the main analysis.

I checked for potential multicollinearity in the sample. All correlation coefficients are lower than 0.6. I also checked variance inflation factors (VIFs) between variables in the sample by using the OLS model. The OLS model includes an average geographic distance as the dependent variable and all independent and control variables, but excludes year dummy, city dummy, firm dummy, and interaction variables because they tend to create multicollinearity among themselves. The average VIF value is 1.83, the minimum 1.05, and the maximum 3.91. Therefore, I concluded that multicollinearity is not a serious threat to the sample.

Main Analysis

Appendix B reports the results of fixed-effects OLS models as a main analysis. Model 1 includes only control variables, and Model 2 adds the dummy for intra-firm agglomeration as a main independent variable to test the Hypothesis 1. Model 3-5

includes additional interaction variables with a new hotel's quality, size and governance structure (i.e., the dummy for a franchised hotel) to test Hypotheses 2-4 respectively. All models include 22 year dummies for 23 years, 19 city dummies for 20 cities, and 9 parent firm dummy variables for the 10 multi-unit hotel firms in the sample. Therefore, these OLS models are equivalent to fixed-effects models that control for unobservable firm, city, and year heterogeneities.

The effects of control variables are as I expected, and their directions and statistical significances are relatively consistent across Models 1-5. First, I found significant effects of location characteristics on average geographic distance. Multi-unit hotel firms established new units closer to incumbents in interstate areas (e.g., highway ramps) than in urban areas, but farther in suburban areas than in urban areas. This result is consistent with Chung and Kalnins's (2001) finding that agglomeration externalities are different between rural and urban areas. Second, the number of hotels in product segments has a significant effect on average geographic distance. As the number of hotels especially in upscale and economy segments increase, new units tend to be established farther from incumbents. These results show that multi-unit hotel firms try to avoid competition by establishing a new hotel far away from incumbents. Third, I find that price distance has a positive effect, while size distance doesn't have a significant effect on average geographic distance. Baum and Haveman (1997) found that when hotel firms decided price and size dimensions of new hotels in Manhattan, they tried to differentiate the new hotels by size but not by price. Unlike Baum and Haveman (1997), I find that new hotels were differentiated by price not by size in my sample.

Hypothesis 1 is supported. In Model 2, the dummy for intra-firm agglomeration has a negative effect on average geographic distance (β=-1.032; $p<.001$). This means that a multi-unit hotel firm establishes new units, on average, 1.032 km closer to its own hotels than to competitors. When I computed the predicted geographic distance of a new unit in Model 2, it is 2.097 km from competitors but 1.065 km from units of the same parent firm. Because I used 5 km as a boundary of agglomeration, 1 km distance difference on average between intra-firm and inter-firm agglomeration is considered to be the strong effect.

Hypothesis 2 is supported. In Model 3, there is the negative moderation effect of a new unit's quality (β=-0.275; $p<.01$). Figure 3 shows this moderation effect. In Figure 3, compared with midscale and economy hotels (i.e., low quality hotels), upscale and luxury hotels (i.e. high quality hotels) are likely to be established closer to a parent hotel firm's own units than to competitors in my dissertation sample. When a new unit's quality is lower than upscale, its distances both to its parent firm's own other and competitors are over than 2 km and very close (2.12 km and 2.06 km respectively). However, when a new unit's quality is upscale or above, its distance to its parent firm's units is even shorter than 1 km (0.87 km), but to competitors is over than 1 km (1.21 km). Therefore, the distance difference between intra-firm and inter-firm agglomeration becomes wider as a new unit's quality increases.

Figure 3. Moderation Effect of a New Hotel's Quality (DV: Average Distance)

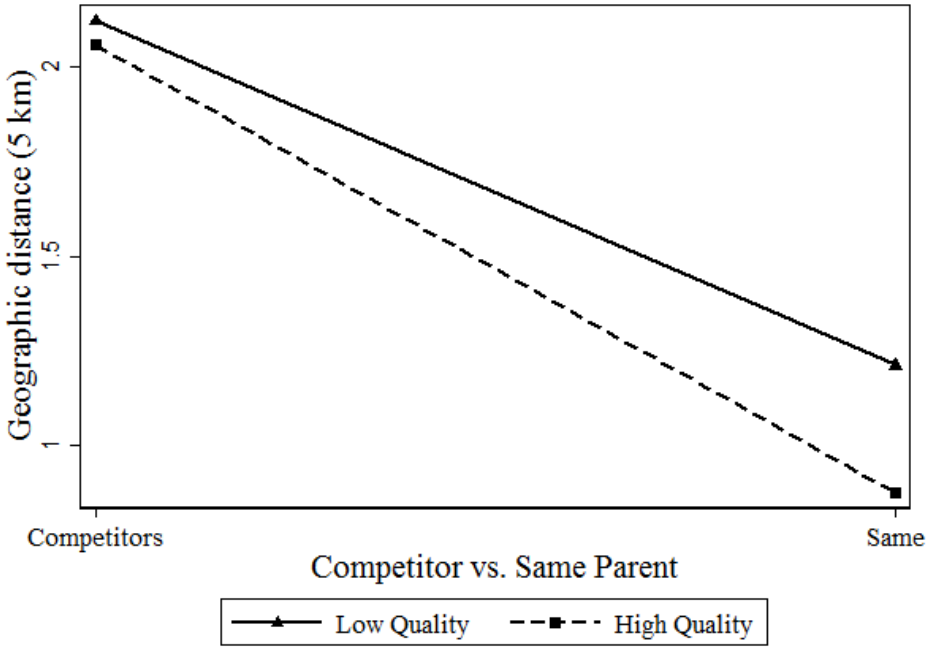
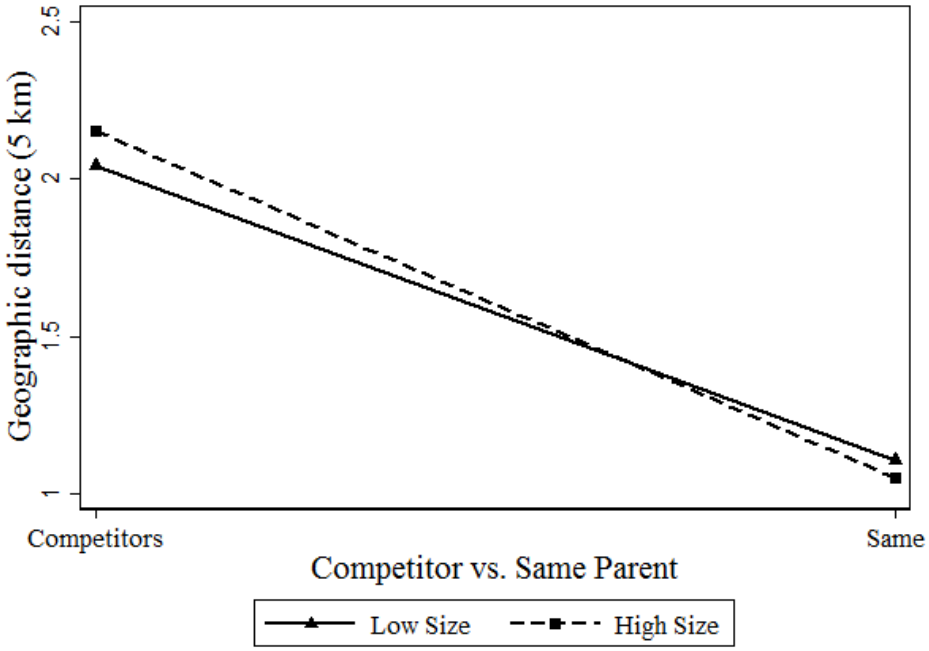


