The importance of bunching, clustering and learning: A location study of Chinese investment in the European Union

Introduction

In 2012, financial newspapers and magazines in Europe were abuzz with reports about a group of more than 60 Chinese companies investing in Europe. A number of destinations had been singled out for final inspection. The Chinese companies are part of an alliance of about 500 Chinese entrepreneurs from various sectors, including companies like Gree, Lifan, TCL and Tencent. Based on the overarching idea of helping Chinese enterprises internationalize, the Aigo Entrepreneurs Alliance (AEA) was founded by Feng Jun, Chairman of Aigo Digital Technology, in cooperation with a consortium of influential entrepreneurs that are leaders in their respective fields. With 16 founding members who lend their names to the venture and almost 500 private companies in tow, the AEA organizes investment road shows to potential destinations with the aim of ultimately negotiating joint office space and other services to give members a quick start in setting up overseas. By limiting membership to one company per industry, AEA fosters cooperation rather than competition among member companies (AEA, 2014).

“Going out by yourself, if you aren't very familiar; it's very hard from a management perspective." says Feng Jun. That is why the AEA organizes regular trips to Europe, as well as to Asia, North America, South America, and Africa for its members. Feng says the key to success for Chinese faced with a daunting international corporate landscape is safety in numbers. They had visited Europe in 2011 for the first time, and came back in 2012 and 2014, always in a large mission as is typical of Chinese culture. During those European missions, AEA had made trips to Belgium, Denmark, the Netherlands, and Britain.

The most concrete initiative was in Belgium, where property developer Group Bernaerts -- which itself is expanding into China -- had wooed the Chinese arrivals to Willebroek with a year of free rent on an office and warehouse complex still under construction half-way between the port of Antwerp and the European Union capital of Brussels. This raised a few eyebrows in Flanders as Willebroek was not known for its booming business or attractive location. A local government official indicated that this investment was more than welcome as it would be a tremendous image builder to be able to attract all these Chinese companies to a soon to be

constructed office building near the highway. This “China Brand” wholesale center would lead to the creation of -much-needed- 500 jobs in the short run, while there was talk of 5,000 or even 50,000 jobs as many more Chinese companies would follow in their wake as these investments would include showroom spaces, warehousing and storage, but also assembly facilities for sale to the European market. The local official welcomed the job creation as well as the supposed embeddedness this would create for future investments.

The Belgian investment opportunity came after an AEA delegation toured Belgium, the Netherlands, Denmark and Britain in December looking for a foothold in the European market. Only the Netherlands failed to make the cut, with members voting that the Dutch had failed to offer enough government or business support (Reuters, 2012). In Denmark, the group had a toehold after it set up a contact office, with an eye to establishing a bigger incubator office, while an AEA delegation held meetings with business associations and property developers near Greenwich on a trip to London (Reuters, 2012). Factors that were deemed essential in the location decision, were the vicinity of a world-class port, skilled workforce, and ready access to the European market. As of today, no decision had been made about a European hub for AEA members, while government officials in Europe property developers reluctantly attempt to win over investors and property developers to get their projects going.

In an attempt to shed some light on the investment location behavior of Chinese companies, this paper will tackle the issue of Chinese greenfield investments in Europe. It will analyze what the driving factors are in determining their investment decisions, and whether any useful conclusions can be drawn. This can inform policy makers on the rational expectations that they might have in trying to attract Chinese investors to their jurisdiction in a region that has become increasingly economically and politically integrated. More and more investors consider Europe as a whole, and outweigh the pros and cons of each investment destination. It is therefore essential to analyze the investment location decision at the right level of geographical unit of analysis, while also taking account of the integration process within Europe. Production space in European countries has become extremely ‘slippery’. Economists, geographers, and economic development planners have sought for more than a decade for alternative models of development in which activities are sustained or transformed in ways that maintain wage levels, social contributions, and quality of life. They have searched for ‘sticky places’ in ‘slippery space’ (Markusen, 1994), examining the structure and operation of these geographic concentrations of interconnected companies and institutions.

This study aims to make contributions to the literature in three ways. First, it develops an integrated theoretical framework that incorporates an institutional perspective (Scott, 2002) along with traditional economic factors (Buckley, Tan, & Xin, 2008; Dunning, 1993) to provide a more comprehensive framework for empirical investigation on the location choice issue. Second, with empirical evidence, this study provides explicit insights explaining the factors influencing FDI location choice of Chinese firms and revealing the divergent and dynamic impacts of various institutional factors on FDI location choice. It thereby analyzes Europe as an integrated market, while also looking at the relevant subnational investment locations.

Literature and hypotheses

There has been a plethora of research that focuses on the location of particular value added activities of foreign firms and of geographical distribution of FDI. For instance, Vernon (1966) and his disciples at Harvard were the first to acknowledge the relevance of trade theories to help explain MNE activity. Vernon used the product life cycle to explain the foreign activities of MNEs. His starting point was that in addition to immobile natural endowments and human resources, the propensity of countries to engage in trade also depended on their capability to upgrade these assets or to create new ones, notably technological capacity (Dunning, 1993).

The influence of Vernon's original model goes way beyond its original application to the development of US direct investment in Europe and subsequently in cheaper labor countries. The dynamics of the model lies in the interaction of the evolving forces of demand and production patterns. In some ways, its simple yet powerful dynamic -resting on the interaction of demand and supply over time- has never been improved (Buckley, 1993). The twin rationales of cost imperatives and market pull are clearly illustrated in Vernon's model.

A group of Vernon's doctoral students, notably Knickerbocker (1973), Graham (1978) and Flowers (1976), argued that it was not just locational variables that determined the spatial distribution of the economic activity of firms but their strategic response to these variables and to the anticipated behavior of their competitors. Knickerbocker (1973) argued that oligopolists would normally follow each other into new and foreign markets to safeguard their own commercial interests. This so-called bandwagon effect can be triggered not only by decisions of competitors but also of customers deciding to establish themselves in a certain market.

Empirical evidence supports the follow-the-leader idea that FDI is subject to bunching. For instance, an analysis of FDI by US MNEs in European manufacturing industry in the 1960s seemed to support the hypotheses (Flowers, 1976). There has also been a stampede of Japanese MNEs in the US and European auto and consumer electronics industries in the 1980s (Head and Meyer, 2004).

