**Co-location Patterns of Foreign Owned Firms in a Small Open Economy: Evidence from the Netherlands**

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**Abstract**

This paper addresses the co-location patterns of foreign owned firms in a small open economy. Evidence is provided from the Netherlands, a small industrialized country. The empirical evidence indicates that the location patterns of foreign owned and domestic firms in the mining industry, construction, transport, communications sectors, and trade industry significantly differ across the twelve Dutch provinces. In the agriculture, forestry and fishing industry, the manufacturing industry, and the service industry the location patterns of foreign owned versus domestic firms are mostly similar. The most influential factor in explaining the co-location pattern of foreign owned firms is the preference for the areas with agglomeration economies and access to larger economic entities and markets. We found evidence that size is significant for industry sector but does not constitute an issue in location patterns across provinces. Large foreign firms target the wholesale and retail trade industry and manufacturing industry. Small, medium and large foreign owned firms are consistently distributed across the twelve Dutch provinces. Moreover, our results show that home country plays an important role in firms' location choice. Foreign owned firms coming from countries in close proximity with the host economy show different location patterns than firms coming from more distanced countries. Our results are consistent with arguments that foreign owned firms value location attributes differently from their domestic counterparts.

**Keywords:** foreign owned firms, location choice, co-location patterns, small open economy

## 1. Introduction

Since globalization has driven firms to locate all over the world and invest increasingly abroad to make foreign direct investments (FDI), the economies of many countries nowadays consist of both domestic and foreign firms potentially co-locating or agglomerating. The location decision of foreign owned firms in a host economy is based on an assessment of the benefits of certain alternative locations, which is determined by different factors. The location choice of a company is based on the perceived attractiveness of a specific location for that company, which is determined by the investment's expected profitability (Shaver, 1998). Recent studies showed that, among others, agglomeration, market, labor, government policy, infrastructure, and geographic factors are to determine the location choice of firms. Regarding location choice, Shaver (1998) showed that domestic and foreign owned firms exhibit different location patterns in the U.S. His work and following studies on location similarities between domestic and foreign owned firms in an economy are mainly concentrated on large developed economies. However, on the winds of globalization, many small open economies increasingly rely on both home grown and foreign multinational enterprises (MNEs) to achieve domestic economic success. Small open economies offer an above average level of specific advantages, such as infrastructure, skills, and technological knowledge, which make them potentially attractive markets for foreign direct investment (Hogenbirk & Kranenburg, 2006). The presence of foreign direct investment (FDI) in a small economy can be beneficial for the latter due to additional labor, skills spillovers, and capital flows. Small open economies are largely dependent on FDI (Hogenbirk & Kranenburg, 2006). Therefore, these economies develop policies to attract foreign direct investments. In

addition, many small economies are nowadays a member of a trading block. This membership increases the location attractiveness of foreign owned firms in a small economy in particular when the small economy is the gateway to a larger economic entity. Consequently, the number of foreign owned firms has increased in many small open economies. In general, foreign owned firms in host markets tend to geographically co-locate with other foreign establishments in an attempt to benefit from agglomeration economies resulting for instance from a pool of specialized labor, technical and knowledge spillovers among firms (Shaver 1998; Hogenbirk 2002). However, foreign owned firms coming from countries in close proximity with the host economy show different location choices than firms coming from more distanced countries (Chung and Song, 2004). Given the increasing attractiveness of small open economies in particular when they are part of a larger economic entity, it can be argued that foreign owned firms employ different location patterns based on the appreciation of certain (strategic) location benefits and firms characteristics. The literature indentified several reasons why foreign owned firms would employ the same location patterns regardless firm characteristics and similarity to domestic firms in a host economy, while it also presents arguments for the opposite statement (Shaver, 1998, Rugman and Verbeke, 2002). Therefore, the aim of this study is to investigate the co-location patterns of foreign firms within a small open economy which is part of a larger economic entity and whether foreign owned firms exhibit similar location patterns as the domestic ones.

Evidence is provided from the Netherlands, a small industrialized country which is part of a larger economic entity, namely the European Union. Following Walsh (1988) and Hogenbirk (2002), the Netherlands can be classified as a small industrialized economy,

based on population, aggregate economic activity, geographic area, availability of natural resources, technological level, growth rate (Walsh 1988, Hogenbirk 2002). Even though a small economy, the Netherlands represents the fifth largest recipient of foreign investment in the world and, due to its favorable location and active role within the European Union, many MNEs have chosen the Netherlands as strategic orientation. Moreover, there is no consistent data on location similarities and differences between domestic and foreign owned firms in the Netherlands. Moreover, FDI has central significance for the innovation area in the Netherlands, for the investment in R&D as for the application of innovation' (Biermans & Poort, 2007: 13) which are expected to be important aspects for the Dutch competitive position (Biermans & Poort, 2007). According to the Netherlands Foreign Investment Agency (NFIA), among the fundamental characteristics that contribute to making the Netherlands a good location for foreign firms are the excellent distribution infrastructure, proximity to a wide range of markets, technical sophistication and leadership, availability of materials and suppliers, and a workforce that is highly educated, multilingual, productive and flexible (NFIA, 2009). The results of a 2004 survey conducted by the Agency of Foreign Investors in the Netherlands (CBIN) aimed at mapping foreign investors' opinions about the Dutch establishment climate, show that the presence of main ports (Schiphol Airport and the harbor of Rotterdam), the international orientation, and the strategically favorable geographical positioning of the country are the leading features of the Netherlands (CBIN, 2004). Therefore, an overview of the location patterns of foreign owned firms provides more insight of where and how these firms are located.

The structure of the paper is as follows. Sections 2 and 3 entail an overview of the literature about the co-location of foreign owned firms, similarity and dissimilarity in location patterns in a host economy. Section 4 gives an overview of the sample, data and methods. In section 5 we present the empirical findings concerning the location similarities and differences among foreign owned firms for all Dutch industry sectors. A discussion of the implications of our findings and concluding remarks together with suggestions for future research are provided in section 6.