Figure 4. Moderation Effect of a New Hotel's Size (DV: Average Distance)



Hypothesis 3 is also supported. In Model 4, there is a significant negative moderation effect of a new unit's size (β=-0.181; p<.1). Because a new unit's size is log-transformed, the coefficient can be interpreted as the percentage effect. Compared with a distance to competitors, it is 0.181 km closer to hotels of the same parent firm as the new unit's size (i.e., the number of rooms) increases by 1 percent. Figure 4 shows this moderation effect of a new unit's size.

However, Hypothesis 4 is not supported. In Model 5, the moderation effect of a new franchised unit is positive but not statistically significant (β=0.033). Therefore, I cannot find statistical evidence that whether a multi-unit hotel firm establishes a new unit farther from its own hotels than to competitors if it is franchised rather than directly operated. One potential reason is that there is relatively small variation in a dummy for a new franchised unit. In Appendix A, the mean value of a dummy for a new franchised unit is 0.9. Multi-unit hotel firms have chosen a growth strategy by building more franchised hotels in order to overcome financial resource scarcity, local knowledge, and agency problems (Combs et al., 2004; Michael, 1996; Perryman & Combs, 2012; Weaven & Frazer, 2007). In fact, the percent of franchised units of multi-unit hotel firms has continued to grow over time in the sample. It was just 18.68% in 1990, but continued to grow such that it became 44.24% in 2000, 73.26% in 2010, and 81.48% in 2013 in the sample. Therefore, most of new established units were franchised in the sample.

Supplementary Analysis: Alternative Boundary of Agglomeration (3 km)

Appendix C reports the results using 3 km as an alternative boundary of agglomeration. I just adjusted the boundary of agglomeration, so the number of observations and the OLS model specifications are same as the main analysis.

Most of the results are consistent with the main analysis. Hypothesis 1 is supported such that the effect of a dummy for intra-firm agglomeration is significantly positive (β=-0.464; p<.001) in Model 2. This means that the average distance to hotels of the same parent firm is 0.464 km shorter than that to competitors if 3 km is used as an alternative boundary of agglomeration. Hypothesis 2 is also supported. The moderation effect of a new unit's quality is significantly negative (β=-0.215; p<.001) in Model 3. Hypotheses 3 is not supported. The moderation effect of a new unit's size is negative, but not statistically significant (β=-0.079) in Model 4. Similarly, Hypothesis 4 is not supported.

Supplementary Analysis: Dyadic Distance

Appendix D reports the results of the OLS models that use a dyadic distance from a new hotel to an individual incumbent hotel within 5 km as the dependent variable, so the number of observations increases to 20,254. Except for the dependent variable, independent and control variables are same as the main analysis.

The results of the OLS models are exactly consistent with the main analysis. Hypothesis 1 is supported. The effect of a dummy for intra-firm agglomeration is significantly negative (β=-0.326; p<.001) in Model 2. Hypotheses 2 and 3 are also supported. The moderation effects of a new hotel's quality (β=-0.359; p<.001) and size (β=-0.298; p<.001) are significantly negative in Model 2 and 3 respectively. One interesting finding in this supplementary analysis is that the negative moderation effect of size becomes stronger in this supplementary analysis. This result shows the possibility that the weak moderation effect of a new hotel unit's size results from using the average

Figure 5. Moderation Effect of a New Hotel's Quality (DV: Dyadic Distance)

