Sectoral Heterogeneity, Inward FDI, and Location Decisions in Sub-national Regions of a Host Country

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ABSTRACT

Built on the differences between service and manufacturing sectors, this study examines the general proposition that service and manufacturing MNEs have different motives for conducting FDI, and that these differences influence their final locations in the sub-national regions of a host country. Using a full population of inward FDI projects conducted by manufacturing and service MNEs across 234 sub-national regions in Korea between 2000 and 2004, this study finds evidence to support the proposition. In addition, it shows non-linear industry and home country effects between the manufacturing and service MNEs' location decisions and certain location-specific advantages in the sub-national regions.

Keywords:

Service MNEs, manufacturing MNEs, location strategy, sub-national regions, FDI

INTRODUCTION

For the past two decades, service sectors have played an increasingly important role in the creation of new jobs and wealth around the globe, thereby sustaining the world economy. Service firms have created the majority of jobs in developed countries (Capar & Kotabe, 2003), with service activities producing more than 60% of the GDP in developed countries by 1990 (World Bank, 1992). As a result of the increased importance of service sectors in the world economy, foreign direct investment (FDI) by service multinational enterprises (MNEs) has grown substantially in the world market across diverse service sectors such as accounting, banking, consulting, advertising, insurance, and telecommunication industries, among others (Contractor, Kundu & Hsu, 2003).

Reflecting on the recent trends of increased service-related FDI activities, a large volume of studies in the international business (IB) literature have investigated the foreign operations of service firms across diverse topics. They include, but are not limited to, the characteristics of service MNEs (Balabanis, 2000), the motivations behind service MNEs' foreign expansion (Li & Guisinger, 1992), the entry mode choices made by service firms in foreign markets (Erramilli, 1990; Erramilli & Rao, 1993), the major determinants of FDI in service sectors (Capar & Kotabe, 2003; Li & Guisinger, 1992), the sourcing activities of service MNEs (Murray & Kotabe, 1999), the internationalization process and patterns of service MNEs (Katrishen & Scordis, 1998), and the performance implications of internationalizing service firms (Habib & Victor, 1991; Katrishen & Scordis, 1998). Noticeably, most of the previous studies on service MNEs and their FDI activities recognize and acknowledge that the major characteristics of service sectors may be different from those of manufacturing sectors as discussed below.

First, because service outputs are mostly intangible, service firms provide the outputs to their final customers through close interactions in the downstream ends of value chains (Anand & Delios, 1997; Capar & Kotabe, 2003; Contractor et al., 2003; Erramilli & Rao, 1993; Goerzen & Makino, 2007; Habib & Victor, 1991; Rugman & Verbeke, 2008). As a result, service firms require more intensive and extensive customization, localization, and cultural adaptation processes, which demand additional

transaction costs from service firms, compared to their manufacturing counterparts (Anand & Delios, 1997; Capar & Kotabe, 2003; Contractor et al., 2003; Goerzen & Makino, 2007; Knight, 1999). Second, many service outputs are produced and consumed in the same place and at the same time due to the non-storable and perishable characteristics of service inventories, which encourages service providers to choose locations in close geographic proximity to their final customers (Anand & Delios, 1997; Capar & Kotabe, 2003; Contractor et al., 2003; Erramilli, 1990; Erramilli & Rao, 1993; Goerzen & Makino, 2007; Lovelock & Yip, 1996; Rugman & Verbeke, 2008). Third, because the strong customer-orientation necessitates that service firms possess accurate information on their final customers that can be quickly and easily retrieved, access to highly localized and immobile tacit knowledge embodied in talented individuals has vital importance to the service firms' businesses in host countries (Habib & Victor, 1991; Keeble & Nachum, 2002). Therefore, service firms need to capitalize on high-quality human capital equipped with skills, talent, and specialized knowledge rather than focusing on large-scale investments in physical facilities, assets, or infrastructure for their successful businesses (Campbell & Verbeke, 1994; Erramilli & Rao, 1993; Goerzen & Makino, 2007).

Despite the abundant studies on service-related FDI activities and the fundamental differences between service and manufacturing sectors identified therein, as Knight (1999) has revealed, the literature on service business and/or service MNEs is still insufficient, and there has been a consistent call for more research in this relatively under-explored field (Caper & Kotabe, 2003; Goerzen & Makino, 2007; Hitt, Bierman, Uhlenbruck & Shimizu, 2006). We observe two major gaps in the literature. First, our knowledge gap remains substantial regarding the international location strategies utilized in service sectors by MNEs. Most studies on location strategies in the IB literature focus on manufacturing sectors (e.g. Driffield & Munday, 2000; Grosse & Trevino, 2005; Head, Ries & Swenson, 1995; Henisz & Delios, 2001; Ito & Rose, 2002; Li & Hu, 2002; Mariotti & Piscitello, 1995; Shaver, 1998; Urata & Kawai, 2000). There are only a handful of exceptions that explore service sectors in a standalone manner (e.g. Bagchi-Sen & Wheeler, 1989; Keeble & Nachum, 2002; Nachum, 2000; Rugman & Verbeke, 2008), but they do not directly compare the different location decision patterns of service MNEs vis-à-vis manufacturing

MNEs within the same national and/or institutional contexts. Therefore, we still do not fully understand how the differences between service sectors and manufacturing sectors affect foreign investors' final location decisions, which are accompanied by huge amounts of resource commitment in host countries.

Second, the fact that most of the previous research on MNE location strategies has adopted a country as a unit of analysis (Grosse & Trevino, 2005; Henisz & Delios, 2001; Ito & Rose, 2002; Li & Hu, 2002; Urata & Kawai, 2000) rather than more refined sub-national regions of host countries represents another substantial gap in the literature (McCann & Mudambi, 2005). As Chan, Makino, and Isobe (2010) show, it is the sub-national regions that are important when considering the final location decisions of MNEs within a host country, because sub-national regions provide MNEs with unique opportunities to exploit and/or explore in a host country (Chan et al., 2010), different developmental stages of economic infrastructure and transactional conventions (Chan et al., 2010; Chung & Alcácer, 2002), the inconsistent formulation and implementation of political and governmental rules and policies (Chan et al., 2010; Meyer & Nguyen, 2005), and the unique social values and/or cultural traditions that are different from region to region in a host country (Chan et al., 2010; Tung, 2008). Because the final locations that MNEs eventually choose for their FDI projects in foreign markets are specific sub-national regions rather than a single host country, intra-country heterogeneity at the level of sub-national regions may be at least as relevant and important a determinant for the location decisions of MNEs as inter-country heterogeneity at a country level (McCann & Mudambi, 2005).

To fill the knowledge gaps in the literature, this study explores the empirical question of *whether the location strategies of service MNEs are related to sub-national location-specific characteristics in host environments based on their unique motives for FDI decisions, and to what degree they are different from those of manufacturing MNEs*. In addition, it examines *how and in what ways manufacturing MNEs' participation in high technology industries and/or service MNEs' origin of OECD home countries may affect their responsiveness to certain location-specific characteristics at a sub-national level*. As a result, we investigate different location decision patterns of service MNEs vis-à-vis manufacturing MNEs on the same stage, and analyze them in sub-national contexts within a single host country by incorporating both

industry and home country effects. We tackle these unexplored research questions with a full population of inward FDI projects conducted across 234 county- and city-level sub-national regions in the Republic of Korea (hereafter Korea) for the following two reasons. First, Korea has been pursuing its remarkable economic development by designing and implementing very strong public policy measures to attract inward FDI since the 1990s, coupled with its steady and persistent development of location-specific advantages for the past 40 years. Therefore, Korea provides us with the significant and meaningful population of inward FDI projects by MNEs needed for the analysis of the location strategies they have made in sub-national regions. Second, a database of all inward FDI projects into Korea is available from the Korean government. This FDI database has firm-level information, including each inward FDI project's exact location, with a substantial number of observations well-suited for the empirical investigation to be conducted in the current study.