## 2 Co-location perspectives

Co-location is a topic broadly discussed in the literature (McCann & Mudambi, 2004; Wu and Strange, 2000; Head, Ries, and Swenson, 1995). It refers to the physical proximity of firms (Rafii, 1995), pointing to the phenomenon of firms locating close to each other. This is also known as agglomeration (Rafii, 1995; Akgüngur, 2006; Hatfield, Lamb, and Tegarden, 2007; Huang, Shekhar, and Xiong, 2004) or bunching (Brandenburger & Nalebuff, 1997; Ghemawat & Thomas, 2003). Co-location can be viewed as a value adding web, with a series of linkages between domestic and foreign owned firms which act like actors in a specific arena. These actors operate close to each other and act in relation to a specific business sector. The relationships established between them are often interdependencies of different strength and quality which define the boundaries of the area. Hence, a co-location area may entail domestic firms, foreign owned ones or a combination of the two. These firms are the actors in a co-location area. These actors may be divided into horizontal, vertical and lateral actors. The horizontal actors are represented by the firms which produce the main products of the central industry in an area. These firms have a common sectoral background. The vertical actors encompass the firms which act as suppliers as well as buyers of the products delivered by the horizontal ones. In a co-location area entailing the presence of FDI, the lateral actors are represented by diverse auxiliary agencies or institutions which guide and support the firms in an area. These may be knowledge institutions and economic development agencies.

Since location choice is an important strategic decision for multinational firms, they pay a lot of attention to the location advantages and disadvantages of host economies. Christensen and Drejer (2005) state that '[c]lassical and neo-classical location theory prescribes the choice of firm location to be guided by cost factors and infrastructure in

the region. These cost reducing factors may lead firms to localize close to main customers or suppliers, thus, reducing costs of inter-firm transactions through this proximity. Another parameter may be that co-locating firms may benefit from access to shared resources like infrastructure, and a local, specialized labour market. Concerning manufacturing, location of traditional production activities might, to a large extent, still be determined by cost factors and other traditional location factors' (p. 807). McCann and Shefer (2004) complement this vision by stating that transportation infrastructure is often considered a main factor in firms' location choices and agglomeration. Dunning (1977) upholds that multinational companies participate to co-location to access context specific resources, such as assets characterizing the location of the area and natural resources. These two types of resources are generally named 'regional resources' (Dunning, 1977, 1980, and 1997). Valuable industry resources echo attractive markets for the multinational companies. As part of a co-location area, foreign owned firms are also engraved into the external institutional environment of the area combining cultural specificities and legal regulations. Thus, in a co-location area, firms are linked to market and non-market actors and are reciprocally influenced by them. Foreign owned firms benefit from an increased availability of complementary products and services and have better access to suppliers, specialized employees in the local labor pool, specific information and public institutions. They have a higher motivated workforce due to the localized competitive environment (Patti, 2006). Foreign owned firms active in co-location areas tend to be more innovative than isolated subsidiaries (Baptista & Swann, 1998; Molina-Morales & Martinez-Fernandez, 2003). From a resource-based perspective the combination of resources that are only available in specific areas enables

multinationals to develop additional competencies that are inaccessible to other subsidiaries. These competencies are a result of the combination of resources available within the respective regions, and are not owned by a single firm but hosted in all firms or institutions of the area. The overall advantages withdrawn from the area constituency embody a higher innovation, growth, productivity, competitiveness, higher new firm formation and higher job growth. Even though the benefits are high, costs for participation are not excluded. The potential disadvantages for foreign owned firms when operating in a specific co-location area exemplifies: technological isomorphism, labor cost inflation, inflation of land and housing costs, over-specialization, and institutional and industrial lock-in (Martin & Sunley, 2003). When trying to access, foreign owned firms can also encounter social difficulties if specific areas which take on the characteristics of a club that gives privileged treatment to its members (Crevoisier, 2004; Hansen, 1992; Steinle, 2005). Within a co-location area, firms can develop club-wise interactions which are simultaneously co-operative and competitive, and which offspring a localized value-creating system. These areas are characterized by a club-like atmosphere with intensive knowledge exchange (Weder & Grubel, 1993; Capello, 1999). Firms operating in such co-location areas experience less opportunistic behavior due to intensive information exchange between the members (Steinle & Shiele, 2002).

## 3. Similarity and dissimilarity in location patterns

The totality of location choices made by firms or a group of firms within a country is said to constitute a certain location pattern, where as mentioned earlier often unequal location distributions are found (Shaver, 1998). As arguments for similarity in location patterns,

Shaver (1998) debates using geographical concentration of production factors, government policies, and infrastructure implications for both domestic and foreign owned firms. Furthermore, foreign-owned firms will often be motivated to locate in regions where industry is already concentrated, which would lead to domestic and foreign firms roughly co-locating according to the same pattern. Regarding reasons for location dissimilarity, Shaver (1998) especially emphasizes that the characteristics of foreign owned firms are on the one hand, different from those of domestic firms, and on the other hand, are different among themselves. These differences are given by nationality, namely country of origin, size and the industry sector they target when making direct investments in the host country. Theories of FDI argue that foreign firms face disadvantages in a host country compared to indigenous firms and offset these disadvantages by bringing with them firm-specific advantages or intangible assets (Shaver, 1998: 472), which might result in assessing certain regional characteristics more than their domestic counterparts; or in differently evaluating regional characteristics than other foreign owned firms. For example, foreign import intensive firms might favor locations with easy access to imports (Shaver, 1998). It could also be argued that 'there might be agglomeration economies among foreign owned firms regardless of where domestic firms locate' (Shaver, 1998: 473), referring to co-locations of (specialized) foreign capital and the importance of agglomeration externalities for these firms.