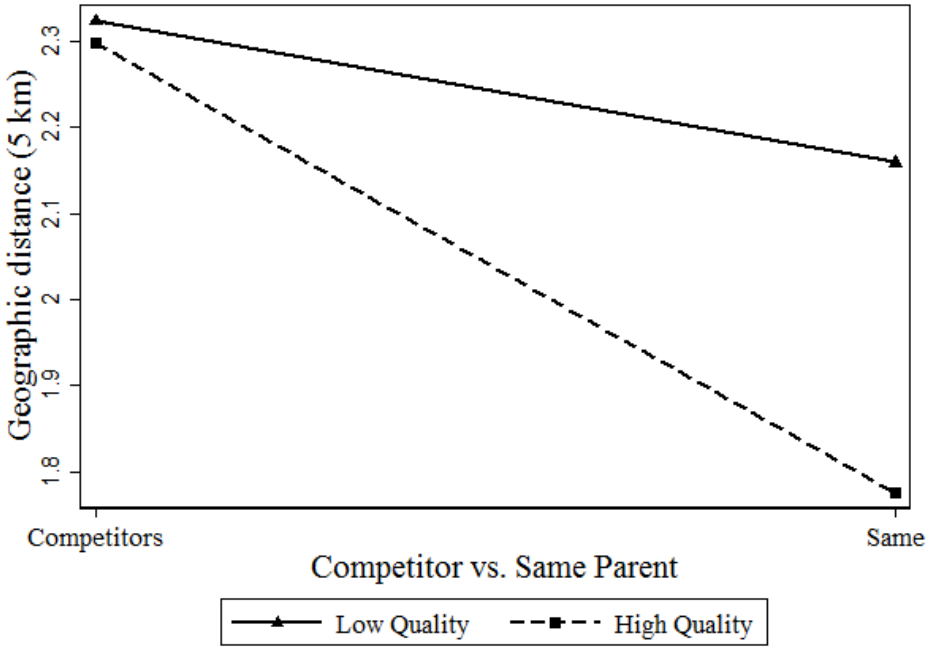
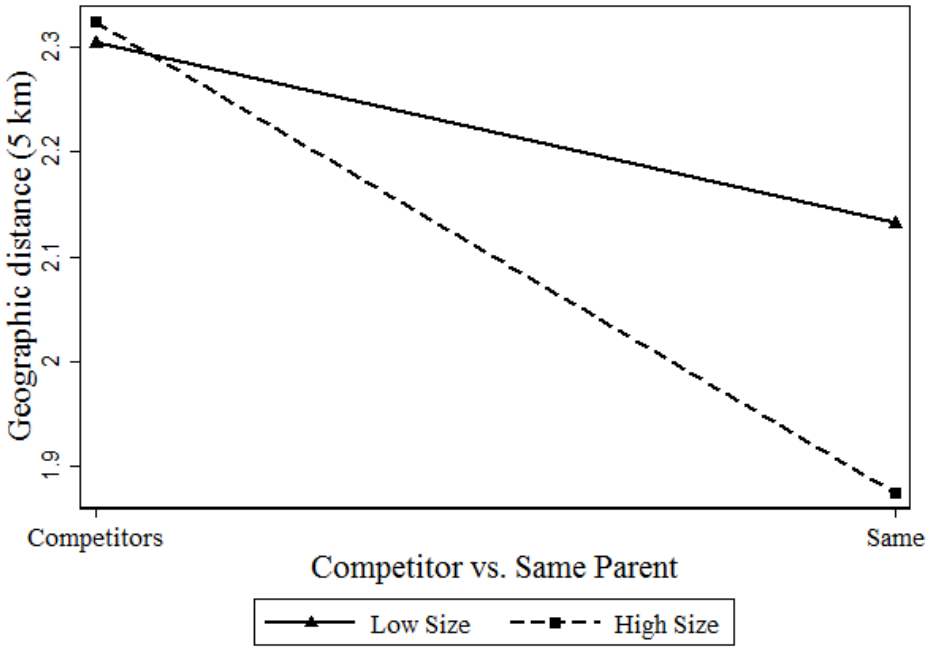


Figure 6. Moderation Effect of a New Hotel's Size (DV: Dyadic Distance)



distance in the main analysis. Figure 5 and 6 show these negative moderation effects. In addition, Hypothesis 4 is not supported as the moderation effect of a dummy for a new franchised hotel is positive but not significant (β=0.087).

Supplementary Analysis: Tobit Model

Appendix E reports the results of the Tobit models. In this supplementary analysis, I used the Tobit model to control for potential left-censoring because a geographic distance from a new hotel to incumbents can be 0 km. The number of observations and independent and control variables are same as the main analysis.

The results of the Tobit models are exactly consistent with the main analysis. Because the Tobit model is non-linear, the interpretation of the coefficients is different from the OLS model (Wooldridge, 2006). However, the direction of the coefficients shows that Hypotheses 1 is supported. The effect of a dummy for intra-firm agglomeration is significantly negative (β=-1.033; p<.001) in Model 2. Hypotheses 2 and 3 are also supported. The moderation effects of a new hotel unit's quality (β=-0.274; p<.01) and size (β=-0.181; p<.05) are significantly negative in Model 3 and 4 respectively. However, Hypothesis 4 is not still supported such that the moderation effect of a dummy for a new franchised hotel is not significant (β=0.034).

Supplementary Analysis: Sample Selection Model

I used a Heckman two-stage model to check for a potential sample selection problem. Appendix F shows the results of the first stage probit model using the two exclusion restrictions (instruments) – the number of hotel failures and the number of hotels of a parent firm. In the first stage probit model, I included only variables of the

main analysis that are observable before a new hotel establishment (Wooldridge, 2010). Thus, new hotel-related variables (e.g., a new hotel's quality, size, franchise and intra-firm agglomeration) cannot be included in the first stage model. The results show that the effect of number of hotels of a parent firm is strongly significant (β=0.027; $p<.001$). I compute the IMR using the estimates of the first stage probit model. The correlation coefficients between independent variables (i.e., intra-firm agglomeration, a new hotel's quality, size, and franchise) and the IMR are also relative low, ranging from |0.056| to |0.216|. Taken together, these results show some evidence that the first stage model has relatively strong exclusion restrictions (Certo et al., 2016).

Appendix G shows the results of the second stage OLS model including the IMR. Although the coefficients of the IMR are significantly negative, the results of the Heckman two-stage models are exactly consistent with the main analysis. Hypothesis 1 is supported such that the effect of a dummy for intra-firm agglomeration is significantly negative (β=-1.055; $p<.001$) in Model 1. Hypotheses 2 and 3 are also supported, so the moderation effects of a new hotel's quality (β=-0.254; $p<.01$) and size (β=-0.171; $p<.05$) are significantly negative in Model 2 and 3. However, Hypothesis 4 is not supported in Model 4.

Summary

In this chapter, I tested the hypotheses in the main and the supplementary analyses. The main analysis was the fixed-effects OLS model controlling for unobservable parent firm heterogeneity. I also tried using an alternative boundary of agglomeration (i.e. 3 km), a dyadic distance as the dependent variable instead of an

average distance, a Tobit analysis for a potential censoring problem, and a Heckman two-stage analysis for a potential sample selection problem.

First, I found that multi-unit hotel firms tended to establish new hotels closer to their own hotels than to competitors in the sample. This result is consistent whether I use different boundaries of agglomeration (i.e., 5 km or 3km) and different measures of geographic distances (i.e., average or dyadic distances). Second, the distance difference between intra-firm and inter-firm agglomeration becomes wider as a new hotel's quality and size increases. Thus, the geographic distance to hotels of the same parent firm was much shorter than that to competitors as a new hotel was upscale or above and had a large number of rooms. The empirical evidence on these moderating effects are more salient when I used 3 km as a boundary of agglomeration instead of 5 km, dyadic distances as the dependent variable, the Tobit model and the Heckman two-stage model in the sample. Third, I couldn't find any empirical evidence that multi-unit firms established new hotels much closer to their own hotels than to competitors if they are franchised rather than directly operated. This result was not consistently significant in any of the main or supplementary analyses.