This study extends the existing literature in several important ways. First, it provides an explanation for the location decisions of service MNEs that may be different from the decisions made by manufacturing MNEs under the same national contexts. Second, it empirically assesses the impact of intra-country regional heterogeneity on the location decisions made by service and manufacturing MNEs in a single host country by incorporating sub-national regions as a unit of analysis. Third, it considers potential industry effects (for manufacturing MNEs) and home country effects (for service MNEs) that might explain their sub-national location decisions in a host country. Finally, it attempts to address the endogeneity issue of location-specific characteristics that may be determined by the final location decisions of both manufacturing and service MNEs in the sub-national regions of a host country. For this purpose, our empirical estimation adopts the system generalized method of moments (i.e., system GMM) that can address both the potential endogeneity of location-specific variables and measurement errors.

This paper will be presented as follows: the next section will establish a conceptual framework and the hypotheses to be tested; the third section will provide a detailed description of the data, their sources, and the empirical models to be used; in the fourth section, the main results from empirical

analyses will be discussed; and the final section will conclude the paper with policy implications, limitations, and some directions for future research.

CONCEPTUAL FRAMEWORK AND HYPOTHESES

The conceptual framework utilized in this paper is captured in Figure 1. It is built on the awareness-motivation-capability perspective (Chen, Su & Tsai, 2007) and applied to the location decisions made by MNEs in a foreign host country. According to the awareness-motivation-capability perspective, firms' strategic decisions, including location selection, are inherently self-selected forms of behavior that are driven by three key factors: (1) awareness, (2) motivation, and (3) capability (Chen et al., 2007). As a result, MNEs' location decisions need to be responsive to their *awareness* of regional differences across the sub-national regions of a host country through the different *motives* that MNEs may possess, depending on whether they are operating in manufacturing versus service sectors. In this process, the heterogeneous, firm-specific *capabilities* of MNEs that have been accumulated in different industrial landscapes (i.e., industry effects) and/or competitive home country environments (i.e., home country effects) may moderate their responsiveness to certain location-specific advantages of sub-national regions.

Insert Figure 1 about here

MNEs seek different types of complementary, location-bound resources from potential locational sites when they go abroad (Rugman, 1981, 2005). Built on Dunning's (1998) classification of FDI motives, this study uses four key motives that encourage MNEs' FDI projects in their host countries (Nachum & Zaheer, 2005): (1) resource-seeking FDI to access cheap/skilled labor forces and/or abundant materials; (2) market-seeking FDI attracted to a local market of large size with strong purchasing power; (3) efficiency-seeking FDI to achieve an efficient production process by utilizing already-developed local infrastructures that result in agglomeration economies; and (4) strategic asset-seeking FDI to have access

to the regional innovative capabilities represented by a high level of R&D investment and/or a large number of patents registered in each region. It should be noted that, depending on whether MNEs are currently operating in manufacturing or service sectors, they will possess different motives for implementing their FDI projects in a host country (Li & Guisinger, 1992; Rugman & Verbeke, 2008) and, as a result, they will display a different level of responsiveness to each of the location-bound resources that are available from the sub-national regions of the host country.

In the case of manufacturing MNEs, the main objective of their foreign investment is to achieve the optimal allocation of a production process based on their global production networks (Kogut & Kulatilaka, 1994). In other words, their foreign investment decisions are driven by the consideration of supply side rather than demand side. As such, they would like to locate in those regions of a host country that provide attractive input-side intermediaries for their production process (e.g., access to labor, raw materials, components, and technology), and local infrastructure (e.g., transportation and power supply). In addition, by being located in regions that feature strong innovative capabilities, manufacturing firms may have easy access to state-of-the-art product and process knowledge that helps them remain competitive in their markets (Tallman, Jenkins, Henry & Pinch, 2004). These arguments lead us to the following hypothesis, namely that the location decisions made by manufacturing MNEs will be negatively related to the expense of labor forces, but positively related to the quality of local infrastructure and the level of regional innovative capabilities offered by each sub-national region in a host country. Thus, we formally propose,

Hypothesis 1. Multinational enterprises in manufacturing sectors are more likely to locate in a sub-national region of a host country that provides them with access to

(i) cheaper labor forces (Resource-seeking FDI);

(ii) advanced local infrastructure (Efficiency-seeking FDI); and/or

(iii) more regional innovative capabilities (Strategic asset-seeking FDI).

In the case of service MNEs, they will exhibit different responsiveness to the location-specific advantages that each sub-national region of a host country provides, due to their unique characteristics and, as a result, they will have unique motives for FDI decisions that are different from those of manufacturing MNEs. First, service MNEs are characterized by their strong orientation toward downstream activities, such as intensive customization and/or cultural adaptation processes, to address the specific needs of local customers rather than toward upstream activities, such as R&D or production activities (Anand & Delios, 1997; Capar & Kotabe, 2003; Contractor et al., 2003; Goerzen & Makino, 2007; Knight, 1999; Rugman, 2005). As such, service MNEs' foreign investment decisions (including location decisions) may be driven by the consideration of the demand side rather than the supply side. Among a variety of reasons that encourage service firms to seek foreign expansion, the availability of new market opportunities and/or the purchasing power of potential local customers in foreign countries have been argued to be the most important in the literature (Campbell & Verbeke, 1994; Katrishen & Scordis, 1998; Lovelock & Yip, 1996).

Second, service outputs are characterized by the inseparability of production, delivery, and consumption of services (Campbell & Verbeke, 1994; Rugman, 2005). Because most service outputs are consumed when and where they are produced, the geographic coincidence between the location of service firms and the customers for their service outputs is very important to service MNEs' successful foreign operations (Anand & Delios, 1997; Capar & Kotabe, 2003; Contractor et al., 2003; Erramilli, 1990; Erramilli & Rao, 1993; Goerzen & Makino, 2007; Lovelock & Yip, 1996; Rugman & Verbeke, 2008). This characteristic of the service sectors makes the size of a local market and/or the purchasing power of local customers one of the critical factors that service MNEs need to consider before making final location decisions in a host country. Considering both arguments, it is formally hypothesized that the location decisions of service MNEs will be positively related to the size of a local market and/or the level of local purchasing power in the sub-national regions of the host country.

Hypothesis 2. Multinational enterprises in service sectors are more likely to locate in a sub-national region of a host country that provides them with access to (i) larger local market size and/or (ii) local customers with stronger purchasing power (Local market-seeking FDI).

When operating abroad, MNEs face a liability of foreignness – firm-specific additional costs that result from their unfamiliarity with new business environments in foreign markets – regardless of whether they are operating in manufacturing or service sectors (Dunning, 1993; Rugman & Verbeke, 2001; Zaheer, 1995); therefore, they need to possess some unique and hard-to-imitate tangible and/or intangible capabilities inside their firm boundaries to overcome the liability (Dunning, 1993; Rugman, 1981, 2005). Hymer (1976) emphasizes that foreign firms are superior to indigenous firms in firm-specific advantages (FSAs), because FSAs enable the foreign firms to go abroad and compete successfully in foreign markets. Noticeably, the FSAs needed for the success of manufacturing MNEs are not necessarily the same as those required for the success of service MNEs. For example, proprietary capabilities in the upstream activities of a value chain (i.e., upstream FSAs such as R&D and/or innovation capabilities) are essential for manufacturing MNEs, due to their strategic orientation on a product and a production process, whereas intangible capabilities in the customer-end activities of the value chain (i.e., downstream FSAs such as marketing skills and/or distribution channels) that lead to customization, local adaptation, and/or national responsiveness are crucial for service MNEs.