Somewhat overlapping, Hogenbirk (2002) also presents some arguments for both viewpoints. 'Dissimilar location patterns might stem from differences among foreign firms with respect to their technologies or customer bases, the existence of agglomeration economies among foreign-owned firms that motivate them to co-locate together, or

changes in location attractiveness over time that motivate foreign firms […] to value locations differently from incumbent local firms' (Hogenbirk, 2002: 76). On the other hand, 'similar location patterns may stem from the geographic concentration of production factors or demand that both foreign and local firms value similarly. Furthermore, industry agglomeration economies may exist, which are positive externalities arising from the geographic co-location of industry (Head et al., 1995; Schmutzler, 1999). They may encourage both foreign owned firms in the same sector to cluster together resulting in similar location choices' (Hogenbirk, 2002: 77).

**4. Methodology**

4.1. The Netherlands

It is generally assumed that the Netherlands is among those small economies that attract FDI due to their favorable geographic location. As the Netherlands was among those countries initiating the European customs union in 1957, foreign owned firms located there have benefited from the process of increasing economic and political integration from the early start. Strategically located within the European Union and at the North Sea, MNEs frequently use their Dutch establishment to supply not only the (relatively small) Dutch market with their sales, but also other (European) markets. Being a small country that is part of a larger regional economic entity -the European Union-, it is expected that many foreign owned firms located in this particular host country will serve a larger market with their products and services. Due to regional integration, MNEs can rationalize their European activities to exploit economies of scale and scope (Benito, Grøgaard and Narula, 2003; Hogenbirk and Kranenburg, 2006). Given the initiating role

of the Netherlands in the European Union, we expect these effects to be clearly visible among the location of foreign owned firms.

Currently, the Netherlands is the fifth largest outward investor in the world (UNCTAD 2006), an extraordinary position for a small country. Although always a net-outward investor, the Netherlands also quickly recognized that incoming FDI could contribute to the economic well-being of the country, since FDI not only involves financial flows, but also transfers of materials, components, finished products, and intangible assets (Hogenbirk et al., 2009). Worldwide, the Netherlands is the sixth largest recipient of FDI (UNCTAD 2006). This is an exceptional position for such a small economy as well. More than 12000 foreign owned firms have been operating in the Netherlands in the last decade. Table 1 presents an overview of the top ten of largest foreign investors in The Netherlands. It shows that the top ten investors in the Netherlands are United States, United Kingdom, Germany, Belgium, Luxembourg, France, Switzerland, Ireland, Japan and Spain.


- insert table 1 about here-


We selected all foreign owned firms operating in the Netherlands in 2007, grouped in eight main industry sectors which reveal both a notable export-orientation and a host-market focus (Carlton, 1983; Bartik, 1985; Friedman et al., 1992; Woodward, 1992; and Head et al.,1995). We classified the foreign firms using the Standard Industrial Classification SIC code into the following categories: agriculture, forestry and fishing;

mining; construction; manufacturing; transportation, communications, electric, gas, and sanitary services; trade; services; public administration.

The Netherlands consists of twelve provinces, namely Friesland, Groningen, Drenthe, Overijssel, Gelderland, Limburg, Noord-Brabant, Zeeland, Utrecht, Zuid-Holland, Noord-Holland, and Flevoland. They differ from each other with respect to language, culture, and history. Noord-Holland, Zuid-Holland, and Utrecht, together often labeled the 'Randstad', are regarded as being quite distinct from the other provinces. These provinces are located close to the sea, hold major business centers in the cities of Amsterdam, Rotterdam, Den Haag, and Utrecht; and encompass the main ports of Schiphol Airport and the harbor of Rotterdam. Groningen, Drenthe, Overijssel, Gelderland, Limburg, Noord-Branbant, and Zeeland are provinces bordering other countries, namely Germany and Belgium. Additionally, Limburg borders both Belgium and Germany. The province Noord-Brabant is known for the technological knowledge and innovation present, which is essential for foreign owned firms as shown by Biermans and Poort (2007) and especially for the ones employing resource-seeking motives. Furthermore, the Overijssel region has a large manufacturing base and excellent infrastructure enabling easy communication with major Eastern European markets.

4.2. Data Sources and sample

The paper uses several datasets collected by the Dutch Central Bank (DNB), Dunn and Bradstreet, DutchInvest, and Central Bureau of Statistics (CBS). The DNB country-level dataset provides an overview on the inward FDI in the Netherlands and the origin of the inward investment per countries and regions worldwide. The Dunn and Bradstreet and

DutchInvest are firm-level databases which provide detailed information on foreign owned firms doing business in the Netherlands, and the number, industry and regional location of their subsidiaries. The data consists of the currently economically active companies, in number of 12.632 foreign owned firms, out of which 11.614 SMEs and 1.018 MNEs. With regards to the origin of these foreign owned firms, 8.099 firms are owned by countries part of European Union (EU), and 4.533 firms are non-EU. We excluded the companies (both subsidiary and branches) which are out of business that is non-marketable. The data refers to the foreign owned firms as legally existing entities relating strategically to the mother-company but existing independently as a juridical form. This entails legal responsibilities and legal consequences directly on the company itself. Only firms, both domestic and foreign owned were taken under consideration.

The Statline database from CBS contains all firms in the Netherlands, without making a distinction between foreign owned and domestic establishments. This database also allows for selecting firms based on the industry in which they operate and representing the selected firms per region or province for the year 2007. However, appropriate data collection is not as clear cut as it may seem. This is because of the fact that the databases provide no numbers on domestic establishments. Therefore, these numbers need to be determined by subtracting the foreign owned firms from the total of establishments. By focusing on establishments, we account for the fact that the Statline database contains data of 'firms per region'. Here, firms are both headquarters of a firm as well as branches at different locations within the Netherlands.