In sum, I found that the results of the main analysis and the supplementary analyses are consistent. From these consistent empirical evidence, I conclude that the results reported in this chapter are robust.

CHAPTER 7

CONCLUSION AND DISCUSSION

The key questions of my dissertation are 1) how intra-firm and inter-firm agglomeration are different and 2) how these differences influence the location decisions of multi-unit firms. I considered the differences between intra-firm and inter-firm agglomeration to be one of the potential factors to understand the inconsistent research findings in the agglomeration literature – positive operational performance from the positive externality perspective and low survival rates from the negative externality perspective. I expected that multi-unit firms face varying levels of positive and negative externalities in terms of intra-firm and inter-firm agglomeration. The balance between positive and negative externalities may tilt more toward positive for intra-firm agglomeration than for inter-firm agglomeration. In addition, multi-unit firms are more likely to enjoy operational synergy from intra-firm agglomeration than from inter-firm agglomeration. These differences can influence the location decisions of multi-unit firms such that multi-unit firms establish new units closer to their own units than to competitors. I also investigated a new unit's quality, size, and governance structure as potential contingencies in the difference of geographic distances between intra-firm and inter-firm agglomeration.

I developed hypotheses to test these differences between intra-firm and inter-firm agglomeration and the effects of these differences on the location decisions of multi-unit firms. Specifically, I tested the hypotheses in the U.S. hotel industry in which 10 large multi-unit hotel firms established new hotels near their own hotels and competitor hotels

in 20 major U.S. cities for 23 years (between 1991 and 2013). I found that large multi-unit hotel firms, in fact, established new hotels closer to their own hotels than to competitors and that these distance differences were wider as a new hotel's quality and size increased. In other words, multi-unit hotel firms established new hotels even much closer to their own hotels than to competitors as a new hotel's quality was upscale or above and its number of rooms increased. These results remained robust in several supplementary analyses.

Contributions

My dissertation makes several contributions to the agglomeration literature. First, I introduce a new concept of intra-firm agglomeration which is distinct from inter-firm agglomeration. While previous studies in the agglomeration literature have not distinguished between intra-firm and inter-firm agglomeration, this distinction is important because the two types of agglomeration are compositionally different so that they can provide theoretically different implications. For example, each agglomeration can have different levels of intra-firm or/and inter-firm agglomeration in terms of components of agglomeration. Intra-firm agglomeration can be dominant in one cluster, while inter-firm agglomeration can be dominant in another cluster. Because the balance between positive and negative externalities and operational synergy effects vary between intra-firm and inter-firm agglomeration, the traditional concept of agglomeration may mislead us about the effect of agglomeration when the researcher fails to consider the presence of both types of agglomeration in a cluster.

Second, a comparison between intra-firm and inter-firm agglomeration can provide another reason why the agglomeration literature has resulted in the paradox of competing empirical evidence between positive and negative externalities – that is, positive operational performance from the positive externality perspective and low survival rates from the negative externality perspective. If firms are exposed to varying levels of positive and negative externalities resulting from intra-firm and inter-firm agglomeration, the two types of agglomeration should be considered to be important contingencies in the agglomeration literature. The balance between positive and negative externalities can tilt toward positive as intra-firm agglomeration is more dominant in a cluster, but the opposite case can happen in another cluster. Put differently, depending on different levels of intra-firm and inter-firm agglomeration, firms can be exposed to either more positive or negative externalities.

Third, my dissertation shows that the location decisions of multi-unit firms are more complex than previous studies have suggested. When multi-unit firms choose their new establishment's location, they should consider geographic distance not only to competitors but also to their own business establishments. This situation opens a possibility that multi-unit firms strategically choose their establishments' distances to competitors and to their own establishments differently to maximize positive externalities and to minimize negative externalities. For example, assuming inter-firm agglomeration, Baum and Haveman (1997) found that when hotel firms established new hotels close to competitors in Manhattan, they differentiated the new hotels by size but not by price in order to benefit from positive externalities but avoid localized

competition. My dissertation's finding shows that intra-firm vs. inter-firm agglomeration has strong effects on the location decisions of multi-unit hotel firms beyond and above size and price differentiation. Multi-unit hotel firms established new hotels 1 km on average closer to their own hotels (i.e., average distance = 1.065 km) than to competitors (i.e., average distance = 2.097 km) within 5 km boundary of agglomeration in my sample (Model 2 in Appendix B). In addition, R-square increased from 0.161 (Model 1 in Appendix B) to 0.356 (Model 2 in Appendix B) after including a dummy variable for intra-firm agglomeration, suggesting that intra-firm vs. inter-firm agglomeration explains more variation of geographic distance decisions of multi-unit firms than all of the control variables together (e.g., price and size differentiation). Therefore, my dissertation shows that different types of agglomeration are important factors in the location decisions of multi-unit firms.

Limitations and Future Research

My dissertation is not perfect and has some limitations, but I believe that they can open new opportunities for future research. First, one way to investigate the varying balance between positive and negative externalities is to test firm performance directly. If the balance tilts more toward positive for intra-firm agglomeration than for inter-firm agglomeration, performance of new or incumbent units (e.g., operational performance or survival rates) becomes more positive for intra-firm agglomeration than for inter-firm agglomeration. Because performance information for individual hotels is not available in my sample, my dissertation tested geographic distance differences between intra-firm and inter-firm agglomeration as an alternative. Future research may investigate how

operational performance or survival performance varies between intra-firm and inter-firm agglomeration. Specifically, according to my dissertation's theoretical framework, I expect that as intra-firm agglomeration becomes more dominant in a cluster, new or incumbent units are likely to have more positive operational performance (e.g., revenues) and higher survival rates. If future research provides additional empirical evidence on the different effects of intra-firm vs. inter-firm agglomeration on firm performance, my dissertation's theoretical framework can receive more direct support.