The empirical literature largely conceptualizes the industrial location of firms as a process of location scanning and choice (Smith and Florida, 1994). Econometric models treat the location decisions as a form of revealed preference for the attributes of a given area, on the one hand, and agglomeration factors, on the other hand. Relevant variables have been shown to be attributes such as relative wages, market size, degree of openness, transport costs, (un)employment, unionization, education, population size and density, transportation access, infrastructure, and tax rate variables (e.g. Alcácer & Chung, 2007; Alcácer & Chung, 2013; Bas & Sierra, 2002; Belderbos & Somers, 2015; Chung & Alcácer, 2002).

Several studies have found evidence of spatial concentration or agglomeration effects in the location of FDI (Florida & Kenney, 1994; Head, Ries, & Swenson, 1995; Knickerbocker, 1973; Vernon, 1974; Wheeler & Mody, 1992; Smith and Florida, 1994; Braunerhjelm and Svensson, 1996; Ford and Strange, 1999; Belderbos et al., 2011). Clustering is a self-reinforcing process in which initial FDI accounts for additional FDI (Wheeler and Mody, 1992; Arthur, 1990; Markusen, 1990). Chance events and government inducements can have a lasting influence on the geographical pattern of manufacturing. In the case of FDI location choice, empirical evidence demonstrates a bandwagon effect that is resulted from a follow-the-leader approach of decision-making (Sethi et al., 2003).

While the observation that firms tend to cluster in particular regions is hardly novel (Smith, 1776; von Thünen, 1826; Marshall, 1890), it has more recently been taken up in explaining the stickiness of certain locations in an increasingly slippery world (Markusen, 1994). Theories suggest that firms may be drawn to the same locations because proximity generates positive externalities or agglomeration effects. Economists have proposed agglomeration effects in the form of both static (pecuniary) and dynamic (technological) externalities to explain industry localization (Baptista & Swann, 1998).

A distinction should therefore be made between two broad types of agglomeration economies. One type relates to general economies of regional and urban concentration that apply to all firms and industries in a particular location. Such external economies lead to the emergence of

manufacturing belts or metropolitan regions (Porter and Sölvell, 1997). These urbanization economies do not consist of increased efficiency of the enterprises themselves but of reduced transport and search costs for the customers and, therefore, lead to more customers than the individual enterprise would have been able to attract (Pedersen, 1994). All of these factors are covered by the notion of agglomeration, which suggests that the stickiness of a place resides not in the individual firms or workers, but in the external economies available to each firm from its spatial conjunction with other firms and suppliers of services at a particular location.

A second type of agglomeration consists of localization economies, resulting from industrial spillovers. Theoretical attempts to formalize these effects have focused on three mechanisms that would yield such positive feedback loops: interfirm technological spillovers, specialized labor, and intermediate inputs (Marshall, 1890). The emergence of the knowledge based global economy and asset augmenting FDI has compelled scholars to take a more dynamic approach to both the logistics of the siting of corporate activities, and to the competitive advantages of nations and regions (Dunning, 1998). Firms need to take account not only of the presence and cost of traditional factor endowments, of transport costs, of demand levels and patterns; but also of distance related transaction costs (Storper and Scott, 1995), of dynamic externalities, knowledge accumulation, and interactive learning (Enright, 1998, 2000; Florida, 1995, Malmberg, et al., 1996) of spatially related innovation and technological standards (Antonelli, 1998, Sölvell and Zander, 1998, Frost, 1998). Localized information flows, technological spillovers, and specialized pools of knowledge and skills will ensure the revitalization of these seedbeds of innovation in these clusters. Clusters are considered as networks of production of strongly interdependent firms, knowledge producing agents and customers, linked to each other in a value adding production chain (OECD, 1999).

The contemporary literature therefore distinguishes between localization economies and urbanization economies (Feldman, 1999; Johansson and Forslund, 2008; Mccann, 2008; Knoben, 2009). Localization economies refer to the effects that are produced by having many firms from the same industry in a single area, whereas urbanization economies refer to the effects of having firms from different industries in the area (Johansson and Forslund, 2008).

Static agglomeration economies are said to occur when the unit costs of production of a business enterprise or establishment are lower in the context of relatively dense clusters of other firms or specialized resources, such as skilled labor or infrastructure, than would be the case if the typical business were located elsewhere. Krugman (1991) recapitulates earlier work in offering as sources of static agglomeration economies: a local concentration of customers (or

downstream firms) sufficient to permit suppliers to achieve economies of scale in production or distribution, great enough for local firms to amass sufficient demand to warrant the provision (usually by or via local governments) of specialized infrastructure, and large enough to attract a deep and diversified pool of workers sufficient to realize a more specialized local division of labor.

Dynamic agglomeration economies refer to the heightened prospect for technological learning to occur (not simply reductions in unit costs of production with a given technology) in relatively dense urban places, districts, or clusters compared with less dense locations. To the extent that differences in innovative behavior among firms are in part attributable to properties of the local economies of which they are a part, most contemporary urban economic and geographic theory treats such dynamic growth processes in terms of the local production and diffusion of information relevant to the firm's decision to adopt (take up) a technology, and of the organizational capacity of that firm to make use of such information. In this globalizing world of increasingly mobile international corporations, it is puzzling why certain places are able to sustain their attractiveness to both capital and labor. Today's economic map of the world is dominated by what can be called clusters: critical masses of unusual competitive success in particular fields (Porter, 1998).

China itself is a prime example of the importance of urbanization and localization economies. Many Chinese cities are heavily dependent on a single industry, not just mining or steel but often a specific single manufactured good—lamps, socks, or automotive wheels. Belderbos and Carree (2002) analyze the location choices by Japanese electronics manufacturers in China's regions and provinces and confirm the major impact of regions in promoting industry, and agglomeration benefits. Tuan and Ng (2002) find that firms prefer sites with higher firm agglomeration. It may also influence the sectoral pattern of FDI across countries or inter-country distribution of a particular sector's FDI flows. Evidence in favor of regional clusters of foreign MNEs in the Chinese pharmaceutical industry was given by Zhang and Van Den Bulcke (2008). Evidence from developed economies also display the favoring of strong linkages between FDI and agglomeration (Ford and Strange, 1999). China's strategy, building industrial clusters through the construction of industrial parks, is not mirrored in Europe, where the role of zones is much less pronounced in the construction of industrial clusters.