The innovation literature argues that companies must first possess basic knowledge to further possess additional new knowledge and information (Cohen & Levinthal, 1990). As a result, manufacturing MNEs in high technology sectors have a stronger incentive to be equipped with advanced technological capabilities, compared to their counterparts in low technology sectors. We argue that the possession of advanced technological capabilities may affect the relationship between manufacturing MNEs' location decisions and the level of regional innovative capability displayed by each sub-national region in a host country.

There are two competing theoretical foundations in the literature that posit these potential industry effects on the relationship between the regional innovative capabilities of each region and manufacturing MNEs' location decisions therein. On the one hand, Shaver and Flyer (2000) argue that the manufacturing MNEs already equipped with advanced technologies may not be motivated to locate in a sub-national region of a host country that has a strong level of regional innovative capabilities. This is because they are expected to show the so-called 'adverse selection' of location pattern, i.e., high-profile companies have a weak incentive to locate in a region with strong innovative capabilities for fear of losing upstream FSAs to their local competitors in the same region (Shaver & Flyer, 2000). As a result, it may be hypothesized that the location decisions made by manufacturing MNEs with a higher level of technological capability will be negatively related to the availability of regional innovative capabilities in the sub-national regions of a host country. On the other hand, the absorptive capacity argument by Cohen and Levinthal (1990) suggests a different view. Numerous studies built on the absorptive capacity have argued that technologically advanced firms have a superior ability to absorb more advanced technology (Cohen & Levinthal, 1990) and, as a result, they are more likely to locate their affiliates in those regions where innovation outputs are prominent. This argument is also consistent with the theory of economic agglomeration and localized knowledge spillovers (Almeida & Kogut, 1997; Audretsch & Feldman, 2004; Audretsch & Lehmann, 2005) because, for example, Silicon Valley tends to attract high technology firms over low technology firms in its vicinity. Therefore, it may also be hypothesized that the location decisions made by manufacturing MNEs with a higher level of technological capability will be positively related to the availability of regional innovative capabilities in the sub-national regions of a host country.

These competing theoretical predictions signify a *non-linear* hypothesis on the relationship between regional innovative capabilities and manufacturing MNEs' location decisions that are affected by the level of technological capability possessed by the MNEs. For manufacturing MNEs equipped with advanced technologies as the result of operating in high technology industries, the sub-national location decisions they make are initially expected to show a negative relationship to the regional innovative capabilities, due to the 'adverse selection' of location patterns. However, after a certain threshold of

regional innovative capabilities, even high-profile MNEs are expected to be attracted to these innovative regions for the purpose of organizational learning – based on the strong absorptive capacity they already achieved. This indicates a *U-shaped* relationship between regional innovative capabilities and high-tech manufacturing MNEs' location decisions in the sub-national regions of a host country. For low-tech manufacturing MNEs that do not yet possess advanced technological capabilities, their aspiration to learn by locating in innovative regions is stronger than their fear of losing upstream FSAs to their competitors in the initial stage. However, after a certain threshold, they will lose the incentive to locate in such innovative regions because low-tech manufacturing MNEs do not possess the absorptive capacity to acquire the innovative capabilities available in these regions, resulting in an overall *inverted U-shaped* relationship between the two constructs. Based on the arguments discussed so far, we formally suggest the following hypotheses on the industry effects affecting manufacturing MNEs' location decisions in the sub-national regions of a host country.

Hypothesis 3. There is a U-shaped relationship between the location decisions made by multinational enterprises in high technology manufacturing sectors and the level of regional innovative capabilities in a sub-national region of a host country.

Hypothesis 4. There is an inverted U-shaped relationship between the location decisions made by multinational enterprises in low technology manufacturing sectors and the level of regional innovative capabilities in a sub-national region of a host country.

The possession of advanced downstream FSAs in customer-end activities may also affect the relationship between service MNEs' location decisions and their responsiveness to the demand-side location-specific advantages of sub-national regions in host countries. Noticeably, service MNEs that have originated from developed countries (such as OECD member countries) are equipped with advanced management skills and strong brand recognition, compared to their counterparts that have origins in home

countries with developing and/or under-developed economies. Nachum (2003) argues that the competitive advantages of MNEs are partly shaped by the resources from their home countries, and that the home country-based advantages endow MNEs with superior FSAs, especially when the home countries concerned possess superior country-specific advantages compared to the host countries where MNEs invest. For example, when service MNEs possess advanced management skills and strong brand recognition (e.g., KFC, McDonald's, Coke, etc.), they are able to penetrate into local customers more effectively than those who do not possess such FSAs. This argument implies that there may be home country effects affecting service MNEs' location decisions in the sub-national regions of a host country.

We can apply both competing theoretical arguments – adverse selection and absorptive capacity – to the effects of a local market size on the location choice patterns of service MNEs equipped with advanced management skills from OECD home countries. On the one hand, the size of a sub-national market may have negative effects on the location decisions made by service MNEs. This is because small markets in rural and suburban areas are less competitive, and the advanced management skills of the service MNEs accumulated in their OECD home countries will allow them to easily build competitive advantages against local firms in these areas. By entering these areas, they can also prevent their sophisticated downstream FSAs from being stolen by rival firms operating in the same region (Shaver & Flyer, 2000). On the other hand, advanced service MNEs may be more likely to enter large markets in city and urban areas to capture a wide range of customer bases. While the level of competition in these areas is relatively high compared to small markets in rural and suburban areas, they will also have a chance to learn advanced downstream FSAs from their competitors in these regions (Cohen & Levinthal, 1990).

These competing arguments also suggest a *non-linear* relationship between local market size and service MNEs' location decisions that are affected by the MNEs' home country effects. For service MNEs from developed OECD home countries, their sub-national location decisions are expected to be negatively related to the size of a local market. It is because MNEs with advanced service skills have a greater ability to exploit their FSAs in any sub-national regions – irrespective of the size of their local

markets – than those without such skills. As a result, on average, MNEs with advanced skills are more likely to invest in smaller markets than those that do not possess such skills. However, after reaching a certain threshold in the local market size, they will lose the incentive to invest in smaller markets. This is because such MNEs do not have to continue investing in small markets as a means of securing a competitive advantage position in a host country, because additional value from investing in smaller local markets may not be substantial in the presence of local markets that are large enough beyond a certain threshold. Furthermore, advanced service MNEs may explore the opportunity to absorb better downstream FSAs from their competitors by entering local markets of large size. This indicates a *U-shaped* relationship between local market size and advanced service MNEs' location decisions in the sub-national regions of a host country. In contrast, service MNEs from non-OECD home countries tend to avoid intense competition in large markets in the city and urban areas where many strong competitors such as OECD MNEs operate. They also tend to avoid small markets in rural and suburban areas because of the absence of a solid customer base and the lack of opportunity to learn from sophisticated customers and competitors. These combined effects result in an overall *inverted U-shaped* relationship between the two. These arguments lead to the following two hypotheses on the home country effects of service MNEs influencing their location decisions in the sub-national regions of a host country.

Hypothesis 5. There is a U-shaped relationship between the location decisions made by multinational enterprises in service sectors from OECD member countries and the size of a local market in a sub-national region of a host country.

Hypothesis 6. There is an inverted U-shaped relationship between the location decisions made by multinational enterprises in service sectors from non-OECD member countries and the size of a local market in a sub-national region of a host country.

RESEARCH DESIGN

Dependent Variables

The data used in our estimation are the number of inward FDI projects made by MNEs in manufacturing and service industries across 234 sub-national regions in Korea for the period of 2000-2004. Information on FDI in Korea is obtained from the Investment Notification Statistics Center (INSC) database (http://mgr.kisc.org/insc/), compiled and managed by the Korean Ministry of Knowledge Economy (MKE). The database provides a full population of the inward FDI projects implemented in Korea. During the 1990-2004 period, 22,182 notifications and 11,739 registrations of inward FDI projects were reported in Korea and we finally obtain 1,212 and 6,199 cases of inward FDI in manufacturing industries (KSIC 15 - 37) and service industries (KSIC 50 - 95), respectively, in 2000-2004.

