

# Heterogeneous determinants of regional location choices for foreign direct investment by multinational firms

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# Chapter 5

## Summary and Conclusions



In this dissertation, we examine two main gaps of the existing literature dealing with the location decisions of multinational enterprises. Firstly, we examine the role played by agglomeration economies in attracting different types of foreign direct investments. Secondly, we examine different sources of heterogeneity which characterize MNEs with respect to the industry in which they operate, the type of activity they invest in, and the spatial scope and characteristics of known locations drivers.

We focus on the role played by agglomeration economies, which are known to be one of the most important determinants for the location of foreign direct investments. We employ a recently developed agglomeration framework due to Glaeser and Kerr (2009) which allows us to disentangle the different benefits associated with agglomeration economies, i.e. greater access to specialized suppliers, greater access to specialized labor, knowledge spillovers, and greater access to specialized demand. For the first time, we apply this framework to the analysis of the location decisions for R&D investments and service investments. In the dissertation, we do not only focus on the role played by local agglomeration economies, but we also examine the role played by agglomeration economies present in the locations surrounding region where MNEs have decided to establish their subsidiaries.

In the dissertation, we uncover different sources of heterogeneity that are likely to affect MNEs location decisions. We examine whether the type of investment is a source of heterogeneity in the context of R&D investments (research versus development activities). Industry heterogeneity is examined in detail in the context of service industries, for which we examine whether key sources of heterogeneity, customer orientation and tradability, affect MNEs location decisions. Heterogeneous dimensions of location drivers are examined in the context of R&D and service investments. For R&D investments, we examine whether the heterogeneous characteristics of local universities in a region have consequences for the attractiveness of regions, considering research quality, specialization, and focus on applied versus basic academic research. For service investments, we examine the heterogeneity in host regions' demand characteristics. We distinguish between demand originating from consumers versus industry clients and assess whether this affects MNE location decisions, especially if one considers the different types of service industries.

Finally, for manufacturing investments, we examine whether the heterogeneity that characterizes the broader spatial environment surrounding a focal region affects location decisions, as different dimensions of agglomeration externalities have a heterogeneous geographic reach. In particular, we look at the role played by highly agglomerated but congested locations from which investing firms can "borrow" agglomeration economies, without incurring the con-

gestion costs typically associated with high levels of agglomeration, by investing in neighboring regions. Similarly, we also assess whether the proximity of a region to highly agglomerated but less congested locations has a negative influence on the probability that the region receives investments, as predicted by the new economic geography literature.

## 5.1 Summary of the findings of each study

**In chapter 2**, results confirm findings of previous research on the topic and show that universities play a major role in attracting R&D investments (Abramovsky et al., 2007, Belderbos et al. 2014). We find that specialization of academic research in domains relevant for the focal R&D investment has a positive impact on firms' R&D location decisions. At the same time, we also find that the training of doctoral students and an entrepreneurial orientation of universities in relevant fields for the investing firms both exert additional positive influences on the location of R&D investments. However, the chapter shows that there is major heterogeneity both with respect to the characteristics (quality and orientation) of academic research and to the type of R&D investment (research vs development). In particular, we find that an applied research orientation is associated with a greater attractiveness of the MSA for R&D investments while no such influence can be found in case investments are in research. On the other hand, we find that the quality of both basic and applied research is associated with a higher probability to receive both types of R&D investments.

In general, the chapter documents important differences with respect to the influence of university characteristics on R&D investments. We show that investments in research are attracted by basic research quality and by the specialization of academic research in relevant fields for the investing firms. On the other hand, we show that investments in development are attracted by an applied orientation of academic research as well as by its quality, in addition to university patenting activity (entrepreneurial orientation). Our results thus suggest that in order to understand the role of university research as a determinant for the location of R&D investments, it is important to distinguish between investments in research and investments in development.

**In chapter 3**, we show that FDI in service is positively attracted by a sophisticated, open and high-density local market in line with previous findings on the topic (Castellani, 2016; Ramasamy and Yeung, 2010). We additionally find that a well-educated labor force as well as a high level of flight connectivity further attract FDI, while high rental fees and a high distance from the source country tend to discourage it (Brueckner, 2003; Ghemawat, 2001; Kiyoyasu, 2013). In the

chapter, we then focus on the role played by agglomeration economies: our results show that locations that are specialized in relevant skilled labor and clients industries for the focal firm strongly attract FDI in services.

However, in the chapter we find that results do not hold for all investments due to the heterogeneity that characterizes service industries. In particular, we identify two important characteristics of service industries that affect the different benefits associated with agglomeration economies: customer orientation and tradability. The first regards the distinction between those service industries serving final consumers such as retail or entertainment and those serving industrial clients such as consulting. Results show that the positive effect of industrial client specialization is not observed for firms operating in industries targeting final consumers. These firms are instead more strongly attracted by high levels of GDP per capita which indicates the presence of wealthier final consumers.