Hypothesis 1a. *The probability of locating a Chinese plant in a given region will be greater the greater the urbanization economies.*

Hypothesis 1b. *The probability of locating a Chinese plant in a given region will be greater the greater the localization economies.*

Above and beyond advantages of urbanization and localization, the agglomeration of firms from the same country in a foreign market may present a number of additional advantages. The presence of the availability of ethnic businesses and entrepreneurial networks is likely to present advantages. It is expected that this would allow the lowering of information and transaction costs and reduce the risks that may occur when venturing into foreign markets. The availability of an ethnic business and entrepreneurial network allows lower information and transaction costs and reduces risks that may otherwise complicate or restrict ventures into foreign markets.

A number of studies grounded in institutional theory (e.g., Johansen and Mattson, 1987; Child, 1997; Zhang and Van Den Bulcke, 2000; Hall and Soskice, 2001) suggest that firms' networks may have an important impact on FDI decisions by providing the focal firm with important information and resources. Such network-related factors may not only facilitate entry in foreign countries by making available resources needed by firms in the early stages of their internationalization process, but may also provide useful advice on avoiding unnecessary complications (Meyer and Scott, 1983).

A more rational perspective on the same phenomenon emphasizes the nature of the imitation process, in which firms look for market signals from their peers or from external capital markets that a given behavior is worth pursuing, which thus generates rational bandwagons (Abrahamson and Rosenkopf, 1993). As a large number of peer organizations engage in a decision, it becomes common practice, or a rule of thumb, to implement the same decision (March, 1988). In particular, this imitation is particularly useful for firms entering new markets, especially for emerging multinational companies that are not all that familiar with Western developed economies. It is therefore not unreasonable to suggest that the potential of locating in an existing agglomeration of Chinese firms may be an important determinant of the location decision.

As such, past behavior of actors in the immediate inter-organizational environment dictate location decisions of similar firms (Henisz & Delios, 2001). Past behavior conveys legitimacy to subsequent consistent behavior (DiMaggio & Powell, 1983; Hannan and Carroll, 1992). A firm's international plant location decisions can be influenced through two types of imitative behavior: frequency-based and trait-based imitation (Haunschild and Miner, 1997). Frequency-

based imitation occurs when decisions are based purely on the number of other firms that have adopted a given strategy. Frequency-based imitation has been observed in organizational studies of market entry (Haveman, 1993).

A more selective process than frequency-based imitation is trait-based imitation, in which the practices of subsets of the population enjoying high status or high similarity to a focal firm receive additional weight in the design of imitative strategies (Haveman, 1993; Strang and Tuma, 1993). Studies of diversification have found that both the size and success of a firm enhance the sensitivity of its peers to its actions (Haunschild and Miner, 1997), as does its industrial context (Martin, Swaminathan, and Mitchell, 1998; Guillen, 2002).

In particular, Chinese companies seem to be particularly prone to imitative behavior as a result of their heavy reliance on existing networks of Chinese firms (Zhang, Yang, & Van Den Bulcke, 2012). As the presence of so-called strong 'diaspora' abroad implies the availability of ethnic businesses and entrepreneurial networks and strong cultural and historic links with the home country, this is likely to specifically direct investments. These locational advantages are particularly useful for firms entering new markets. This is even more so for emerging multinational companies such as Chinese companies which usually lack the firm specific advantages that are necessary to successfully cope with the cultural and institutional distance that separates them from more developed countries in Europe.

Hypothesis 2a: *The probability of locating a plant in a given country will be greater the greater the number of prior plant locations by other Chinese firms.*

Hypothesis 2b: *The probability of locating a plant in a given country will be greater the greater the number of prior plant locations by other Chinese firms in the same industry.*

An important source of heterogeneity in a firm's propensity to locate a plant in a country is its prior investment experience in that specific country (Barkema, Bell, & Pennings, 1996; Chang, 1995). Firms new to a market are unlikely to have developed a heuristic for making an investment or to have a system in place for determining and analyzing the relevant information. Inexperience thus heightens uncertainty about the market. One consequence of inexperience is that an organization begins to rely more heavily on social cues to make decisions (DiMaggio & Powell, 1983; Haunschild & Miner, 1997). firms lacking experience in a prospective host

country are also more likely to rely on socially based cues for plant location decisions because uncertainty strengthens the influence of social criteria (DiMaggio and Powell, 1983).

Researchers suggest that imitation is more likely in the presence of uncertainty, although it seems necessary to distinguish between the firm-specific uncertainty associated with a firm's level of experience in a market and the policy uncertainty that arises in a market due to uncertainty regarding the likely evolution of relevant government macroeconomic or regulatory policies.

In a contradictory vein, once a firm is experienced, it tends to look internally for solutions, and it places a greater reliance on technical decision-making criteria than social criteria in investment decisions. Relatedly, as an organization establishes a pattern of behaving in a certain manner, consistency with its own past behavior may either be perceived as internally legitimate or become a rule of thumb (March, 1988). A firm's own experience facilitates foreign expansion because direct organizational experience yields substantive information about a country's culture, its common business practices, preferences of consumers, the process of policymaking, the preferences of key public and private actors, and the likelihood of policy change (Barkema et al., 1996; Delios & Henisz, 2000; Chang and Rosenzweig, 2001). In a way, host-country experience should make a country more attractive for future investment because this experience is likely to provide an analogue on which future decisions can be based.

Hypothesis 3a : *Previous investments by the same firm will have a positive influence on the probability of plant location in a given country.*

Hypothesis 3b : *The number of prior plant locations by other Chinese firms will have a more positive influence on the probability of plant location in a given country for firms inexperienced in that country*.