Second, one unexpected result is that a new hotel's governance structure (i.e., direct operation vs. franchising) had no significant effect on the geographic distance difference between intra-firm and inter-firm agglomeration despite of theoretical expectation and some anecdotal evidence from an interview with a hotel manager. One potential reason is that I considered only a new hotel's governance structure but not the incumbents' governance structure. It is possible that only when a new hotel and incumbents both are directly operated, multi-unit hotel firms tend to establish the new hotel closer to their own incumbents. Because I used an average distance from a new hotel to incumbents, I couldn't consider governance structures of incumbents. Thus, incumbents could be mixed with directly operated and franchised hotels. In this case, the effect of a new hotel's governance structure can be also contingent on incumbents' governance structure. Another potential reason is that multi-unit hotel firms have established mostly franchised hotels rather than directly operated hotels in two decades in my sample. In fact, approximately 90% of new established hotels were franchised in my sample. Although I included some market and firm-level characteristics as control

variables, it is possible that there are some unobservable factors affecting the governance structure decisions of multi-unit hotel firms and that my dissertation's model failed to include some influential factors behind the governance structure decision. For example, Perryman and Combs (2012) suggested that geographic distance from a new unit to headquarters of multi-outlet firms is an important aspect of the governance structure decision as it affects monitoring costs. Perryman and Combs (2012) considered multi-outlet ownership to exist when one franchisee has multiple units linked to the same franchisor. Although I did not find any multi-outlet ownership in my sample, this type of monitoring cost can be a factor of the governance structure in the hotel industry. In sum, future studies need to consider the effect of the match of governance structure on the location decisions of multi-unit firms and other potential factors behind the governance structure decision. Those studies may help understand why the effect of governance structure is not significant on the geographic distance differences between intra-firm and inter-firm agglomeration in my sample.

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APPENDIX A

DESCRIPTIVE STATISTICS

Appendix A. Descriptive Statistics

	Variable	Mean	S.D.	Min	Max	1	2	3
1	Geographic distance (within 5km)	1.8	1.0	0.0	4.2	1.00		
2	City population	2037.3	1305.4	464.8	5522.9	-0.03	1.00	
3	Airport	0.1	0.3	0.0	1.0	-0.01	-0.03	1.00
4	Interstate	0.1	0.2	0.0	1.0	-0.17	0.05	-0.10
5	Resort	0.0	0.1	0.0	1.0	-0.01	-0.07	-0.04
6	Small metro/town	0.0	0.1	0.0	1.0	-0.04	-0.02	-0.05
7	Suburban	0.6	0.5	0.0	1.0	0.11	0.07	-0.54
8	Number of luxury hotels	0.5	1.2	0.0	10.0	0.04	-0.01	-0.11
9	Number of upper upscale hotels	2.8	2.4	0.0	15.0	0.01	0.19	0.08
10	Number of upscale hotels	5.3	3.8	0.0	28.0	0.08	0.09	0.05
11	Number of upper midscale hotels	8.6	5.2	0.0	28.0	-0.02	0.16	-0.03
12	Number of midscale hotels	7.6	4.2	0.0	26.0	0.00	0.15	0.09
13	Number of economy hotels	25.9	13.6	0.0	75.0	-0.02	0.24	-0.01
14	Number of same brand hotels	0.6	1.0	0.0	7.0	-0.09	0.12	-0.13
15	Price distance	5.7	3.0	0.0	18.2	0.23	-0.11	0.24
16	Size distance	396.2	513.2	0.0	10723.5	0.07	0.06	0.08
17	Dummy for quality of a new hotel	0.3	0.5	0.0	1.0	-0.04	0.02	0.05
18	Size of a new hotel	4.6	0.5	3.3	8.0	0.04	0.05	0.05
19	Dummy for franchise	0.9	0.3	0.0	1.0	-0.07	-0.09	0.03
20	Intra-firm agglomeration	0.3	0.4	0.0	1.0	-0.43	-0.01	0.05

	Variable	4	5	6	7	8	9	10
5	Resort	-0.03	1.00					
6	Small metro/town	-0.03	-0.01	1.00				
7	Suburban	-0.34	-0.15	-0.16	1.00			
8	Number of luxury hotels	-0.06	0.22	0.00	-0.18	1.00		
9	Number of upper upscale hotels	-0.14	0.13	-0.02	-0.32	0.47	1.00	
10	Number of upscale hotels	-0.21	0.11	-0.04	0.05	0.30	0.35	1.00
11	Number of upper midscale hotels	0.03	0.14	0.06	0.05	0.18	0.14	0.47
12	Number of midscale hotels	0.11	0.12	0.07	0.02	0.09	-0.04	0.21
13	Number of economy hotels	0.22	0.01	0.05	0.07	-0.02	-0.18	-0.07
14	Number of same brand hotels	0.23	0.00	0.21	0.00	-0.04	-0.02	0.00
15	Price distance	-0.18	-0.07	-0.11	-0.24	0.12	0.20	0.12
16	Size distance	-0.15	0.08	-0.08	-0.34	0.24	0.48	0.11
17	Dummy for quality of a new hotel	-0.15	0.02	-0.09	-0.13	0.13	0.18	0.13
18	Size of a new hotel	-0.21	-0.01	-0.13	-0.20	0.16	0.31	0.20
19	Dummy for franchise	0.08	0.00	0.04	-0.03	-0.02	-0.05	-0.02
20	Intra-firm agglomeration	-0.07	-0.01	-0.06	-0.06	0.02	0.09	0.07

1. Year dummy, city dummy, and parent firm dummy variables are excluded for the limited space.
2. The correlation coefficient is statistically significant at 5% of the p-value if the coefficient is larger than |0.0486|.

Appendix A. Descriptive Statistics (Continued)

	Variable	11	12	13	14	15	16	17	18	19
12	Number of midscale hotels	0.57	1.00							
13	Number of economy hotels	0.44	0.57	1.00						
14	Number of same brand hotels	0.28	0.19	0.28	1.00					
15	Price distance	-0.06	0.01	-0.10	-0.25	1.00				
16	Size distance	-0.11	-0.21	-0.26	-0.17	0.40	1.00			
17	Dummy for quality of a new hotel	0.03	-0.07	-0.17	-0.20	0.30	0.28	1.00		
18	Size of a new hotel	-0.03	-0.15	-0.29	-0.25	0.36	0.58	0.53	1.00	
19	Dummy for franchise	0.13	0.11	0.13	0.11	-0.04	-0.18	-0.05	-0.29	1.00
20	Intra-firm agglomeration	-0.01	-0.04	-0.05	-0.06	0.10	0.12	0.17	0.12	0.06

1. Year dummy, city dummy, and parent firm dummy variables are excluded for the limited space.
2. The correlation coefficient is statistically significant at 5% of the p-value if the coefficient is larger than |0.0486|.