Six dependent variables are constructed. To compare different motives between manufacturing- and service-oriented FDIs, we use the logarithm of one plus the number of inward FDI in manufacturing industries [$\ln(FDI_M)_{i,t}$], and the logarithm of one plus the number of inward FDI in service industries [$\ln(FDI_S)_{i,t}$] across 234 regions in Korea between 2000 and 2004.[1] To compare different patterns of FDI location choice among manufacturing MNEs whose levels of upstream FSAs (i.e., production technologies) differ, we spilt the manufacturing FDI sample into high-tech and low-tech industrial sub-samples because manufacturing MNEs operating in high-tech sectors are equipped with advanced technological capabilities compared to their counterparts operating in low-tech sectors (Chung & Alcácer, 2002). As a result, we use the logarithm of one plus the number of inward manufacturing FDI projects in high-tech industries across 234 regions in Korea [$\ln(FDI_{M,High-Tech})_{i,t}$] for this sub-sample. High-tech manufacturing industries include both information and communication technology (ICT) manufacturing industries – suggested by the Organization for Economic Co-operation & Development (OECD) STI Committee – and knowledge-based manufacturing industries classified by the Korea Institute of Economics and Trade (KIET). For the other sub-sample, we use the logarithm of one plus the number of

inward manufacturing FDI projects in low-tech industries across 234 regions in Korea [$\ln(FDI_{M,Low-Tech})_{i,t}$]. Low-tech manufacturing industries are defined as the remaining industries that are not classified as high-tech industries. To compare different patterns of FDI location choice among service MNEs whose levels of downstream FSAs (i.e., management skills) differ, we spilt the service FDI sample into two sub-samples based on the level of economic development displayed by the MNEs' home country. The first is the logarithm of one plus the number of inward service FDI projects from MNEs in OECD countries [$\ln(FDI_{S,OECD})_{i,t}$], and the other is the logarithm of one plus the number of inward service FDI projects from MNEs in non-OECD countries [$\ln(FDI_{S,Non-OECD})_{i,t}$]. For each of the dependent variables, we end up with 1,170 observations for the five years covered in this study (234 sub-national regions × 5 years), because we adopt a region as a unit of analysis. 1,166 observations remain in the final dataset due to missing values for some independent variables

Independent and Control Variables

For independent variables, four key FDI motives (Dunning, 1998; Nachum & Zaheer, 2005) are captured by a comprehensive set of relevant, location-specific characteristics identified in the literature. We employ the measures and proxies involving local wage level (Resource-seeking FDI), local infrastructure (Efficiency-seeking FDI), regional innovativeness (Strategic asset-seeking FDI), and local market size and purchasing power (Local market-seeking FDI). The local wage level is defined as monthly average wage per employee in region *i* and year *t* ($WAGE_{it}$).[2] The development level of local infrastructure is proxied by the total length of paved roads per square meter in region *i* and year *t* ($ROAD_{it}$), because it potentially leads to increased production and/or logistics efficiency for MNEs. The regional innovativeness is measured by the number of patents registered per 1,000 people in region *i* and year *t* ($PATENT_{it}$). The local market size is represented by the gross regional product from

manufacturing firms in region *i* and year *t* (GRP_{it}). The local purchasing power is measured by the local tax per capita collected (TAX_{it}), because it is closely related to the overall level of business and non-business activities that determine the size of local customers' purchasing power.

For control variables, we incorporate an industrial complex dummy that indicates the existence of the industrial complex established by the local government with the aim of increasing the attractiveness of the region to both domestic and foreign firms. In addition, we use yearly dummies to control for unobservable, time-specific effects and consider a way to address unobservable region-specific fixed effects in our empirical estimations.

For all independent and control variables, we use government statistics on regional economies published by the Korean National Statistics Office (http://kosis.nso.go.kr/). We choose log-transformed, one-year lagged values of independent and control variables – except for dummies – to capture the decision making process of MNEs' location selection that is usually based on the most updated information on location-specific characteristics in the sub-national regions of a host country available from the last year.

Econometric Models: System GMM

Based on the conceptual framework and the dependent, independent, and control variables introduced in the previous sections, we specify three econometric models to test the suggested hypotheses empirically. The first model is to test different FDI motives between manufacturing and service MNEs:

$$\begin{aligned}\ln(FDI_l)_{i,t} = {} & \beta_0 + \beta_1 \ln WAGE_{i,t-1} + \beta_2 \ln ROAD_{i,t-1} + \beta_3 \ln PATENT_{i,t-1} \\ & + \beta_4 \ln GRP_{i,t-1} + \beta_5 \ln TAX_{i,t-1} + ComplexDummy_{i,t} \\ & + u_i + \nu_t + \varepsilon_{it}\end{aligned} \tag{1}$$

where l stands for manufacturing or service industries; u_i and ν_t capture region- and year-specific effects, respectively, and ε_{it} is an error term.

The second model tests the non-linear relationships between manufacturing MNEs' location decisions and the level of regional innovativeness in sub-national regions that may be affected by the high-tech versus low-tech industries in which manufacturing MNEs are operating. We use a quadratic model for the regional innovativeness variable as follows:

$$\begin{aligned}\ln(FDI_{M,j})_{i,t} = {} & \beta_0 + \beta_1 \ln PATENT_{i,t-1} + \beta_2 (\ln PATENT)^2{}_{i,t-1} + \beta_3 \ln WAGE_{i,t-1} \\ & + \beta_4 \ln ROAD_{i,t-1} + \beta_5 \ln GRP_{i,t-1} + \beta_6 \ln TAX_{i,t-1} + ComplexDummy_{i,t} \\ & + u_i + \nu_t + \varepsilon_{it}\end{aligned} \tag{2}$$

where j stands for high-tech or low-tech manufacturing industries.

The third model is to test the non-linear relationships between service MNEs' location selection and the level of local market size that may be influenced by the OECD versus non-OECD home countries where service MNEs are originated. We also use a quadratic model for the local market size variable:

$$\begin{aligned}\ln(FDI_{S,k})_{i,t} = {} & \beta_0 + \beta_1 \ln GRP_{i,t-1} + \beta_2 (\ln GRP)^2{}_{i,t-1} + \beta_3 \ln WAGE_{i,t-1} \\ & + \beta_4 \ln ROAD_{i,t-1} + \beta_5 \ln PATENT_{i,t-1} + \beta_6 \ln TAX_{i,t-1} \\ & + ComplexDummy_{i,t} + u_i + \nu_t + \varepsilon_{it}\end{aligned} \tag{3}$$

where k stands for OECD countries or non-OECD countries.

Although our hypotheses indicate a clear direction of causality from the location-specific characteristics to MNEs' FDI location choices, unbiased and consistent estimations of the location-specific variables are needed to control the possible endogeneity problems. For example, regional innovativeness, represented by the number of patents, may be attracted to certain geographic regions that provide the same opportunities that favor MNEs for their FDI projects. In addition, the increased level of regional innovativeness may result in improved regional economic performance, which further enhances new opportunities for MNEs' FDI projects. A lack of control for such potential endogeneity issues may generate biased and inconsistent empirical results.