Data and methodology

Database and geographical level of analysis

While the majority of previous location studies of Chinese multinationals were conducted at the national level (e.g. Buckley et al., 2007; De Beule & Van Den Bulcke, 2012; Kang & Jiang, 2012; Ramasamy, Yeung, & Laforet, 2012), traditional literature has shown that multinational firms take regions across multiple countries into consideration when they decide to locate foreign investments (e.g. Belderbos, Van Roy, Leten, & Thijs, 2011; Mayer, 2004; Thursby & Thursby, 2006). The geographical concentration of Chinese firms in only a few European cities (Zhang, Yang, & Van Den Bulcke, 2012) also suggests the need for an analysis at the regional level. Accordingly, our study will be conducted at the regional level and we allocated all Chinese investments into EU-27 countries to smaller geographical regions. For this purpose we made use of an available classification offered by Eurostat. More specifically, we assign each Chinese investment to its corresponding NUTS-2 region. The Nomenclature of Territorial Units for Statistics (NUTS), is a geocode standard for referencing the administrative divisions of countries for statistical purposes. This standard was developed by the European Union. NUTS-2 regions refer to administrative regions with a population between 800,000 and 3 million. This approach has also been taken by other recent studies (e.g. Crescenzi, Pietrobelli, & Rabellotti, 2015).

Instead of using aggregate outward FDI flows or stock, as most former studies have done (e.g. Buckley et al., 2007; Cheung & Qian, 2009; Kang & Jiang, 2012; Ramasamy et al., 2012), we resort to firm-level greenfield investment data. The use of firm-level transactions will be more reliable because recent research has shown that the use of aggregate FDI flows or stock is a biased measure to study investment activity (Agrawal & Sensarma, 2007; Beugelsdijk, Hennart, Slangen, & Smeets, 2010). We obtained information on cross-border greenfield investments from the fDi Markets database for the years 2003 up to and including July 2012 . The fDi markets database is the most comprehensive online database of cross-border greenfield investments currently available and covers all countries and sectors worldwide. The accuracy and validity of this database have been confirmed independently by different researchers (e.g. Castellani & Pieri, 2013; Crescenzi, Pietrobelli, & Rabellotti, 2013). The database records cross-border greenfield investment projects since 2003 and provides information on the investing company, the parent company, the type of project (new, expansion or extension), the source country, source state and source city, the destination country, state and city and the

industry sector and industry activity in which the investment is made. Regarding these industries, the database classifies each project into one of the 18 different industry activities (value chains activities) and 39 broader industry sectors. For our purpose we only retrieved information on Chinese projects located in the EU-27. This resulted in an initial dataset consisting of 710 Greenfield investments. Based on the destination city and admin region, we tried to allocate each investment to one of the 276 available NUTS-2 regions in the European Union. Unfortunately, due to missing values for this variable, we were only able to assign 593 investments (made by 423 firms). Furthermore, based on the information on the industry of the investment project we categorized the projects in twelve 2-digit NACE manufacturing industries, for which we can also construct our measures of industry-specific patent activity (see below). We complemented this dataset with information about the characteristics of the NUTS-2 regions in EU-27 countries using various data sources.

Dependent variable

The dependent variable is a binary variable, which indicates in which NUTS-2 region in the EU-28 the Chinese investment is made. The variables takes the value 1 if the Chinese firm makes it investment in host region j, and 0 otherwise. Our analysis included all NUTS-2 regions as potential regions to invest. However, not all regions receive investments over our time period. Table 1 in appendix shows the top-20 regions with the most Chinese investments. The table clearly shows that Chinese firms tend to cluster together and have a strong tendency to invest in German regions. The top-20 regions combined represent 66 percent of all Chinese investments. The regions that receive the most investments are the NUTS-2 regions of *Düsseldorf* and *Darmstadt*. These regions receive around 14 percent and 11 percent of all Chinese investments. Table 2 in appendix shows the distribution of Chinese investments over EU-28 countries (over the whole time period). From the table, we can observe that Germany, Great-Britain, France, the Netherlands and Spain are the 5 countries hosting the most Chinese investments (in descending order of importance). The dominance of Germany is particularly striking with 45% of all investments. The presence of the Netherlands in this list is also somewhat surprising, given the small size of the Dutch economy. However, from an international perspective, the Dutch innovation system can be considered as top-class (Erken & Gilsing, 2005) and the country holds a central position in Europe and could be considered a perfect gateway to penetrate into the rest of Europe. Table 3 in appendix gives us an overview of the 12 sectors we constructed and its number of investments. The most investments are made in the electronics industry, with 42% of the investments. Chinese investors are also very active

in the machinery industry (14%). Furthermore, only a few investments are made in minerals, the paper industry, the pharmaceutical industry and the rubber industry.

Main hypothesis-testing variables

- Localization and Urbanization

To capture the urbanization economies of the host region and test the first hypothesis, we included the region's *population* as an independent variable. This can be seen as a proxy for the scale of the urbanization economies (Viladecans-Marsal, 2004). Regions with higher population are typically the ones with the more diversified economic structures, hosting many firm establishments and a large labor force. Accordingly, we expect a positive effect of the population size of the host region on the location choice. To account for the localization economies (i.e. externalities resulting from the presence of other firms in the same industry), we include the variable *technological strength*, which is the share of the region in the number of company patent applications in the EU-28 allocated to the industry of the investing firm. It measures the availability of technological knowledge and potential knowledge spillovers (one of the key externalities of localization economies) relevant for the industry of the investing firm. Patents are assigned to NUTS-2 regions based on the addresses of the inventors that are listed on the patents (Deyle & Grupp, 2005). In order to allocate patents to industries, we make use of the patent technology class to industry concordance table developed by Schmoch et al. (2003). This concordance table links the technology codes (IPC) of the patents to their corresponding NACE code at the two-digit level. If a patent lists multiple inventors and IPC classes, we use fractional counts to assign the patent to the region and industry. We use patent information from the OECD REGPAT database to construct this variable. The advantages of patent data are given by their consistent availability over time and their detailed information on technological content and location of inventive activity (Griliches, 1998). Patent data have been very frequently used in prior research on location decisions and as indicator of the agglomeration of innovative activities (Allred & Park, 2007; Belderbos, 2001; Cantwell & Piscitello, 2005).