An issue of concern is that the databases are based on different industry classification systems, namely SBI (Standaard Bedrijfsindeling) and SIC (Standard Industrial

Classification). Therefore, we synchronized the two classification systems in order to refer to the same kind of firms (i.e. firms active in the same industry). The CBS, which provides the Statline database, uses a SBI classification to distinguish between industry sectors. SBI is referred to as the Dutch SIC system (Broersma & Gautier, 1997). The other database uses the SIC 1987 classification system. It is necessary to verify which SIC 1987 classification codes correspond to the just presented SBI codes to validly synchronize the two databases (www.siccode.com). Therefore, in this research all branches under division A to J in the SIC'87 system will be regarded similar to all establishments in division D in the SBI'93 system. From the Statline database, which contains all foreign firms (both domestic and foreign) active in the Netherlands on the 1st of Januari 2008 we selected a total of 94625.

4.3. Method

A chi-square test is used to analyze the categorical data that refer to the possible differences in location choices of domestic and foreign owned firms across each industry sector. The chi-square test is the most appropriate method because we have nominal data (frequency) data, where subjects are assigned to categories. The test is concerned with answering the question: does a relationship exist between the variables of interest? This method compares the observed frequencies with the expected frequencies if there are no statistical relationships between the relevant variables.

## 5. Empirical findings

5.1. Domestic and foreign owned firms across Dutch industries: similar or different location pattern

In order to see the co-location patterns of the foreign owned firms in the Netherlands we start our analysis by investigating whether the foreign firms exhibit the same location behavior as the domestic firms. In 2002 Hogenbirk found that domestic and foreign firms located dissimilarly in the Netherlands in 1997. Although this research is based on data from a decade later, we expected that foreign owned firms locate differently from their domestic counterparts, mostly based on their different characteristics, as emphasized by Shaver (1998). Therefore, the assumption here was that the location patterns of foreign owned and domestic firms differ across provinces. Table 2 presents the number of foreign owned firms, the number of domestic firms and the total number firms across eight industry sectors and for each of the Dutch provinces, which constitutes the basis for our analysis.

- insert Table 2 about here -

Our analysis shows that there exists a high similarity among the distribution of domestic and foreign owned firms per province. This would suggest that the location patterns of domestic and foreign owned firms are quite similar. Provinces that employ relatively a high number of domestic firms, like Noord-Brabant (18.89%), Noord-Holland (15.99%) and Zuid-Holland (16.23%), also employ relatively high number of foreign owned firms

(respectively 20.19%, 16.12%, and 17.23%). The same stands for provinces with relatively low domestic firm counts, like Flevoland, Drenthe, and Zeeland. At a first glance, the share of domestic firms per province and the share of foreign owned firms per province are very much alike. To analyze this location pattern similarity more objectively, a Chi-square test is conducted. This test determines if the location pattern of foreign owned firms differs significantly from the location pattern of domestic firms for each industry sector. A Chi-square test identifies if the test's null-hypothesis that the location patterns are identical needs to be rejected.

Table 3 presents the results of the Chi-square test for each individual industry sector.


- insert Table 3 about here -


Results show that for the industry sectors of mining, construction, transport and communications, and trade industry the null-hypothesis of identical location patterns is rejected and that the location patterns do significantly differ across the twelve Dutch provinces. For the agriculture, forestry and fishing, the manufacturing, and the services industries the null-hypothesis cannot be rejected, consequently the locations patterns of foreign owned versus domestic firms do not significantly differ from each other.

In the case of the public administration sector there are only two foreign owned firms in the DutchInvest database, both located in Zuid-Holland, it seems that this industry is not adequate for studying location pattern differences. Because of the general absence of foreign firms, no Chi-square test is performed. The same counts for an analysis of the provinces favoured and disfavoured. To conclude, a FDI-analysis of the public

administration industry would not be valid and will be disregarded from this point forward for the purpose of this study.


5.2. Investigation into which provinces foreign owned firms favor

In order to provide a more accurate analysis of the location patterns of foreign owned firms across industries in the Netherlands, we will focus our investigation on which provinces are favored and disfavored by the foreign owned firms. We will firstly look at how domestic firms per industry are located with respect to the number of domestic firms per province. Furthermore, we will determine which provinces are favored by foreign owned firms by comparing their location patterns with the location patterns of the domestic ones.

- insert Table 4 about here –


Table 4 also provides information about where domestic and foreign owned firms are located. To gain insight in the location patterns, the data in the columns 'share of total foreign firms' and 'share of total domestic firms', will be used. Domestic firms favor the provinces Noord-Brabant (18.89%), Zuid-Holland (16.23%), Noord-Holland (15.99%), and Gelderland (13.38%). Similar to the domestic firms' distribution, the provinces Noord-Brabant (20.19%), Zuid-Holland (17.23%), Noord-Holland (16.12%), and Gelderland (12.53%) are highly favored by foreign owned firms.

The Chi-square test has a value of 27,000, and a p-value of 0.250 which is higher than 0.001 meaning that we cannot reject the null-hypothesis, therefore, the domestic and foreign owned firms favor the same provinces. When comparing the distribution pattern

of both domestic and foreign owned firms, our results are consistent with the previous results, namely that the provinces favored by foreign owned firms are, to a large extent, similar to the ones favored by domestic firms. Exceptionally from the domestic firms distribution, the province Limburg is highly favored by foreign owned firms and the province Friesland is less favored by foreign firms compared to domestic ones.

In order to objectify which provinces are favored by the foreign firms we need to focus on 'the difference in the number of firms that foreign owned firms control in a [province], and the expected number of firms that foreign owned firms would have controlled if they followed the same distribution pattern as [domestic firms]' (Shaver, 1998: 478). Therefore, table 5 provides the actual number of foreign owned firms per province, the expected number foreign firms per province if they would have followed the location pattern of the domestic ones, and the difference between these two numbers (actual – expected), implying favoring or disfavoring of the province considered. The expected number of foreign owned firms is calculated by multiplying the actual number of foreign owned firms per province with the shares of the total domestic firms per province.