The most common method of dealing with endogeneity is to find "good" instrument variables (IVs) that must satisfy two requirements: they should be correlated with the endogenous variable(s) and, at the same time, orthogonal to the error terms. Arellano and Bond (1991) derived the difference GMM

estimator, which employs lagged terms of endogenous variables as IVs to generate orthogonal restrictions after the fixed effects are removed by first differencing. However, a problem with the difference GMM estimator is that lagged levels are often poor IVs for first differences, especially for variables whose time series are close to persistent (Blundell & Bond, 1998). The system GMM method of Blundell and Bond (1998) tackles this weak instrument problem by building up a system of two equations: one in its first-order difference equation, which serves to remove the time invariance fixed effects; and the other in its level equation, which enables technical gains of additional level moment conditions specified in the estimation procedure. Lagged first differences and lagged levels are used as instruments for equations in levels, and for equations in first differences, respectively. Therefore, the use of instrumental variables in the system GMM allows the consistent estimation of parameters even in the presence of endogenous right-hand-side variables (Bond, Hoeffler & Temple, 2001).

Following the recommendations in Roodman (2009), we conduct three sets of specification tests that assess whether a selected set of lagged level and first-differenced values of the right-hand-side variables are valid instruments in the regression. First, the overall validity of the IVs is tested by Hansen's J test of over-identifying restrictions. Second, Difference-in-Hansen tests for the full set of instruments for the level equation are conducted. Third, first-order and second-order serial correlations in the first-differenced residuals are tested, because significant second-order serial correlation of the first-differenced residuals indicates serial correlation in the original error terms, and therefore misspecification of the instruments. If the original error terms are not serially correlated, evidence of a significant first-order serial correlation should appear, and no evidence of second-order serial correlation in the first-differenced residuals. In addition to the validity tests, a finite-sample correction is made to the two-step covariance matrix as suggested in Windmeijer (2005).

EMPIRICAL RESULTS AND DISCUSSION

Insert Table 1 about here

The descriptive statistics and correlations matrix for the variables introduced in the previous section are presented in Table 1. To assess whether manufacturing and service MNEs make statistically significant and different location decisions across the sub-national regions where they commence their foreign operations, we executed a χ^2 test over two locational distributions of inward FDI projects by sectors across 234 sub-national regions of Korea for the time 2000-2004 period. The χ^2 test results clearly indicate that manufacturing and service MNEs execute statistically different location strategies by rejecting the null hypothesis of same distributions ($p < 0.001$, $\chi^2 = 1{,}683.83$). When we executed the same test on those regions with more than five counts of inward FDI projects implemented, it produced similar results ($p < 0.001$, $\chi^2 = 1{,}041.46$). The evidence suggests that sectoral heterogeneity plays an important role in determining the final locations of inward FDI projects by MNEs in the sub-national regions of a host country.

Insert Tables 2 – 4 about here

Eqs. (1) – (3) are estimated by the system GMM, and regression results are reported in Tables 2 - 4. As shown in the bottom lines of each table, all models pass the specification tests of Hansen's *J*, Difference-in-Hansen, AR(1) and AR(2), indicating that a selected set of instrument variables are statistically valid and, as a result, that the potential endogeneity of location-specific characteristics are adequately addressed. The *F*-statistics ($p < 0.001$) confirm the joint significance of coefficients in all regressions.

Regarding the effects of location-specific advantages on the location decisions of inward FDI by MNEs made in the sub-national regions of Korea, the system GMM regression results in Table 2 show that the applicability of Dunning's (1998) classification of FDI motives is heterogeneous depending on the types of sectors in which MNEs are currently operating. In the case of manufacturing MNEs, the resource-seeking FDI hypothesis [Hypothesis 1(i)] is supported because the coefficient of per

employment monthly wage (i.e., cost of local labor forces) is statistically significant with an expected negative sign, as hypothesized, from the first column of Table 2. The results in the same column show that the efficiency-seeking FDI hypothesis [Hypothesis 1(ii)] is also supported, because the coefficient for the length of paved roads (i.e., local infrastructure) is statistically significant with a positive sign. In addition, the same column in Table 2 confirms that the strategic asset-seeking FDI hypothesis [Hypothesis 1(iii)] is strongly supported. The coefficient for the number of patents per 1,000 people (i.e., regional innovative capabilities) in each sub-national region of Korea is positive with a significant sign. We interpret this result as indicating that the increase of innovative capabilities in a region will enhance the probability that the same region accommodates inward FDI projects by manufacturing MNEs. This statistical evidence partly suggests that Korea is no longer a source of cheap labor forces for foreign investors: it is becoming a source of technology.

In the case of service MNEs, however, the local market-seeking FDI hypothesis [Hypothesis 2] is shown to be strongly supported, as hypothesized from the second column of Table 2. The coefficients of both gross regional product (i.e., local market size) and local tax per capita collected (i.e., the level of purchasing power of local customers) are positive with significant signs. These results imply that the increase of local market size and/or local customers' purchasing power in a region will increase the possibility that the same region attracts inward FDI projects conducted by service MNEs.

The system GMM regression results in Table 2 suggest two interesting observations regarding the sub-national location decisions made by manufacturing versus service MNEs. First, manufacturing MNEs are shown to be positively responsive to gross regional product (i.e., the size of a local market), partially suggesting the demand-side consideration of their location decisions. However, its coefficient size is far below that of service MNEs and, more importantly, the local tax per capita collected (i.e., local customers' purchasing power) does not exert any significant influence on manufacturing MNEs' sub-national location choices. As a result, we interpret this result as indicating that the local market-seeking FDI hypothesis is a far more important phenomenon to service MNEs, as we hypothesized. Second, service MNEs are also shown to be positively responsive to the length of paved roads (i.e., local

infrastructure), leading to the efficiency-seeking FDI hypothesis. It may be due to the fact that, although Korea is a small country, easy access to efficient transportation may also be important for service MNEs' foreign operations in a host country, such as effective interactions with and/or their final delivery of service outputs to the local customers in sub-national regions.

Insert Figures 2 and 3 about here

The system GMM regression results in Table 3 suggest evidence of the significant industry effects on the relationship between the regional innovative capabilities of each region and the location decisions made by high-tech versus low-tech manufacturing MNEs. From the first column of Table 3, the coefficient for the number of patents per 1,000 people (i.e., regional innovative capabilities) in each sub-national region of Korea has a negative and significant sign, whereas its squared term shows a positive and significant sign – supporting the presence of a non-linear, U-shaped relationship between the two constructs [Hypothesis 3] for high-tech manufacturing MNEs. However, we find an opposite picture for manufacturing MNEs in low technology industries, because the coefficient for the number of patents per 1,000 people and its squared term both appear significant, but with positive and negative signs, respectively, from the second column of Table 3, supporting a non-linear, inverted U-shaped relationship [Hypothesis 4]. These contrasting industry effects are visualized in Figure 2, which shows that high-tech manufacturing MNEs start to be attracted to innovative sub-national regions when there are more than 1.6 patents registered in those regions, whereas low-tech manufacturing MNEs are discouraged from locating in innovative regions when there are more than 8.2 patents registered in the same sub-national regions.

The system GMM regression results in Table 4 suggest strong evidence of the home country effects on the relationship between the size of a local market and the location decisions made by service MNEs originating from OECD versus non-OECD home countries. In the first column of Table 4, the coefficient of gross regional product (i.e., local market size) in each sub-national region of Korea has a negative and significant sign, whereas its squared term shows a significant opposite, supporting a non-

linear, U-shaped relationship between the two constructs – as in Hypothesis 5 – for service MNEs from developed OECD member countries. However, the second column of Table 4 reveals that the coefficient for the gross regional product and its squared term show positive and negative signs in significant ways, respectively, supporting a non-linear, inverted U-shaped relationship as in Hypothesis 6. Again, these home country effects are contrasted in Figure 3, where service MNEs from OECD home countries are shown to be attracted to larger local markets while those from non-OECD home countries are discouraged from locating in larger local markets after a certain threshold of gross regional products has been reached in the sub-national regions of a host country.