- Effects of neighboring regions

As the geographical units of our analysis constitute of small geographical NUTS-2 areas (some of which have only a population count of a few 10-thousands), the externalities from urbanization and localization economies are likely to transcend the geographical borders of these regions (both within and across countries, though the latter is more difficult). Furthermore,

the geographical classification of Eurostat into NUTS region is more based on legal and administrative definitions, which are less likely to represent the actual agglomeration of each region. Accordingly, as a firm located in a particular NUTS-2 region might also benefit from the urbanization and localization externalities of surrounding regions, it is important to take into account the characteristics of these surrounding regions. Furthermore, as more and more investors consider Europe as a single market, this integration process has to be taken into account. It is argued that the regional economic integration of the EU enlarged the market size of the individual countries/regions. It is also documented that this integration process generates positive externalities and increases the attractiveness of member countries for inward FDI (Barrell & Pain, 1999; Geppert, Happich, & Stephan, 2005). Such integration processes can be particularly valuable for Chinese investors as several studies have documented that market seeking FDI is one of the major driving forces for outward investment by Chinese firms (Buckley et al., 2007; Buckley et al., 2008; Deng, 2004, 2011). After investing in one region/country, Chinese companies benefit from free export access to other member regions/countries and this initial investment could be used as a platform to serve other member countries.

To address these issues, we constructed two variables that take the agglomeration economies of the surrounding regions into account. The first variable *Population surrounding regions* sums up the population of all other NUTS-2 regions except for the host region and weights each value by the distance to the focal region. This approach was also used by Crozet et al. (2004). This weighting takes into account that more distant regions are more difficult to access due to transport costs and other transaction cost. Furthermore, it has been found that agglomeration externalities decay at distance. The second variable *Technological strength* follows the take methodology and sums up the technological strengths of all other regions. This measure will control for the localization economies of the surrounding regions. The bilateral distances between the host regions and the rest is calculated with the great-circle distance method. This method calculates the shortest distance between any two point on the surface of a sphere, measured along a path on the surface of the sphere. These distance are then calculated based on the longitude and latitude of each region. The latitude and longitude from each region are represented by the coordinates of the largest city in the region (common practice, e.g. Belderbos et al., 2014). Geographical latitude and longitude information was obtained from the online *Geonames* database. The formulas used to construct these variables are presented below. We expect these variables to have a significant positive impact on the location choice. Table 4 and Table 5 in appendix show the regions that are ranked high on these measures. The first table

shows the top 20 regions with the highest values for the variable *Population surrounding regions*. This list is clearly dominated by Western European regions that are situated in highly urbanized areas. Several smaller Belgian and Dutch regions are also included into this list. This is not surprising, as they are strategically located close to highly urbanized regions such as the regions of Île-de-France (France), Inner and Outer London (UK), and the Ruhrgebiet (Germany). Table 5 is region-specific and shows for each sector the 3 NUTS-2 regions with the highest ranking. West-German regions are ubiquitous in this list. As the Darmstadt-region is one of regions that is omnipresent in these rankings, it is no surprising that this region is also very highly ranked in number of inward Chinese investments. This might reflect the strategic-asset-seeking motivations of Chinese investors in developed regions.

$$\textit{GDP surrounding regions} = \sum_{j \neq i} \left(\frac{GDP_j}{d_{ij}} \right) \quad (1)$$

$$\textit{Technological strength surround regions} = \sum_{j \neq i} \left(\frac{Techno\log ical.strenghth_j}{d_{ij}} \right) \quad (2)$$

- Trait-based and frequency-based imitation effects

To examine the extent of frequency-based and trait-based imitation effects, we constructed two variables. The first variable *Count Chinese firms in the sector* measures all prior investments by Chinese firms in the same sector as the investing firm. This variable will measure the trait-based imitation effects. The second variable *Count all Chinese firms* measures all prior investments by Chinese firms in the previous year of the investment, regardless of the sector. This variable will test the frequency-based imitation effects. Trait-based imitation effects are expected to be larger as investing firms are more likely to identify themselves with firms from the same industry. This high similarity with the investing firm will make they receive an additional weight in the design of the focal firm's imitative strategy (e.g. Haveman and Rao, 1997).

- Experience and its moderation effect

To test hypothesis H3a and examine whether Chinese firms prefer to invest in regions with less uncertainty (i.e. where they have already invested in the past), we include the variable *Experience*. This variable equals 1 if the firm previously invested in the region. We expect this variable to have a positive significant effect on the probability that this region will be chosen

as a location for a new greenfield investment. To test the moderating impact of this *experience* on the variable that is accounting for *previous investments by other Chinese firms* (H3b), we make an interaction term of these two variables. We expect that inexperienced firms are more being led by the investments of other Chinese firms. Consequently, we expect to observe a negative coefficient of this interaction term.

Other explanatory variables

We also control for traditional factors that have been found to influence the location choice in previous studies. We have measured most of these factors at the host region level. Some of these factors are however not available at the regional level (or simply do not vary across regions) which made us to include some host country variables as well. Most of our control variables were extracted from Eurostat or from the World Bank. We included the *GDP growth* of the NUTS-2 region as this reflects the market opportunities in the region. We might argue that regions characterized by high positive GDP growth rates will be more attractive for foreign multinational corporations. The infrastructure of the region can also be an important factor that increases the attractiveness of a region. To take this into account, we included the *Airport traffic* of the host region. This variable measures the total passengers embarked and disembarked on regional airports and is a measure of transportation infrastructure and regional connectivity, which may be particularly important for multinational firms (Bel & Fageda, 2008). Furthermore, we included a dummy variable *Seaport*, which equals one when the NUTS-2 region has an operative seaport (for freight transport). If this is the case, the import and export of materials, components and final goods – a major share of these is shipped by sea – will be more cost effective. Belderbos & Carree (2002) already documented that this variable can have a significant effect on the location decision of a foreign multinational. The regional *unemployment rate* is also included, since general labour availability can be an important factor in the decision to invest in a region (Friedman, Gerlowski, & Silberman, 1992). We also included the variable *Tertiary education*, which measures the percentage of the labor force that experienced tertiary education in the region. This is a proxy for the availability of skilled labor, which has been found to be significant pull factor for foreign investments. Finally, we included three variables at the country level. Following previous studies, we included the *Corporate tax* rate and we expect this variable to have a negative effect on location decisions (e.g. Buettner & Wamser, 2009; Mudambi & Mudambi, 2005). Furthermore, we controlled for the *Freedom from corruption* in the host country. This variable was extracted from the World Bank and equals the "freedom from corruption" ranking of the host country. As it is often suggested that

emerging market multinationals are pushed abroad to escape their institutional deficiencies – termed as institutional escapism – and corruption (e.g. Witt & Lewin, 2007; Yamakawa, Peng, & Deeds, 2008), we might expect that they are driven towards countries highly ranked on this measure. Finally, we included the cultural distance between China and the host country as this could have a negative impact on the location choice (e.g. Kang & Jiang, 2012). We used the Kogut and Singh (1988) index to capture these distances. Data to construct this index were extracted from Hofstede's personal website. However instead of relying on the traditional measure with only the 4 cultural dimensions included, we constructed the index based on the 5 dimensions. This broader index is more appropriate when having a sample of Asian companies (Shenkar, 2012).