- insert table 5 about here -


We notice that the provinces of Limburg, Noord-Brabant, Noord-Holland, and Zuid-Holland are favored by foreign owned firms overall industry sectors. It has to be noted that Noord-Holland only has a deviation (of the actual from the expected number) of three, which means that the favoring is here very low. Drenthe, Flevoland, Friesland, Gelderland, Groningen, and Overijssel are unfavored, whereas for Utrecht and Zeeland

the expected number is exactly the same as the actual number of foreign owned firms. The province of Limburg is strongly favored by foreign manufacturing firms no matter the industry division.

5.3. Co-location patterns considering industry, nationality and size of foreign owned firms

In order to deepen our insight into the co-location patterns of foreign owned firms we will consider firm characteristics such as size and country of origin. We will now look at the distribution across provinces according to the nationality or country of origin of the foreign owned firms. Firstly, we select the foreign owned firms depending of the home country of the mother company (global headquarters) into three categories: EU country of origin (E.U. comprises of: Belgium, Denmark, Germany, Finland, France, Greece, Ireland, Italy, Luxembourg, Austria, Portugal, Spain, United Kingdom, Sweden.), North America (USA and Canada), and the rest of the world. Furthermore, we look at the distribution per each province according to the main investors (De Nederlandse Bank, 2005). Results (table6) show that the provinces of Limburg, Noord-Brabant and Zeeland are favored by the foreign owned firms with a Belgium mother company. Accordingly, Belgium owned firms co-locate in the Dutch provinces which neighbor Belgium. The same results stand for the German owned firms which co-locate across the provinces bordering Germany namely: Limburg, Gelderland, Overijssel, Drenthe, and Groningen.

- insert table 6 about here -

Related to size, Rugman and Verbeke (2002) strengthen the idea where as company size play an important role in firms' location choice and agglomeration patterns. For this study we consider firms with less than 250 employees as small and medium sized and firms with more than 250 employees as large firms (European Commission, 2003). The Chi-square test has a value of 130,000, and a p-value of 0.262 which is higher than 0.001 meaning that we cannot reject the null-hypothesis. Results (table 7) show that there is a consistent/ equal distribution of foreign firms no matter the size across all twelve provinces. Overall a share of 83.19 % of is occupied by small and medium size firms, while large foreign manufactures occupy an average share of 16.83 %. These results are consistent across all Dutch provinces.

- insert table 7 about here –


When investigating co-location patterns considering nationality, thus, country of origin, and size the Chi-square value of 100,000, and the p-value of 0.25 show that we cannot rejects the null-hypothesis and that there is an equal distribution of both large and small foreign owned firms regardless of country of origin.

Regarding co-location patterns considering size and industry we observe a different in location patterns among foreign owned firms. The statistical test has a value of 42,000 and a p-value of 0.000 which means that the null-hypothesis of identical location patterns can be rejected. The patterns of small foreign owned firms are significantly different than the ones of large firms across industry sectors. Table 8 shows clearly that large firms are targeting two main industries in the Netherlands namely trade (wholesale and retail) and manufacturing. The highest numbers of large foreign owned firms are present in these industry sectors.

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**6. Discussions and Conclusion**

Our empirical evidence shows that the location patterns of foreign owned firms and domestic firms in the following industries: mining, construction, transport and communications, and trade industry significantly differ across the twelve Dutch provinces. In the agriculture, forestry and fishing, the manufacturing, and the services industries the locations patterns of foreign owned versus domestic firms are mostly similar.The similarity in location patterns can be explained by Marshall's specialization theory, according to which knowledge spillovers between competitors in the same industry attract them to that region (Marshall, 1890). Reflecting back, theory states that, under the circumstances of manufacturing costs, taxation and location attractiveness differing across provinces, foreign firms have the tendency to locate where costs are lower (Shaver, 1998). In the case of the Netherlands there is not a large difference in government policy and taxation across the twelve Dutch provinces. This can add to the understanding of the similarity in the distribution of foreign owned firms with the domestic one in the above mentioned industries.  On the other hand, an additional reason for location similarity revolves around the effect of agglomeration economies, which are positive externalities that arise from the geographical co-location of industry. Marshall (1890) highlighted three sources of external economies from industry co-location: knowledge spillovers among competitors, industry demand that creates a pool of specialized labor, and industry demand that creates a pool of specialized input providers. In the context of foreign entry, to the extent that domestic industry agglomeration already

exists, foreign owned firms are often motivated to locate in regions where industry is already concentrated. Our findings related to the foreign owned firms location patterns are in line with Head, Ries and Swenson's (1995) findings that Japanese establishments were more likely located in states where U.S. domestic establishments have greater industry presence. Moreover, Mariotti and Piscitello's (1995) results show that foreign firms tend to co-locate near industrial cores.

Our second empirical finding refers to the provinces (areas) which the foreign owned firms prefer and co-locate, namely Noord-Brabant (20.19%), Zuid-Holland (17.23%), Noord-Holland (16.12%), and Gelderland (12.53%). For this occurring we employ again the arguments of agglomeration economies, which are positive externalities that arise from the geographical collocation of industry, these areas being the mostly populated by the domestic firms also. These areas are favored by the foreign owned companies also due to infrastructure reasons, the concentration of production factors and, additionally, the presence of the main ports namely, Rotterdam Harbor and Amsterdam Schipol. The provinces of Noord-Holland and Zuid-Holland are located close to the sea; contain major business centers in the cities of Amsterdam, Rotterdam, Den Haag, and Utrecht; and encompass two main ports (Hogenbirk, 2002), something foreign owned firms find extremely valuable because of infrastructure reasons. The region of Noord-Brabant is known for the technological knowledge and innovation present, which is essential for foreign owned firms employing resource-seeking motives as shown by Biermans and Poort (2007). Furthermore, the Gelderland region has a large manufacturing base and excellent infrastructure enabling easy communication with major Eastern European markets (www.nfia.nl), where the CBIN (2004) states that near access to other European

markets and a favorable geographical positioning constituting a 'gateway to Europe' is deemed a major strength for foreign owned firms.