APPENDIX B

RESULTS OF FIXED-EFFECTS OLS MODEL (DV: AVERAGE DISTANCE WITHIN 5 KM)

Appendix B. Results of Fixed-Effects OLS Model (DV: Average Distance within 5 km)

	Geographic distance (within 5km)				
	Model 1	Model 2	Model 3	Model 4	Model 5
Year dummy	Included	Included	Included	Included	Included
City dummy	Included	Included	Included	Included	Included
Firm dummy	Included	Included	Included	Included	Included
City population	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Airport	-0.054 (0.106)	-0.068 (0.093)	-0.068 (0.093)	-0.074 (0.093)	-0.067 (0.093)
Interstate	-0.340* (0.140)	-0.426*** (0.123)	-0.423*** (0.123)	-0.425*** (0.123)	-0.426*** (0.123)
Resort	0.331 (0.254)	0.257 (0.222)	0.274 (0.222)	0.240 (0.222)	0.257 (0.223)
Small metro/town	0.041 (0.223)	-0.143 (0.195)	-0.129 (0.195)	-0.129 (0.195)	-0.142 (0.195)
Suburban	0.228* (0.097)	0.164^{+} (0.085)	0.162^{+} (0.085)	0.158^{+} (0.085)	0.164^{+} (0.085)
Number of luxury hotels	-0.001 (0.027)	-0.023 (0.023)	-0.022 (0.023)	-0.022 (0.023)	-0.023 (0.023)
Number of upper upscale hotels	-0.008 (0.014)	0.001 (0.013)	0.000 (0.012)	0.001 (0.013)	0.001 (0.013)
Number of upscale hotels	0.026** (0.009)	0.034*** (0.008)	0.033*** (0.008)	0.034*** (0.008)	0.034*** (0.008)
Number of upper midscale hotels	0.006 (0.008)	0.002 (0.007)	0.002 (0.007)	0.002 (0.007)	0.002 (0.007)
Number of midscale hotels	-0.011 (0.009)	-0.009 (0.008)	-0.010 (0.008)	-0.010 (0.008)	-0.009 (0.008)
Number of economy hotels	0.004 (0.003)	0.004^{+} (0.002)	0.004^{+} (0.002)	0.004^{+} (0.002)	0.004^{+} (0.002)
Number of same brand hotels	-0.007 (0.027)	-0.015 (0.024)	-0.012 (0.024)	-0.013 (0.024)	-0.015 (0.024)
Price distance	0.089*** (0.010)	0.092*** (0.009)	0.092*** (0.009)	0.092*** (0.009)	0.092*** (0.009)
Size distance	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Dummy for quality of a new hotel	-0.215*** (0.064)	-0.146** (0.056)	-0.063 (0.062)	-0.147** (0.056)	-0.146** (0.056)
Size of a new hotel	0.028 (0.082)	0.063 (0.072)	0.064 (0.072)	0.119 (0.077)	0.063 (0.072)
Dummy for franchise	-0.112 (0.102)	-0.106 (0.090)	-0.111 (0.090)	-0.107 (0.090)	-0.115 (0.102)

Intra-firm agglomeration		-1.032*** (0.047)	-0.910*** (0.062)	-0.183 (0.436)	-1.062*** (0.166)
Intra X Quality			-0.275** (0.093)		
Intra X Size				-0.181+ (0.092)	
Intra X Franchise					0.033 (0.172)
Constant	1.097* (0.475)	1.322** (0.416)	1.287** (0.416)	1.057* (0.437)	1.331** (0.419)
Observations	1682	1682	1682	1682	1682
R^2	0.161	0.356	0.359	0.357	0.356
F	4.546	12.912	12.915	12.805	12.721

Standard errors in parentheses
+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

APPENDIX C

RESULTS OF FIXED-EFFECTS OLS MODEL (DV: AVERAGE DISTANCE WITHIN 3 KM)

Appendix C. Results of Fixed-Effects OLS Model (DV: Average Distance within 3 km)

	Geographic distance (within 3km)				
	Model 1	Model 2	Model 3	Model 4	Model 5
Year dummy	Included	Included	Included	Included	Included
City dummy	Included	Included	Included	Included	Included
Firm dummy	Included	Included	Included	Included	Included
City population	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Airport	-0.265*** (0.059)	-0.271*** (0.054)	-0.271*** (0.054)	-0.273*** (0.054)	-0.271*** (0.054)
Interstate	-0.228** (0.076)	-0.268*** (0.070)	-0.266*** (0.070)	-0.268*** (0.070)	-0.268*** (0.070)
Resort	0.132 (0.139)	0.095 (0.128)	0.109 (0.127)	0.088 (0.128)	0.097 (0.128)
Small metro/town	-0.078 (0.122)	-0.162 (0.112)	-0.152 (0.112)	-0.157 (0.112)	-0.162 (0.112)
Suburban	-0.098^{+} (0.053)	-0.128** (0.049)	-0.129** (0.049)	-0.131** (0.049)	-0.128** (0.049)
Number of luxury hotels	0.013 (0.015)	0.002 (0.014)	0.003 (0.013)	0.003 (0.014)	0.003 (0.014)
Number of upper upscale hotels	-0.005 (0.008)	-0.001 (0.007)	-0.001 (0.007)	-0.001 (0.007)	-0.001 (0.007)
Number of upscale hotels	0.013** (0.005)	0.016*** (0.004)	0.016*** (0.004)	0.017*** (0.004)	0.017*** (0.004)
Number of upper midscale hotels	0.004 (0.004)	0.002 (0.004)	0.002 (0.004)	0.002 (0.004)	0.002 (0.004)
Number of midscale hotels	-0.009^{+} (0.005)	-0.008^{+} (0.004)	-0.009* (0.004)	-0.008^{+} (0.004)	-0.008^{+} (0.004)
Number of economy hotels	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Number of same brand hotels	-0.012 (0.015)	-0.015 (0.014)	-0.013 (0.014)	-0.015 (0.014)	-0.015 (0.014)
Price distance	0.072*** (0.006)	0.072*** (0.006)	0.072*** (0.006)	0.072*** (0.006)	0.072*** (0.006)
Size distance	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Dummy for quality of a new hotel	-0.072* (0.035)	-0.041 (0.032)	0.024 (0.036)	-0.041 (0.032)	-0.040 (0.032)
Size of a new hotel	0.022 (0.044)	0.037 (0.041)	0.037 (0.040)	0.062 (0.044)	0.037 (0.041)
Dummy for	-0.097^{+}	-0.094^{+}	-0.098^{+}	-0.094^{+}	-0.119*

franchise	(0.056)	(0.052)	(0.052)	(0.052)	(0.059)
Intra-firm agglomeration		-0.464*** (0.027)	-0.368*** (0.036)	-0.094 (0.252)	-0.548*** (0.096)
Intra X Quality			-0.215*** (0.053)		
Intra X Size				-0.079 (0.053)	
Intra X Franchise					0.090 (0.099)
Constant	0.745** (0.259)	0.853*** (0.238)	0.824*** (0.237)	0.736** (0.251)	0.876*** (0.239)
Observations	1682	1682	1682	1682	1682
R^2	0.186	0.312	0.319	0.313	0.313
F	5.407	10.602	10.781	10.490	10.461