All variables – except the binary variables – have been transformed to logarithms to reduce variance and to improve our model fit. Additionally, the variables are lagged by one year with respect to the year of investment to allow for a response time by the investing firm (this is commonly done in location studies). Table 6 in appendix gives a detailed definition for all variables used in our study and also provides some general descriptives.

Methodology

We use conditional logit models to relate the location choice to the set of regional characteristics. Conditional models are typically used in previous studies examining location choices (Head et al., 1995; Henisz and Delios, 2001; Belderbos et al., 2011). The conditional logit model is built on the Random Utility (Profit) Maximization Framework, developed by McFadden (1974) . In this framework, a chooser labelled i (i=1,…,N), chooses one option from among a choice set j(j=1,…,J) with the aim to maximize utility. In the context of Chinese location choices, the expected utility of a location for an investing firm (U_{ij}) is modeled in terms of the observable characteristics of the location (X_{ij}) and an unknown error term(ε_{ij}).

$$U_{ij} = \beta' X_{ij} + \varepsilon_{ij} \qquad (3)$$

In our empirical model, NUTS-2 regions form the location set and the observable characteristics of the locations are the independent variables. McFadden (1974) demonstrated that if the errors terms are independently and identically distributed with type 1 extreme-value distribution, the

probability of choosing alternative k (a NUTS-1 region in our analysis) is given by the following formula:

$$P(y_i = k) = \frac{exp(x_{ik}\beta)}{\sum_{j=1}^{J} exp\left(x_{ij}\beta\right)}, k \in J \quad (4)$$

The interpretation of coefficients of a logistic regression is not straightforward. However, because we transformed our variables by taking natural logarithms, we can interpret the estimated coefficients as an approximation of average elasticities. The average elasticity of the probability of location choice with respect to a logarithmic transformed variable can be calculated as (Z-1)/Z times the coefficient of the variable, where Z equals the total number of location choices (Head et al., 1995). Table 7 shows the results of our conditional logit regressions. We included 5 final models. The first model only includes the control variables. Model 2 subsequently adds the variables related to the urbanization and localization externalities and the characteristics of the surrounding regions. Model 3 includes the variables testing the imitation and bandwagon effects. Next, model 4 adds the experience variable and finally the last model tests for the moderation effect of previous experience.

Table 7: Regression results of conditional logit regressions

	Model1	Model2	Model3	Model4	Model5
Hypothesis testing variables					
Population (H1a)		1.633***	1.108***	1.101***	1.093***
		(0.094)	(0.094)	(0.094)	(0.094)
Population surrounding regions		1.875***	1.000***	0.986***	1.067***
		(0.401)	(0.367)	(0.354)	(0.346)
Technological strength (H1b)		11.915***	8.248***	8.368***	8.579***
		(2.366)	(3.046)	(3.005)	(2.998)
Technological strength surrounding regions		3.908***	2.991**	3.017**	2.691**
		(1.268)	(1.327)	(1.298)	(1.288)
Count all Chinese firms (H2a)			0.548***	0.547***	0.619***
			(0.074)	(0.075)	(0.077)
Count Chinese firms in the sector (H2b)			0.885***	0.856***	0.648***
			(0.207)	(0.205)	(0.200)
Experience (H3a)				0.785**	2.410***
				(0.387)	(0.535)
Experience * Count all Chinese firms (H3b)					-1.042***
					(0.189)
Control variables					
GDP growth	2.156***	2.842***	1.708*	1.639*	1.595*
	(0.830)	(0.896)	(0.952)	(0.962)	(0.959)
Airport traffic	0.104***	0.106***	0.070***	0.070***	0.071***
	(0.015)	(0.015)	(0.016)	(0.016)	(0.016)
Seaport	0.313***	0.663***	0.286**	0.273**	0.279**
	(0.109)	(0.104)	(0.118)	(0.119)	(0.120)
Unemployment rate	-0.222	0.497***	0.488***	0.489***	0.500***
	(0.141)	(0.175)	(0.173)	(0.169)	(0.163)
Tertiary education	0.055	0.397*	0.200	0.198	0.168
	(0.234)	(0.230)	(0.219)	(0.221)	(0.218)
Corporate tax	-10.870***	-12.333***	-9.254***	-9.320***	-9.244***
	(1.533)	(1.801)	(1.775)	(1.746)	(1.723)
Cultural Distance	-3.389***	-1.407**	-0.619	-0.668	-0.783
	(0.666)	(0.597)	(0.540)	(0.525)	(0.508)
Freedom from corruption	4.484***	1.915***	1.684***	1.709***	1.746***
	(0.698)	(0.531)	(0.523)	(0.524)	(0.507)
Observations	136,504	136,504	134,794	134,794	134,794
Number of firms	423	423	418	418	418
Loglikelihood	-2628	-2521	-2376	-2371	-2355
Chi squared test	1126***	1034***	1576***	1455***	1603***
Pseudo r-squared	0.185	0.218	0.252	0.254	0.259

Notes: Error terms are clustered by investing firm. Significance levels: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$. Likelihood ratio tests show that all hypothesis testing variables significantly improve all models.