CONCLUSION

Built on the different characteristics between service and manufacturing sectors identified in the literature, this study investigated whether and how service MNEs implement location strategies in the sub-national regions of a host country that may be different from those implemented by manufacturing MNEs with a full population of inward FDI projects in Korea. In addition, it examined the potential industry effects for manufacturing MNEs, and the home country effects for service MNEs that may affect their final location decisions in the sub-national regions of a host country. Our empirical findings show that MNEs operating in different types of sectors are responsive to different sets of location-specific advantages that the sub-national regions of a host country provide when determining location sites for their inward FDI projects to be implemented. Manufacturing MNEs seek the benefits of cheap labor forces, advanced local infrastructure, and regional innovative capabilities from the sub-national regions of Korea, whereas their service counterparts seek large local markets and local customers possessing strong purchasing power. Our results also suggest that MNEs' responsiveness to the location-specific advantages of specific sub-national regions of a host country may be affected by industry effects and home country effects. Manufacturing MNEs equipped with advanced production technology from operating in high technology industries are shown to be related to regional innovative capabilities in a non-linear, *U-shaped*

fashion – supporting the adverse selection argument for location selections by foreign-owned MNEs at a low level of regional innovative capabilities, and the absorptive capacity argument at a high level of regional innovative capabilities. In addition, their counterparts in low technology industries exhibit an *inverted U-shaped* relationship to the regional innovative capabilities. Service MNEs equipped with advanced management skills from OECD home countries, on the other hand, are also shown to be attracted to the size of local markets in a non-linear, *U-shaped* way under similar lines of reasoning. However, service MNEs from non-OECD countries show an opposite, *inverted U-shaped* relationship to the local market size.

This study sheds light on the advancement of location theories and practices by MNEs in several ways. First, it provides a theoretical explanation of the location decisions of service MNEs that are different from those of manufacturing MNEs under the same national contexts. Confirming the awareness-motivation-capability perspective (Chen et al., 2007), our findings show that the location decisions made by MNEs are really self-selected forms of behavior that are driven by (1) their *awareness* of regional differences across the sub-national regions of a host country; (2) the different *motives* possessed, depending on the types of sectors; and (3) their heterogeneous types and the levels of firm-specific *capabilities* accumulated in different industrial landscapes and/or competitive home country environments, which further demonstrate the industry- and home country-specific effects on their sub-national location decisions. Second, it also provides an empirical explanation of the potential impact of intra-country regional heterogeneity on the location selections of service and manufacturing MNEs in the context of a single host country. The sophisticated econometric method of the system GMM was attempted to address the endogeneity issue of location-specific advantages in the empirical estimations, giving us a better understanding of which sub-national regions may be chosen and why they were chosen by service versus manufacturing MNEs after they had entered a certain host country or state while implementing their direct investment plans in foreign countries. Third, this study provides evidence for the importance of the strategic fit between MNEs' motives related to their sectoral types and sub-national location-specific characteristics that they wish to pursue from their internationalization. Simply put, it

confirms that service MNEs, compared to their manufacturing counterparts, are more sensitive to certain types of location-specific characteristics that lead to different location choice patterns at sub-national levels due to their unique motivations for FDI into foreign countries.

This paper has several limitations that its authors hope will be complemented and improved by future studies. First, it is an empirical study of a single country. Because we analyzed the location decisions made by service versus manufacturing inward FDI projects implemented in the sub-national regions of a host country, the choice of the single country was indispensible. However, there is no doubt that the main findings from this paper need to be replicated in, compared to, and generalized for the different contexts of other countries. Second, we used an administrative region as the unit of analysis in this paper. The administrative purposes of sub-national regions in a country may not necessarily coincide with the criteria for the determination of economic activities by companies, including the location decisions made by service and/or manufacturing MNEs. Therefore, an important interconnection among neighboring sub-national regions may have been sacrificed for the convenience of data collection in the current study. Finally, we did not consider potential simultaneous location choice patterns between service and manufacturing MNEs in a single country in our current empirical setting. The location selections made by both types of MNEs may affect their counterparts' locations as well, due to the supporting characteristics of service sectors and manufacturing sectors leading to complementary location choice patterns that achieve the lowest transaction costs for both parties (Rugman, 2005). In addition, a location choice pattern by MNEs in one type of industrial sector may be a good source of information for a subsequent location decision by those in the other type of industrial sector through imitative behaviors (Henisz & Delios, 2001). As a result, there is still much to be investigated about the issue of location strategies chosen by service versus manufacturing MNEs, and we hope others will join us in this line of research in the future.

ENDNOTES

1. Upscaling of count variables by adding one is to keep data observations with zeros after taking logarithm (e.g., Head et al., 1995; Crozet, Mayer & Mucchielli, 2004; and Maitland, Rose & Nicholas, 2005 among others).
2. All monetary values in this paragraph are measured in million KRW (1 USD = 1,118 KRW in November 2011).

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Figure 1. Conceptual Framework

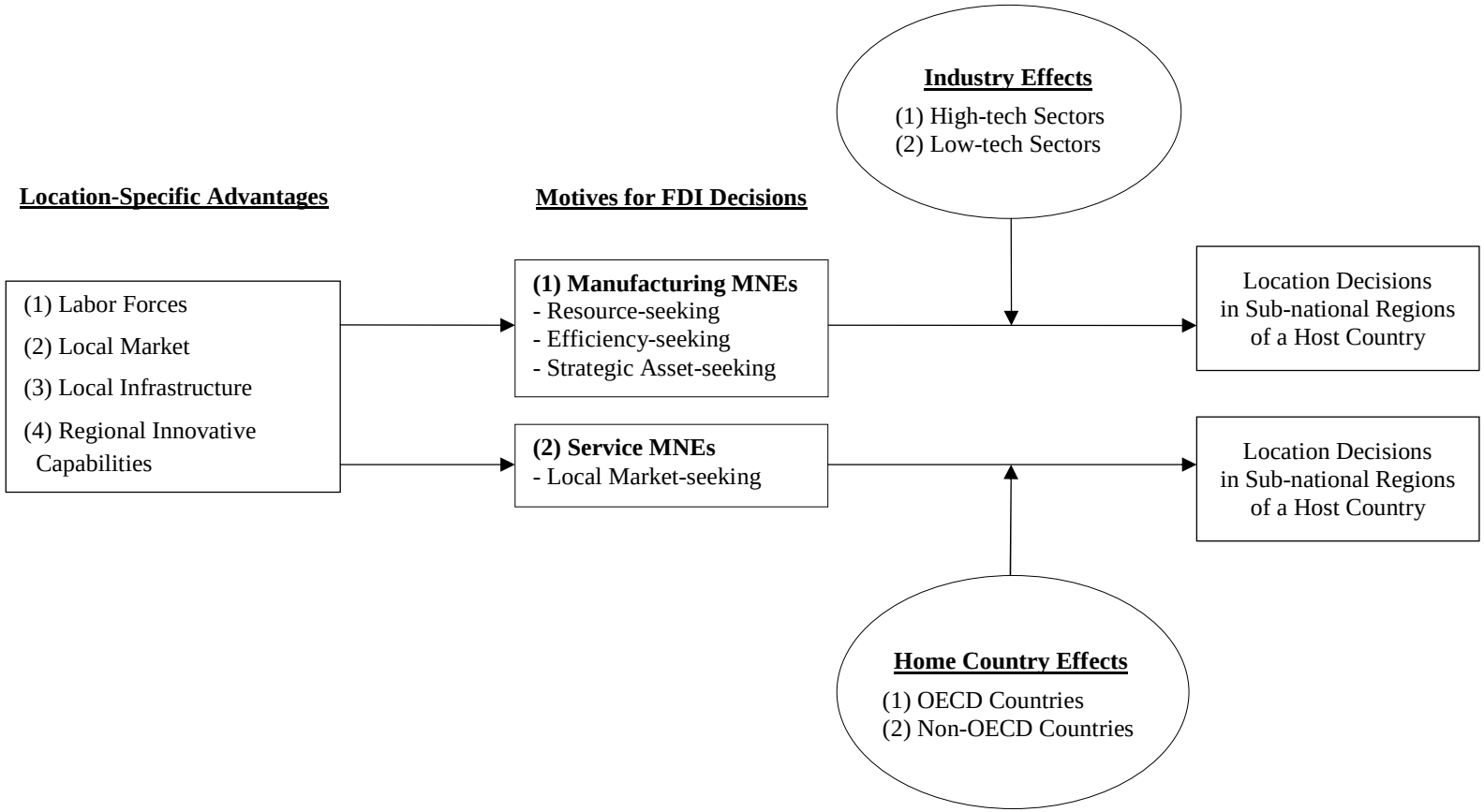
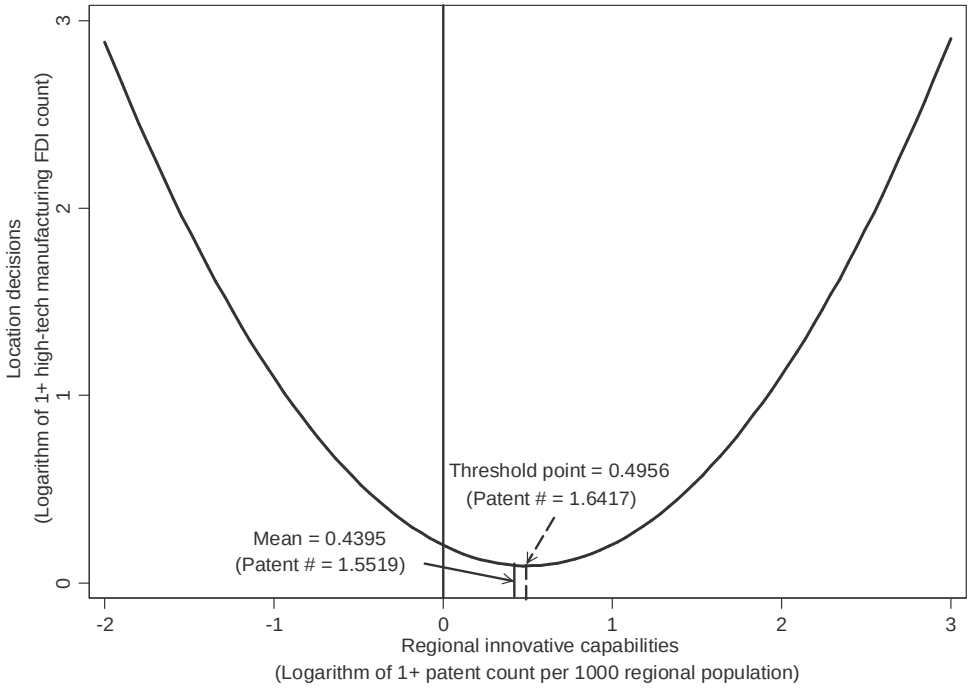