Theories of FDI argue that foreign owned firms face different disadvantages in a host country and offset these disadvantages through intangible assets (Shaver, 1998), which might result in differently evaluating regional characteristics than other foreign owned firms. For example, foreign import intensive firms might favor locations with easy access to imports (Shaver, 1998). Our empirical findings related to size differ from the theoretical view which considers size as playing role in firms' location choice and agglomeration patterns (Rugman and Verbeke, 2002). We found that small, medium and large foreign owned firms are averagely consistent distributed across the twelve provinces. Therefore, we do not consider company size as significant for co-location patterns of foreign owned firms in the Netherlands. Additionally, we found a difference in industry co-location according to size namely that large firms clearly target the trade industry, strongest wholesale trade, retail trade and manufacturing industry. Thus, large foreign owned firms are mainly co-located in the wholesale and retail trade industry and manufacturing one. Considering the geographic location of the Netherlands, the presence of the main ports namely, Rotterdam Harbor and Amsterdam Schipol, on the one hand; and the membership to the E.U. market, on the other hand, we consider that large foreign owned firms are targeting and co-locating in the wholesale trade industry for export reasons also sustained by Hogenbirk and Kranenburg in 2002.

On the other hand, nationality was empirically sustained as significant for co-location patterns among foreign owned firms. Our results show that the Belgium owned firms co-locate in the provinces bordering Belgium (Limburg, Noord-Brabant and Zeeland),

therefore, in close proximity to their country of origin. The same stands for the German owned firms which prefer the German neighboring Dutch provinces, namely Limburg, Gelderland, Overijssel, Drenthe, and Groningen. Consequently, foreign owned firms with different nationalities exhibit different location patterns.

Limburg is the province where both foreign owned firms and domestic firms co-locate due to its geographic proximity to three countries: Belgium, the Netherlands and Luxemburg. This result is consistent to Shaver's findings (1998).

Concerning limitations of the research, firstly the number of domestic firms per province is calculated by subtracting the number of foreign owned firms from the total number of firms in the Dutch province under consideration. Although this seems a logical way of calculating, which is also employed by Shaver (1998) and Hogenbirk (2002), it would be more straightforward if this data would be objectively available. Secondly, this research is characterized by its static nature, without explicitly addressing dynamics by looking at evolving location patterns over time. Therefore, the fact that the results of this research only apply to one moment in time (2007) can be considered a limitation. Moreover, considering dynamics, longitudinal research would be appropriate.

Concerning the generalizability of the research, the study and findings regard all industry domains within the Netherlands. On the other hand, they are not instantly applicable to other countries. The findings apply only to all foreign owned firms in the Netherlands, although they may provide useful insights for similar research in other relatively similar countries. Therefore, extending this research to other countries could prove a valuable avenue for future research. Another interesting avenue would be the location choice

factors, such as agglomeration, labor, infrastructure, and geography, which can be investigated in a future study.

This research is a case-study of the foreign owned firms across the Dutch industries of agriculture, forestry and fishing; mining; construction; manufacturing; transportation, communications, electric, and gas; trade; services; and public administration. It mainly aims at providing insight in the location patterns of foreign owned firms, and it validly achieves its purpose because we investigate the whole population of foreign owned companies by means of a census without drawing a sample. This is particularly relevant since almost half of the foreign investors think the Dutch establishment climate has lately worsened (CBIN, 2004). This research determines whether for particular regions government policies should be aimed at both domestic and foreign investors, or whether it would be worthwhile to focus on just one of these two groups because of the likelihood of the group actually locating in the region concerned, based on identified predictors. Nations also aim to attract FDI because it yields certain benefits for the region and economy (McCann & Mudambi, 2004), such as economic development, employment, innovation, and an increase in the host-countries' overall development (Netherlands Foreign Investment Agency; Hogenbirk, 2002). Therefore, policy makers in many countries are increasingly interested in analyses of multinational enterprises' (MNE) location choices (Pertijs, 2006; Erken, Kleijn, and Lantzendörffer, 2004), where their efforts in attracting foreign investments often result in high inward flows of FDI. Additionally, this study is relevant since FDI has lately gained renewed attention from Dutch policy makers and the government in the beginning of this century, after initially in the 90s being pushed somewhat to the background because of the ICT hype and high

expectations of the 'new economy' (Biermans & Poort, 2007). Concerning the relevance of the research for managers of firms, they could benefit from the study by learning what would be a wise location decision in their particular situation (Shaver, 1998), especially if they aim at benefiting from a particular type of spillover effects generated by a certain agglomeration of firms (Van der Panne, 2004).