Results

The first model shows that most of our control variables are significant and have the expected sign. More specifically, the results shows that the GDP growth, the airport infrastructure, the presence of an operative seaport, and the freedom from corruption all significantly improve the attractiveness of the region. This clearly shows that Chinese investors are attracted by strongly developed regions with a good infrastructure and little corruption. From the table we can also observe that Chinese firms are strongly drawn towards regions with a low corporate tax rate and a high cultural distance. This last result might be a bit surprising, but it is yet another sign that Chinese investors are attracted towards the most developed regions which typically have a large cultural distance with emerging countries (i.e. China in our context). Furthermore, the results show that both the unemployment rate and the tertiary education of the local labor force have no significant effect on the location choice. When we turn to the following model, we can observe that most control variables are robust and maintain the same sign and significance level. The unemployment rate however turns positively significant and stays so in the remaining models. The tertiary education variable also becomes significant, although this result in not robust in the later models. From the second model, we can also observe that both urbanization and localization economies have a positive significant effect on the attractiveness of the host region. The coefficient of the population variable shows that a 10 percent increase in the population of the host region increases the propensity to invest with approximately 16 percent. The technological strength variable (the proxy for localization economies) shows a much stronger effect, but here it is worth noting that this variable is scaled by the total European patent count and accordingly is only a small number. It is also shown that there are strong effects from the surrounding regions. Both variables are strongly significant and have a positive impact. This impact is robust over all models. Accordingly, these results show it is very important to control for these effects as well. This is an important finding, as the characteristics of surrounding or adjacent regions of the focal host region are not included in most location studies. Next, model 3 shows that Chinese investors are indeed influenced by prior location studies by other Chinese firms, confirming hypotheses 3a and 3b. It is also clear that Chinese investors are more led by prior investments from firms active in the same sector, as would be expected from the literature. Next, model 4 shows that Chinese firms show a tendency to invest in regions where they already invested, i.e. regions with less uncertainty. Finally, the last model

shows that experienced firms are less led by prior investments of other Chinese firms, which confirms our last hypothesis.

Conclusions

Chinese investors have become one of the most prolific outward investors in the last decade (UNCTAD, 2014). Large delegations of Chinese investors have been roaming Europe in search for the best location. European countries, in turn, have been frantically trying to attract them to their shores. Anecdotal evidence seems to suggest that the Chinese seem to be particularly sensitive to bunching and clustering. This paper has attempted to analyze the effects of bunching and clustering on Chinese greenfield investment, and the moderating effect of experience.

First, and foremost, Chinese firms seem to be mimicking other Chinese firms. Our results confirm that Chinese firms' networks may have an important impact on FDI decisions by providing the focal firm with important information and resources. These network-related factors not only facilitate entry in foreign countries by making available resources needed by firms in the early stages of their internationalization process, but may also provide useful advice on avoiding unnecessary complications. As such, this imitation process -in which firms look for market signals from their peers that a given behavior is worth pursuing-, generates bandwagons. This imitation is particularly useful for firms entering new markets, especially for Chinese multinational companies that are not all that familiar with European economies (Zhang, Yang & Van Den Bulcke, 2012).

The results indicate that Chinese firms are not only driven by trait-based mimicry but also by frequency-based imitation behavior. Therefore, Chinese firms like to locate where other competitors in the same industry have based their investments, on the one hand, but are also influenced by behavior from other Chinese firms. As such, behavior can be determined to some extent by delegations. Efforts from local business communities and governments to try to attract Chinese investors can therefore be worthwhile.

As far as clustering is concerned, the results indicate that urbanization and localization benefits are extremely important for Chinese firms. They clearly like to locate where there are positive spillovers from the breadth and depth of industries. Our results –researched at a subnational

level of analysis- show that not only the strengths of the immediate neighborhood are important but also surrounding regions have a positive impact on the location of Chinese firms. This result contributes and improves received wisdom as most studies focus on the country-level or on the arbitrary NUTS regions without taking account of the integrated nature of the European economy. This study has done so by calculating distance-weighted urbanization and localization economies.

As a proxy for measuring urbanization economies –which is a measure of regional diversity-, total population in the region prove an essential determinant of attraction. It is assumed that regions with higher population are the ones with more diversified economic structures. These indicators, however, capture rather global urbanization externalities, which are related to local market size, but not to the diversity implied by Jacobs externalities per se, because they derive from the specific industrial composition of the region. As such, an extension of this research could be to improve the measure of industrial diversity in a region.

Furthermore, technological strengths in the investor's sector are of particular interest. Yet again, the distance-weighted variable of technological strength of surrounding regions is also positively significant indicating that not all investments go to the same core regions but that neighboring regions can also try to take advantage of the European economic integration.

Finally, there is the matter of experience. On the one hand, experience mediates the bunching and clustering effect as previous experience in a region seems to attract follow-up investments as well. Chinese investors are more likely to invest in the same region as before. As such, it makes sense for regions to try to attract first-time investors as subsequent investments are more likely to follow. On the other hand, experience moderates the imitative behavior of Chinese firms. They seem to be less driven by other Chinese investors given that they have already had first-hand experience in Europe and in a given region in particular.

In terms of control variables, the importance of good transport links is noteworthy. Both airport traffic and a seaport are essential infrastructure in order to lure Chinese investors. The Greek port of Piraeus is a good example of stiff competition for the Western European ports, although institutional quality does seem to attract rather than deter Chinese investments.

In sum, this paper has analyzed locations of Chinese greenfield investments in Europe. It has used both institutional theory as well as classic economic variables in order to analyze the importance of bunching, clustering and experience. It has done so at a subnational level where real-life investment decisions are made, while at the same time taking account of European

economic integration. The results clearly support hypotheses regarding the importance of bunching and clustering, while experience serves both as a mediating and moderating variable for clustering and bunching, respectively.

Appendix

Table 1: Top-20 regions with most Chinese investments

NUTS-2 region	**Frequency**	**Percent**
Düsseldorf (DEA1)	85	14.33
Darmstadt (DE71)	64	10.79
Köln (DEA2)	49	8.26
Inner London (UKI1)	43	7.25
Île de France (FR10)	28	4.72
Lombardia (ITC4)	16	2.7
Oberbayern (DE21)	14	2.36
Rhône-Alpes (FR71)	11	1.85
Noord-Holland (NL32)	11	1.85
Cataluña (ES51)	10	1.69
Zuid-Holland (NL33)	10	1.69
West Midlands (UKG3)	9	1.52
Brussels (BE10)	8	1.35
Berlin (DE30)	8	1.35
Comunidad de Madrid (ES30)	7	1.18
Stockholm (SE11)	7	1.18
UKC2 (Northumberland and Tyne and Wear)	7	1.18
DE11 (Stuttgart)	6	1.01
Budapest (HU10)	6	1.01
Piemonte (ITC1)	6	1.01
Total top-20	393	0.66
Other regions	200	0.34
Total	593	100