Figure 2. Manufacturing MNEs: Sub-national Location Decisions and Regional Innovative Capabilities

(1) Manufacturing MNEs in High Technology Industries



(2) Manufacturing MNEs in Low Technology Industries

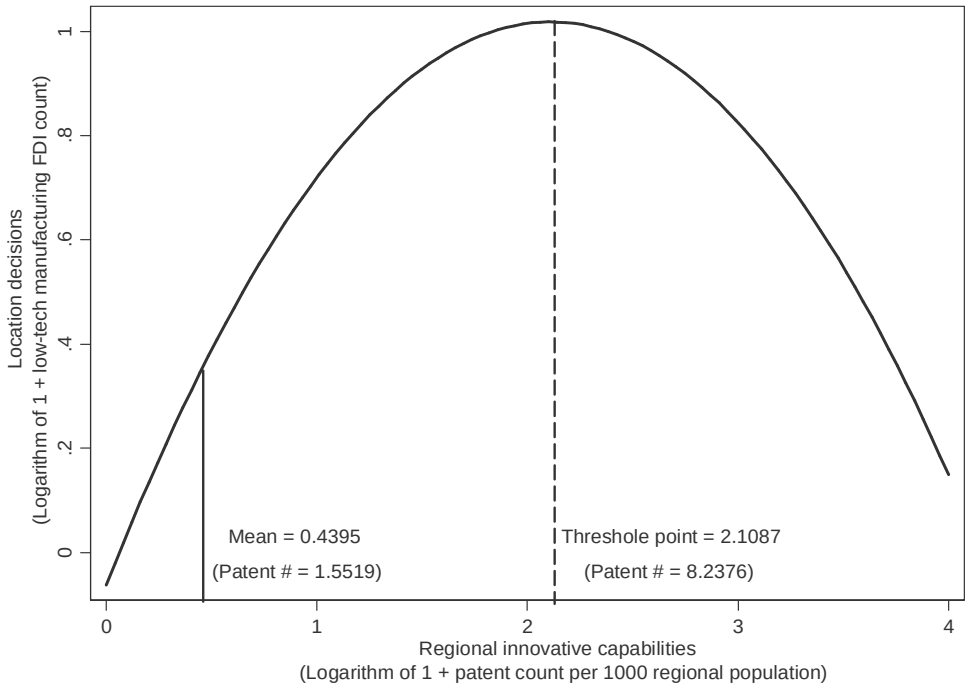
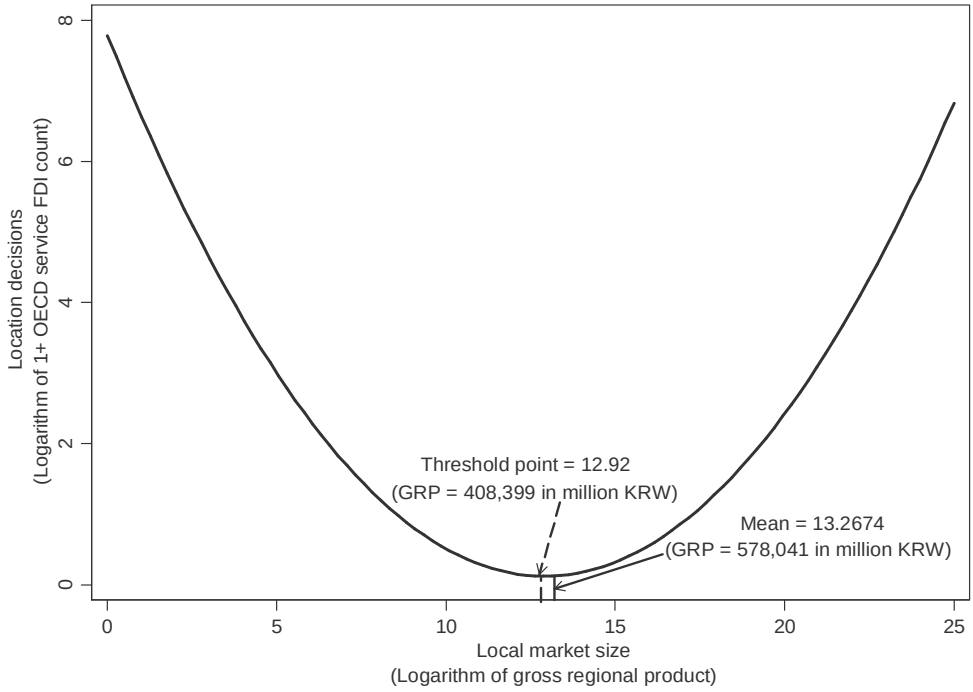