Standard errors in parentheses
$^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

APPENDIX D

RESULTS OF FIXED-EFFECTS OLS MODEL (DV: DYADIC DISTANCE WITHIN 5 KM)

Appendix D. Results of Fixed-Effects OLS Model (DV: Dyadic Distance within 5 km)

	Geographic distance (within 5km)				
	Model 1	Model 2	Model 3	Model 4	Model 5
Year dummy	Included	Included	Included	Included	Included
City dummy	Included	Included	Included	Included	Included
Firm dummy	Included	Included	Included	Included	Included
City population	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Airport	-0.195*** (0.046)	-0.193*** (0.046)	-0.192*** (0.046)	-0.192*** (0.046)	-0.193*** (0.046)
Interstate	-0.617*** (0.082)	-0.620*** (0.082)	-0.618*** (0.082)	-0.614*** (0.082)	-0.619*** (0.082)
Resort	0.280* (0.133)	0.273* (0.133)	0.277* (0.133)	0.275* (0.133)	0.274* (0.133)
Small metro/town	-0.141 (0.170)	-0.159 (0.170)	-0.151 (0.170)	-0.146 (0.170)	-0.158 (0.170)
Suburban	0.088* (0.043)	0.089* (0.043)	0.089* (0.043)	0.091* (0.043)	0.089* (0.043)
Number of luxury hotels	-0.053*** (0.012)	-0.053*** (0.012)	-0.053*** (0.012)	-0.053*** (0.012)	-0.053*** (0.012)
Number of upper upscale hotels	-0.010 (0.007)	-0.010 (0.007)	-0.010 (0.007)	-0.010 (0.007)	-0.010 (0.007)
Number of upscale hotels	0.026*** (0.004)	0.027*** (0.004)	0.027*** (0.004)	0.027*** (0.004)	0.027*** (0.004)
Number of upper midscale hotels	0.003 (0.004)	0.002 (0.004)	0.002 (0.004)	0.002 (0.004)	0.002 (0.004)
Number of midscale hotels	-0.019*** (0.004)	-0.020*** (0.004)	-0.020*** (0.004)	-0.020*** (0.004)	-0.020*** (0.004)
Number of economy hotels	0.007*** (0.001)	0.007*** (0.001)	0.007*** (0.001)	0.007*** (0.001)	0.007*** (0.001)
Number of same brand hotels	-0.007 (0.015)	-0.007 (0.015)	-0.006 (0.015)	-0.006 (0.015)	-0.006 (0.015)
Price distance	0.061*** (0.004)	0.059*** (0.004)	0.059*** (0.004)	0.059*** (0.004)	0.059*** (0.004)
Size distance	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Dummy for quality of a new hotel	-0.059+ (0.030)	-0.056+ (0.030)	-0.025 (0.031)	-0.057+ (0.030)	-0.056+ (0.030)
Size of a new hotel	-0.006 (0.037)	-0.003 (0.037)	-0.003 (0.037)	0.022 (0.037)	-0.003 (0.037)
Dummy for franchise	-0.057 (0.045)	-0.058 (0.045)	-0.059 (0.045)	-0.058 (0.045)	-0.065 (0.046)

Intra-firm agglomeration		-0.326*** (0.040)	-0.164** (0.054)	1.083** (0.374)	-0.404** (0.131)
Intra X Quality			-0.359*** (0.080)		
Intra X Size				-0.298*** (0.079)	
Intra X Franchise					0.087 (0.137)
Constant	2.073*** (0.215)	2.116*** (0.215)	2.099*** (0.215)	1.988*** (0.217)	2.122*** (0.215)
Observations	20254	20254	20254	20254	20254
R^2	0.054	0.057	0.058	0.058	0.057
F	16.873	17.634	17.683	17.598	17.387

Standard errors in parentheses
$^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

APPENDIX E

RESULTS OF TOBIT MODEL (DV: AVERAGE DISTANCE WITHIN 5 KM)

Appendix E. Results of Tobit Model (DV: Average Distance within 5 km)

	Geographic distance (within 5km)				
	Model 1	Model 2	Model 3	Model 4	Model 5
Year dummy	Included	Included	Included	Included	Included
City dummy	Included	Included	Included	Included	Included
Firm dummy	Included	Included	Included	Included	Included
City population	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Airport	-0.055 (0.104)	-0.068 (0.091)	-0.069 (0.091)	-0.074 (0.091)	-0.068 (0.091)
Interstate	-0.345* (0.138)	-0.434*** (0.121)	-0.431*** (0.120)	-0.433*** (0.121)	-0.434*** (0.121)
Resort	0.322 (0.249)	0.257 (0.218)	0.274 (0.218)	0.240 (0.218)	0.257 (0.218)
Small metro/town	0.041 (0.219)	-0.139 (0.192)	-0.125 (0.191)	-0.125 (0.192)	-0.138 (0.192)
Suburban	0.226* (0.095)	0.162^{+} (0.084)	0.160^{+} (0.083)	0.157^{+} (0.084)	0.162^{+} (0.084)
Number of luxury hotels	0.000 (0.026)	-0.024 (0.023)	-0.023 (0.023)	-0.023 (0.023)	-0.024 (0.023)
Number of upper upscale hotels	-0.009 (0.014)	0.001 (0.012)	0.000 (0.012)	0.000 (0.012)	0.001 (0.012)
Number of upscale hotels	0.026** (0.008)	0.034*** (0.007)	0.033*** (0.007)	0.034*** (0.007)	0.034*** (0.007)
Number of upper midscale hotels	0.006 (0.007)	0.002 (0.006)	0.002 (0.006)	0.002 (0.006)	0.002 (0.007)
Number of midscale hotels	-0.010 (0.008)	-0.009 (0.007)	-0.010 (0.007)	-0.010 (0.007)	-0.009 (0.007)
Number of economy hotels	0.004 (0.003)	0.004^{+} (0.002)	0.004^{+} (0.002)	0.004^{+} (0.002)	0.004^{+} (0.002)
Number of same brand hotels	-0.009 (0.027)	-0.015 (0.024)	-0.013 (0.024)	-0.014 (0.024)	-0.015 (0.024)
Price distance	0.089*** (0.010)	0.092*** (0.008)	0.092*** (0.008)	0.092*** (0.008)	0.092*** (0.008)
Size distance	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Dummy for quality of a new hotel	-0.219*** (0.062)	-0.147** (0.055)	-0.064 (0.061)	-0.148** (0.055)	-0.146** (0.055)
Size of a new hotel	0.031 (0.081)	0.062 (0.071)	0.062 (0.070)	0.118 (0.076)	0.062 (0.071)
Dummy for	-0.112	-0.109	-0.114	-0.109	-0.118