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**List of tables:**

Table 1: FDI Stock in the Netherlands by top ten countries, 2005 - Million EUR at year-end

| No. | Country | Stock |
|---|---|---|
| 1 | United States | 69.140 |
| 2 | United Kingdom | 57.085 |
| 3 | Germany | 44.526 |
| 4 | Belgium | 35.807 |
| 5 | Luxembourg | 28.203 |
| 6 | France | 26.102 |
| 7 | Switzerland | 16.655 |
| 8 | Ireland | 14.521 |
| 9 | Japan | 9.682 |
| 10 | Spain | 8.005 |
| **Total** | | **309.726** |

Table 2: Domestic and foreign owned firms in the Netherlands

| Province | Total Establishments | Foreign Establishments | Share of Total Foreign Establishments (%) | Domestic Establishments | Share of Total Domestic Establishments |
|---|---|---|---|---|---|
| Drenthe | 1400 | 45 | 2.38 | 1355 | 2.65 |
| Flevoland | 1055 | 26 | 1.37 | 1029 | 2.02 |
| Friesland | 2545 | 38 | 2.01 | 2507 | 4.91 |
| Gelderland | 7070 | 237 | 12.53 | 6833 | 13.38 |
| Groningen | 1705 | 59 | 3.12 | 1646 | 3.22 |
| Limburg | 3685 | 193 | 10.20 | 3492 | 6.84 |
| Noord-Brabant | 10025 | 382 | 20.19 | 9643 | 18.89 |
| Noord-Holland | 8470 | 305 | 16.12 | 8165 | 15.99 |
| Overijssel | 3775 | 116 | 6.13 | 3659 | 7.17 |
| Utrecht | 3430 | 123 | 6.50 | 3307 | 6.48 |
| Zuid-Holland | 8615 | 326 | 17.23 | 8289 | 16.23 |
| Zeeland | 1175 | 42 | 2.22 | 1133 | 2.22 |
| | 52950 | 1892 | 100% | 51058 | 100% |

Table 3: Chi-Square tests – industry sectors

| Industry sector | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Agriculture, Forestry, and Fishing | 23,332a | 11 | .016 |
| Mining | 201,799a | 11 | .000 |
| Construction | 42,270a | 11 | .000 |
| Manufacturing | 72,000a | 11 | .232 |
| Transportation, Communications, Electric, Gas, and Sanitary Services | 146,856a | 11 | .000 |
| Trade | 211,860a | 11 | .000 |
| Services | 321,682a | 11 | .000 |
| Public Administration | not valid | not valid | not valid |

Table 4: Domestic and foreign owned firms, shares per province and industry

| Industry | Agriculture, Forestry, Fishing | | Mining | | Construction | | Manufacturing | | Transportation, Communications, Electric, Gas | | Trade | | Services | | Public Administration | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Province | Domestic | Foreign | Domestic | Foreign | Domestic | Foreign | Domestic | Foreign | Domestic | Foreign | Domestic | Foreign | Domestic | Foreign | Domestic | Foreign |
| Groningen | 4,28 | 5,56 | 3.32 | 0.07 | 2.74 | 1.63 | 3.22 | 3.12 | 3.70 | 1.77 | 3.06 | 2.56 | 2.79 | 1.86 | 5.27 | 0 |
| Friesland | 7,29 | 2,78 | 5.17 | 0.07 | 4.52 | 0.82 | 4.91 | 2.01 | 4.84 | 1.57 | 4 | 2.42 | 3.20 | 1.45 | 4.29 | 0 |
| Drenthe | 5 | 2,78 | 14.39 | 0.07 | 2.86 | 1.22 | 2.65 | 2.38 | 2.43 | 1.11 | 3.05 | 2.07 | 2.48 | 1.60 | 3.84 | 0 |
| Overijssel | 11,23 | 2,78 | 7.38 | 0 | 5.86 | 3.67 | 7.17 | 6.13 | 4.76 | 2.49 | 6.87 | 5.61 | 5.35 | 3.01 | 5.75 | 0 |
| Flevoland | 2,66 | 8,33 | 1.85 | 0 | 1.88 | 0.82 | 2.02 | 1.37 | 2.53 | 0.92 | 2.02 | 2.30 | 1.95 | 1.33 | 1.44 | 0 |
| Gelderland | 16,65 | 8,33 | 14.02 | 4.58 | 12.22 | 7.35 | 13.38 | 12.53 | 10.19 | 7.80 | 12.10 | 10.83 | 11.48 | 7.80 | 9.59 | 0 |
| Utrecht | 4,45 | 2,78 | 1.85 | 0 | 6.97 | 11.02 | 6.48 | 6.50 | 5.90 | 5.11 | 7 | 9.68 | 9.30 | 7.97 | 6.21 | 0 |
| Noord-Holland | 7,61 | 16,67 | 11.08 | 32.68 | 17.86 | 19.18 | 15.99 | 16.12 | 19.12 | 24.59 | 16.99 | 18.90 | 20.21 | 28.30 | 16.36 | 0 |
| Zuid-Holland | 12,64 | 11,11 | 5.54 | 52.29 | 20.51 | 26.94 | 16.23 | 17.23 | 24.54 | 29.70 | 19.99 | 20.56 | 20.51 | 24.37 | 20.90 | 100 |
| Zeeland | 4,47 | 5,56 | 4.43 | 1.96 | 2.10 | 2.86 | 2.22 | 2.22 | 2.98 | 2.62 | 2.34 | 1.82 | 2.03 | 1.86 | 2.88 | 0 |
| Noord-Brabant | 17,21 | 13,89 | 16.24 | 3.92 | 16.97 | 22.86 | 18.89 | 20.19 | 12.95 | 15.15 | 16.02 | 16.46 | 14.56 | 14.36 | 13.90 | 0 |
| Limburg | 6,52 | 19,44 | 15.13 | 2.61 | 5.51 | 1.63 | 6.84 | 10.20 | 6.06 | 7.15 | 6.56 | 6.79 | 6.16 | 6.09 | 8.15 | 0 |
| Limburg | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 0 |