Figure 3. Service MNEs: Sub-national Location Decisions and Local Market Size

(1) Service MNEs from OECD Home Countries



(2) Service MNEs from Non-OECD Home Countries

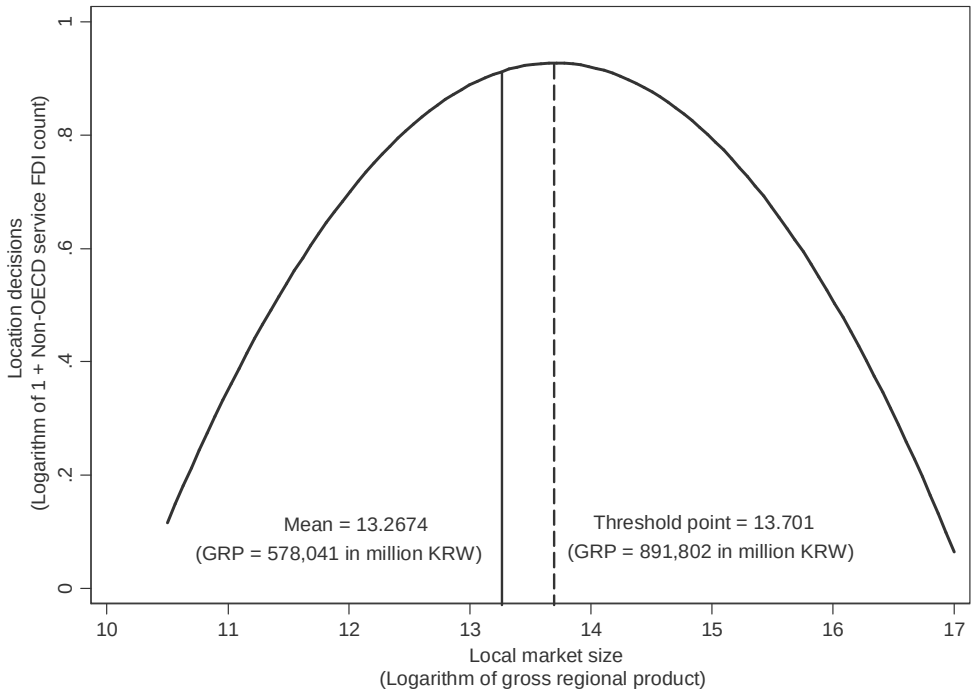


Table 1. Descriptive Statistics and Correlation Matrix

	Mean	*S.D.*	*Min.*	*Max.*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) $\ln(FDI_{M})_{it}$	0.404	0.649	0	3.638	1.000										
(2) $\ln(FDI_{S})_{it}$	0.775	1.112	0	5.613	0.622	1.000									
(3) $\ln(FDI_{M,High\text{-}Tech})_{it}$	0.194	0.465	0	2.996	0.826	0.574	1.000								
(4) $\ln(FDI_{M,Low\text{-}Tech})_{it}$	0.288	0.508	0	2.944	0.911	0.545	0.565	1.000							
(5) $\ln(FDI_{S,OECD})_{it}$	0.360	0.750	0	5.176	0.619	0.842	0.602	0.550	1.000						
(6) $\ln(FDI_{S,Non-OECD})_{it}$	0.644	1.008	0	4.949	0.588	0.974	0.541	0.514	0.741	1.000					
(7) $\ln GRP_{i,t-1}$	13.26	1.868	5.737	17.54	0.510	0.345	0.387	0.456	0.254	0.322	1.000				
(8) $\ln TAX_{i,t-1}$	-0.863	0.571	-5.140	2.405	0.384	0.453	0.350	0.333	0.472	0.412	0.333	1.000			
(9) $\ln WAGE_{i,t-1}$	0.224	0.322	-1.142	1.267	0.267	0.129	0.208	0.231	0.134	0.105	0.675	0.414	1.000		
(10) $\ln PATENT_{i,t-1}$	0.440	0.494	0	3.523	0.570	0.557	0.550	0.474	0.603	0.517	0.416	0.540	0.342	1.000	
(11) $\ln ROAD_{i,t-1}$	0.210	1.419	-16.12	3.253	0.382	0.666	0.308	0.340	0.526	0.638	0.268	0.226	0.111	0.350	1.000

† N = 1,166.
†† All correlation coefficients are significant at $p < 0.001$.
††† Industrial complex dummy and yearly dummies are not reported.

Table 2. System GMM Results: Manufacturing versus Service MNEs

	Manufacturing MNEs	Service MNEs
Hypothesized Variables		
$\ln GRP_{i,t-1}$	0.109*** [0.034]	0.350** [0.171]
$\ln TAX_{i,t-1}$	0.059 [0.079]	0.477*** [0.160]
$\ln WAGE_{i,t-1}$	-0.296*** [0.083]	-2.168 [1.505]
$\ln PATENT_{i,t-1}$	0.578** [0.240]	0.190 [0.264]
$\ln ROAD_{i,t-1}$	0.069*** [0.021]	0.372*** [0.075]
Control Variables		
Industrial Complex	Yes	Yes
Time Dummies	Yes	Yes
Fixed Effects	Yes	Yes
Constant	-1.123***	-3.010
F Statistics	16.30***	16.15***
Hansen J Test	(0.375)	(0.428)
Difference-Hansen Test	(0.581)	(0.510)
AR(1)	(0.000)	(0.000)
AR(2)	(0.895)	(0.463)

† N = 1,166.
†† Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
††† Numbers in [ ] and ( ) are standard errors and *p*-values, respectively.

Table 3. System GMM Results: Manufacturing MNEs in High-tech versus Low-tech Industries

	High-tech Manufacturing MNEs	Low-tech Manufacturing MNEs
Hypothesized Variables		
$\ln PATENT_{i,t-1}$	-0.445** [0.222]	1.024*** [0.268]
$(\ln PATENT_{i,t-1})^2$	0.448*** [0.141]	-0.243*** [0.087]
$\ln GRP_{i,t-1}$	0.076*** [0.023]	0.060*** [0.021]
$\ln TAX_{i,t-1}$	0.037 [0.034]	-0.020 [0.160]
$\ln WAGE_{i,t-1}$	-0.227*** [0.066]	-0.156** [0.067]
$\ln ROAD_{i,t-1}$	0.046*** [0.016]	0.027* [0.014]
Control Variables		
Industrial Complex	Yes	Yes
Time Dummies	Yes	Yes
Fixed Effects	Yes	Yes
Constant	-0.756***	-0.763***
F Statistics	7.16***	13.95***
Hansen J Test	(0.327)	(0.316)
Difference-Hansen Test	(0.619)	(0.741)
AR(1)	(0.000)	(0.000)
AR(2)	(0.279)	(0.547)

† N = 1,166.
†† Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
††† Numbers in [ ] and ( ) are standard errors and *p*-values, respectively.

Table 4. System GMM Results: Service MNEs from OECD versus Non-OECD Home Countries

	Service MNEs from OECD Home Countries	Service MNEs from Non-OECD Home Countries
Hypothesized Variables		
$\ln GRP_{i,t-1}$	-1.187*** [0.386]	2.172** [0.948]
$(\ln GRP_{i,t-1})^2$	0.046*** [0.015]	-0.079** [0.038]
$\ln TAX_{i,t-1}$	0.107 [0.128]	0.301** [0.124]
$\ln WAGE_{i,t-1}$	-0.218 [0.214]	-0.973*** [0.249]
$\ln PATENT_{i,t-1}$	0.949** [0.406]	1.048*** [0.369]
$\ln ROAD_{i,t-1}$	0.146*** [0.038]	0.278*** [0.050]
Control Variables		
Industrial Complex	Yes	Yes
Time Dummies	Yes	Yes
Fixed Effects	Yes	Yes
Constant	7.756***	-13.776**
F Statistics	11.47***	18.50***
Hansen J Test	(0.652)	(0.174)
Difference-Hansen Test	(0.600)	(0.131)
AR(1)	(0.000)	(0.000)
AR(2)	(0.626)	(0.760)

† N = 1,166.
†† Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
††† Numbers in [ ] and ( ) are standard errors and *p*-values, respectively.