Table 2:Distribution of Chinese investments over EU-28 countries

Host country	Frequency	Percent
Austria	5	0.84
Belgium	17	2.87
Bulgaria	4	0.67
Czech Rep	4	0.67
Denmark	5	0.84
Finland	1	0.17
France	49	8.26
Germany	266	44.86
Great Britain	97	16.36
Greece	4	0.67
Hungary	14	2.36
Ireland	6	1.01
Italy	23	3.88
Latvia	1	0.17
Lithuania	3	0.51
Luxembourg	1	0.17
Netherlands	30	5.06
Poland	11	1.85
Portugal	4	0.67
Romania	5	0.84
Slovak Rep	1	0.17
Spain	27	4.55
Sweden	15	2.53
Total	593	100

Note: Cyprus received 2 Chinese investments during the time window, but was left out of the regressions due to lack of data

Table 3: Number of Chinese investments, by sector, 2003-2012

Industry	Frequency	Percentage
Food	11	1.85
Textiles	25	4.22
Paper	8	1.35
Chemicals	16	2.7
Pharmaceuticals	10	1.69
Rubber	10	1.69
Minerals	2	0.34
Metals	19	3.2
Machinery	82	13.83
Electronics	250	42.16
Transport	59	9.95
Others	101	17.03
Total	593	100

Table 4: Top 20 regions with highest population numbers of surrounding regions

NUTS-2 region	Ranking population surrounding region
Inner London (UKI1)	1
Münster (DEA3)	2
Darmstadt (DE71)	3
Outer London (UKI2)	4
Rheinhessen-Pfalz (DEB3)	5
Limburg, NL (NL42)	6
Prov. Limburg, BE (BE22)	7
Köln (DEA2)	8
Prov. Vlaams-Brabant (BE24)	9
Brussels (BE10)	10
Düsseldorf (DEA1)	11
Prov. Liège (BE33)	12
Noord-Brabant (NL41)	13
Prov. Antwerpen (BE21)	14
Koblenz (DEB1)	15
Utrecht (NL31)	16
Prov. Brabant Wallon (BE31)	17
Flevoland (NL23)	18
Prov. Namur (BE35)	19
Surrey, East and West Sussex (UKJ2)	20

Table 5:Top 3 NUTS-2 regions technological strength of all surrounding regions, by sector

Food		**Textiles**		**Paper**		**Chemicals**	
Ranking	NUTS-2 region	Ranking	NUTS-2 region	Ranking	NUTS-2 region	Ranking	NUTS-2 region
1	Brussels (BE10)	1	Münster (DEA3)	1	Münster (DEA3)	1	Münster (DEA3)
2	Flevoland (NL23)	2	Rheinhessen-Pfalz (DEB3)	2	Tübingen (DE14)	2	Darmstadt (DE71)
3	Utrecht (NL31)	3	Darmstadt (DE71)	3	Darmstadt (DE71)	3	Rheinhessen-Pfalz (DEB3)
Pharmaceuticals		**Rubber**		**Minerals**		**Metals**	
Ranking	NUTS-2 region	Ranking	NUTS-2 region	Ranking	NUTS-2 region	Ranking	NUTS-2 region
1	Münster (DEA3)	1	Münster (DEA3)	1	Darmstadt (DE71)	1	Tübingen (DE14)
2	Rheinhessen-Pfalz (DEB3)	2	Darmstadt (DE71)	2	Tübingen (DE14)	2	Münster (DEA3)
3	Darmstadt (DE71)	3	Rheinhessen-Pfalz (DEB3)	3	Köln (DEA2)	3	Darmstadt (DE71)
Machinery		**Electronics**		**Transport**		**Others**	
Ranking	NUTS-2 region	Ranking	NUTS-2 region	Ranking	NUTS-2 region	Ranking	NUTS-2 region
1	Münster (DEA3)	1	Münster (DEA3)	1	Tübingen (DE14)	1	Münster (DEA3)
2	Tübingen (DE14)	2	Tübingen (DE14)	2	Münster (DEA3)	2	Tübingen (DE14)
3	Rheinhessen-Pfalz (DEB3)	3	Rheinhessen-Pfalz (DEB3)	3	Karlsruhe (DE12)	3	Rheinhessen-Pfalz (DEB3)

Table 6: Definition and summary statistics of all variables

Variable name	Definition	Mean	Stdev.	Min	Max
Population	Log of (population of NUTS-2 region)	1,906,704	1,565,334	66,412	11,851,399
GDP growth	Log of (1 + GDP growth of NUTS-2 region)	0.02	0.07	-0.21	0.46
Technological strength	Log of (1 + share of NUTS-2 region in EU28 patent applications) (at industry level)	0.00	0.01	0	0.20
Airport traffic	Log of (1 + air transport of passengers of NUTS-2 region) (total passengers embarked and disembarked, in 1000s)	213648.80	401469.00	0	990,099
Seaport	Dummy variable indicating whether the NUTS-2 region has an operative seaport (for freight transport)	0.47	0.50	0	1
Unemployment rate	Log of (1 + unemployment rate of NUTS-2 region)	8.11	3.96	1.9	30.4
Tertiary education	Log of (1 + percentage of labour force with tertiary education of NUTS-2 region)	24.33	8.37	6.5	59.7
Corporate tax	Log of (1 + corporate tax rate of host country)	0.24	0.05	0.13	0.40
Cultural Distance	Log of (1 + Kogut and Singh index of host country) (based on 5 dimensions)	2.89	0.72	1.63	5.06
Freedom from corruption	Log of (freedom from corruption ranking of host country) (the higher the better)	68.21	17.38	26	100
Population surrounding regions	Log of (population of all surrounding regions of NUTS-2 region) - distance weighted	698124.60	237353.60	160,067.50	1,266,900
Technological strength surrounding regions	Log of (1 + technological strength of all surrounding regions of NUTS-2 region*100) - distance weighted	0.17	0.10	0.03	0.94
Count Chinese firms in the sector	Log of (1 + count of chinese firms in the sector in NUTS-2 region)	0.26	1.31	0	31
Count all Chinese firms	Log of (1 + count of all chinese firms in NUTS-2 region)	0.35	1.81	0	34
Experience	Dummy variable indicating whether investing firm has previous investment(s) in NUTS-2 region	0.01	0.08	0	1
Experience * Count all Chinese firms	Interaction term of the two variables above	0.02	0.55	0	34

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