Table 5: Favouring and Disfavouring of Provinces by Foreign Owned Firms (* Due to rounding off) for each industry sector

| Industry | Agriculture, Forestry, Fishing | | Mining | | Construction | | Manufacturing | | Transportation, Communications, Electric, Gas | | Trade | | Services | | Public Administration | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Province | Difference in favor | F/D | Difference in favor | F/D | Difference in favor | F/D | Difference in favor | F/D | Difference in favor | F/D | Difference in favor | F/D | Difference in favor | F/D | Difference in favor | F/D |
| Groningen | 0 | F/D | -4 | D | -3 | D | -2 | D | -29 | D | -39 | D | -37 | D | Not valid | |
| Friesland | -2 | D | -7 | D | -9 | D | -55 | D | -50 | D | -124 | D | -70 | D | Not valid | |
| Drenthe | -1 | D | -21 | D | -4 | D | -5 | D | -20 | D | -77 | D | -35 | D | Not valid | |
| Overijssel | -3 | D | -11 | D | -5 | D | -20 | D | -35 | D | -98 | D | -93 | D | Not valid | |
| Flevoland | 2 | F | -3 | D | -3 | D | -12 | D | -25 | D | 22 | F | -25 | D | Not valid | |
| Gelderland | -6 | D | -14 | D | -12 | D | -15 | D | -36 | D | -99 | D | -147 | D | Not valid | |
| Utrecht | -1 | D | -3 | D | 10 | F | 0 | D/F | -12 | D | 210 | F | -53 | D | Not valid | |
| Noord-Holland | 3 | F | 33 | F | 3 | F | 2 | F | 83 | F | 149 | F | 323 | F | Not valid | |
| Zuid-Holland | -1 | D | 72 | F | 16 | F | 19 | F | 79 | F | 45 | F | 154 | F | Not valid | |
| Zeeland | 0 | F/D | -4 | D | 2 | F | 0 | D/F | -5 | D | -41 | D | -7 | D | Not valid | |
| Noord-Brabant | -1 | D | -19 | D | 14 | F | 25 | F | 34 | F | 35 | F | -8 | D | Not valid | |
| Limburg | 5 | F | -19 | D | -9 | D | 64 | F | 17 | F | 18 | F | -3 | D | Not valid | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Table 6: Distribution of foreign owned firms, shares per province according to nationality

| Province | Home country | USA | UK | Germany | Belgium | Luxemburg | France | Switzerland |
|---|---|---|---|---|---|---|---|---|
| Limburg | | 9.00 | 12.6 | 10.73 | 14.75 | 6.28 | 7.40 | 9.09 |
| Noord-Brabant | | 19.00 | 15.15 | 19.77 | 33.11 | 11.32 | 12.34 | 11.36 |
| Zeeland | | 3.00 | 1.51 | 1.12 | 3.27 | 1.25 | 1.23 | 0.75 |
| Gelderland | | 7.00 | 1.51 | 20.62 | 7.54 | 9.43 | 8.02 | 6.18 |
| Utrecht | | 6.00 | 11.61 | 5.93 | 8.19 | 12.57 | 11.72 | 12.87 |
| Zuid-Holland | | 10.00 | 12.12 | 4.80 | 6.55 | 19.49 | 17.28 | 24.24 |
| Noord-Holland | | 17.00 | 20.20 | 10.73 | 13.11 | 20.12 | 18.51 | 26.51 |
| Flevoland | | 11.00 | 3.03 | 2.54 | 3.27 | 3.77 | 4.93 | 0.75 |
| Overijssel | | 8.00 | 14.14 | 14.12 | 6.55 | 8.17 | 17.28 | 11.36 |
| Drenthe | | 3.10 | 3.03 | 3.38 | 1.96 | 3.14 | 3.08 | 3 |
| Groningen | | 1.55 | 1.51 | 2.82 | 0.98 | 2.51 | 1.23 | 2.27 |
| Friesland | | 0.77 | 3.53 | 3.38 | 0.65 | 1.88 | 1.23 | 2.27 |
| Total | | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

Table 7: Distribution of foreign owned firms (FOF), shares per province according to size

| Province | Total | Small & medium FOF (SM_FOF) | Share of Total SM_FOF % | Large FOF | Share of Total large FOF |
|---|---|---|---|---|---|
| Limburg | 174 | 155 | 89.08 | 19 | 10.91 |
| Noord-Brabant | 508 | 403 | 79.33 | 105 | 20.66 |
| Zeeland | 31 | 26 | 83.87 | 5 | 16.12 |
| Gelderland | 171 | 145 | 84.79 | 26 | 15.20 |
| Utrecht | 147 | 121 | 82.31 | 26 | 17.68 |
| Zuid-Holland | 224 | 184 | 82.14 | 40 | 17.85 |
| Noord-Holland | 279 | 236 | 84.58 | 43 | 15.41 |
| Flevoland | 70 | 51 | 72.85 | 19 | 27.14 |
| Overijssel | 160 | 142 | 88.75 | 18 | 11.25 |
| Drenthe | 52 | 40 | 76.92 | 12 | 23.07 |
| Groningen | 38 | 33 | 86.84 | 5 | 13.56 |
| Friesland | 38 | 33 | 86.84 | 5 | 13.15 |
| Total | 1892 | 1569 | 83.19 | 323 | 16.83 |

Table 8: Co-locations according to industry sector and size, dominance large foreign owned firms (FOF)

| Industry | Co-locations – dominance large FOF <= 25 % | Co-locations – dominance large FOF <= 50 % | Co-locations dominance large FOF <= 75 % | Co-locations dominance large FOF > 75 % |
|---|---|---|---|---|
| Agriculture, Forestry, Fishing | 0 | 0 | 0 | 0 |
| Mining | 0 | 0 | 0 | 0 |
| Construction | 35 | 2 | 0 | 0 |
| Manufacturing | 16 | 10 | 0 | 0 |
| Transportation, Communications, Electric, Gas | 21 | 0 | 0 | 0 |
| Trade(Retail) | 228 | 0 | 0 | 0 |
| Trade(Wholesale) | 388 | 84 | 41 | 0 |
| Services | 44 | 0 | 0 | 0 |
| Public Administration | 0 | 0 | 0 | 0 |
| Total | 732 | 96 | 41 | 0 |

1 Co-location = 20 FOF