franchise	(0.101)	(0.088)	(0.088)	(0.088)	(0.100)
Intra-firm agglomeration		-1.033*** (0.046)	-0.911*** (0.061)	-0.182 (0.427)	-1.065*** (0.163)
Intra X Quality			-0.274** (0.091)		
Intra X Size				-0.181* (0.091)	
Intra X Franchise					0.034 (0.168)
Constant	1.194** (0.461)	1.332** (0.409)	1.296** (0.408)	1.066* (0.429)	1.341** (0.411)
Observations	1682	1682	1682	1682	1682
Pseudo R^2	0.063	0.158	0.160	0.159	0.158
Log-likelihood	-2187.680	-1965.203	-1960.682	-1963.202	-1965.182
Chi^2	293.747	738.702	747.744	742.704	738.744

Standard errors in parentheses

$^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

APPENDIX F

RESULTS OF FIRST STAGE PROBIT MODEL

Appendix F. Results of First Stage Probit Model

	Hotel establishment
Year dummy	Included
City dummy	Included
Firm dummy	Included
City population	0.000
	(0.000)
Airport	0.221***
	(0.058)
Interstate	0.199**
	(0.064)
Resort	0.067
	(0.134)
Small metro/town	0.246***
	(0.062)
Suburban	0.192***
	(0.044)
Number of luxury hotels	-0.036**
	(0.014)
Number of upper upscale hotels	0.005
	(0.007)
Number of upscale hotels	0.002
	(0.004)
Number of upper midscale hotels	0.004
	(0.004)
Number of midscale hotels	0.013**
	(0.005)
Number of economy hotels	0.005***
	(0.001)
Number of hotel failures	0.004
	(0.017)
Number of hotels of a parent firm	0.027***
	(0.006)
Constant	-1.426***
	(0.125)
Observations	21390

Pseudo R^2	0.177
Log likelihood	-6870.313
Chi^2	2960.380

Standard errors in parentheses
$^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

APPENDIX G

RESULTS OF SECOND STAGE OLS MODEL

Appendix G. Results of Second Stage OLS Model

	Geographic distance (within 5km)			
	Model 1	Model 2	Model 3	Model 4
Year dummy	Included	Included	Included	Included
City dummy	Included	Included	Included	Included
Firm dummy	Included	Included	Included	Included
IMR	-1.435***	-1.387***	-1.419***	-1.434***
	(0.335)	(0.336)	(0.336)	(0.335)
City population	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Airport	-0.106	-0.105	-0.111	-0.106
	(0.089)	(0.089)	(0.089)	(0.089)
Interstate	-0.461***	-0.457***	-0.460***	-0.461***
	(0.114)	(0.113)	(0.114)	(0.114)
Resort	0.290	0.305	0.274	0.291
	(0.225)	(0.222)	(0.225)	(0.225)
Small metro/town	-0.177	-0.163	-0.163	-0.176
	(0.189)	(0.190)	(0.190)	(0.189)
Suburban	0.126	0.125	0.121	0.126
	(0.078)	(0.078)	(0.078)	(0.078)
Number of luxury hotels	0.035	0.034	0.035	0.035
	(0.027)	(0.027)	(0.027)	(0.027)
Number of upper upscale hotels	-0.004	-0.004	-0.004	-0.004
	(0.013)	(0.013)	(0.013)	(0.013)
Number of upscale hotels	0.027***	0.026***	0.027***	0.027***
	(0.008)	(0.008)	(0.008)	(0.008)
Number of upper midscale hotels	-0.006	-0.006	-0.006	-0.006
	(0.007)	(0.007)	(0.007)	(0.007)
Number of midscale hotels	-0.025**	-0.025**	-0.026**	-0.025**
	(0.008)	(0.008)	(0.008)	(0.008)
Number of economy hotels	-0.002	-0.001	-0.002	-0.002
	(0.003)	(0.003)	(0.003)	(0.003)
Number of same brand hotels	-0.045+	-0.041	-0.043	-0.045
	(0.027)	(0.027)	(0.027)	(0.027)
Price distance	0.094***	0.094***	0.094***	0.094***
	(0.009)	(0.009)	(0.009)	(0.009)

Size distance	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Dummy for quality of a new hotel	-0.149** (0.055)	-0.072 (0.060)	-0.150** (0.055)	-0.149** (0.055)
Size of a new hotel	0.046 (0.067)	0.047 (0.067)	0.099 (0.070)	0.046 (0.067)
Dummy for franchise	-0.081 (0.081)	-0.087 (0.081)	-0.082 (0.081)	-0.089 (0.088)
Intra-firm agglomeration	-1.055*** (0.048)	-0.941*** (0.065)	-0.254 (0.408)	-1.081*** (0.154)
Intra X Quality		-0.254** (0.095)		
Intra X Size			-0.171* (0.085)	
Intra X Franchise				0.028 (0.161)
Constant	3.688*** (0.685)	3.577*** (0.687)	3.412*** (0.695)	3.695*** (0.685)
Observations	1682	1682	1682	1682
R^2	0.364	0.366	0.365	0.364
F	18.120	18.328	18.287	17.873

Standard errors in parentheses
$^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$