The second characteristic, i.e. tradability, refers to the possibility to serve customers from afar (Jensen, 2005; Gervais and Jensen, 2013). Results show that there is a positive influence of client specialization for non-tradable service industries which is not observed for tradable industries. Firms operating in these industries are instead strongly attracted by “Supply side” conditions such as the availability of relevant skilled labor, openness of the market, and rent costs.

**In chapter 4**, results show that agglomeration economies arising from other proximate MSAs increase the attractiveness of the focal MSA. This result is in line with prior studies on the topic which have also found that agglomeration economies have a broader geographical scope than usually assumed (Phelps et al., 2001; Van Oort et al., 2004; Viladecans-Marsal, 2004). In the chapter, we first examine the benefits associated with agglomeration economies of relevant MSAs at different spatial cutoff points. Our findings suggest that agglomeration economies in the form of greater access to specialized demand and to specialized suppliers have a wider spatial range than the one of specialized labor in line with previous findings on the topic (Alcacer and Chung, 2014).

In the chapter, we also investigate whether there is a positive influence on the attractiveness of less agglomerated MSAs when, in their proximity, there are highly agglomerated but congested MSAs from which investing firms can “borrow” agglomeration economies without incurring the congestion costs typically associated with high levels of agglomeration. At the same time, we also investigate whether there is a negative influence of proximity to highly agglomerated but less congested MSAs in line with the notion of “shadow” effect as predicted by the new economic geography literature. Our results show that there is a positive influence in case of proximity to highly agglomerated and congested MSAs as it gives firms the possibility to “borrow” agglomeration economies in the

form of greater access to specialized labor and knowledge spillovers. On the other hand, we do not find any evidence of a “shadow” effect.

## 5.2 Contributions to the literature

This dissertation provides implications for the literature on the locational determinants of foreign direct investments. Several authors have underlined the important role played by agglomeration economies in attracting FDI (Alcacer and Chung, 2007; Belderbos and Carree, 2002; Chang and Park, 2005; Head et al., 1995; Shaver and Flyer, 2000). However, only few authors have been able to empirically identify the actual benefits associated with agglomeration economies (Alcacer and Chung, 2014; Glaeser and Kerr, 2009). In chapter 2 and 3, we thus contribute to the current literature by employing for the first the time a recent agglomeration framework due to Glaeser and Kerr (2009) within the context of R&D and service investments which has enabled us to show the importance of the different benefits associated with agglomeration economies.

In the three chapters, we also uncover various sources of heterogeneity that existing literature has failed to recognize. In particular, while several studies have found empirical evidence for a positive influence of academic research on R&D investments (Abramovsky et al. 2007; Autant-Bernard, 2001; Belderbos et al., 2014; Belderbos et al., 2017; Cantwell and Piscitello, 2005), none has so far considered the heterogeneity that characterizes academic research which is likely to play a role in attracting these investments. In chapter 2, we thus contribute to the literature by showing that academic research is heterogeneous both with respect to quality, specialization and focus (basic vs. applied). In chapter 2, we also separately examined locational drivers for development and for research investments (Belderbos et al., 2009; Todo and Shimizutani, 2008; Von Zedtwitz and Gassman, 2002). Our results highlight important differences in the influence of university characteristics for these two types of investments. Overall, these findings lead to a more nuanced perspective on the role of universities in attracting R&D investments.

Similarly, in chapter 3 we show that locational drivers for service investments differ depending on the characteristics of the industry of the investing firm. While previous literature on the topic has analyzed location determinants of the whole service sector (Bellak and Leibrecht, 2009; Feng and Mingque, 2016; Kiyoyasu 2013; Kolstad and Villanger, 2008; Rugman, 2008), we examine two characteristics of service industries (customer orientation and tradability) that are likely to affect MNEs location decisions. In the chapter, we also show that one of the main important drivers for MNEs operating in service indus-

tries, demand, is heterogeneous. In particular, distinguishing between demand originating from final consumers and demand originating from industry clients, we show different responses from investing MNEs depending on the main type of customer served (final consumers vs industry client).

Finally, the last source of heterogeneity that we uncover in chapter 4 regards the geographic reach of one of the main important determinants of FDI, agglomeration economies. Indeed, while previous literature has already found that agglomeration economies are not as geographically circumscribed as usually assumed (Parr, 2002; Phelps et al., 2001; Richardson, 1995) none has so far examined the actual spatial range associated with the different benefits arising from agglomeration economies. Results from the chapter underline the importance to not solely focus on the role played by local agglomeration but also consider that, depending on the type of agglomeration benefit considered, different surrounding locations may affect the attractiveness of the location where MNEs invest.

### 5.3 Policy implications

From the three studies composing this dissertation, relevant policy implications can be drawn. In particular, we show that MNEs are heterogeneous with respect to the values they attach to specific locational attributes, which in turn suggests that a one-size-fits-all policy seeking to attract FDI may prove to be less effective.

In chapter 2, we show that there is major heterogeneity in the location determinants of investments in research and investments in development, especially with respect to the characteristics of academic research. In particular, universities that are more prone to engage in patenting activities and have a focus on applied research tend to attract more investments in development, while universities that have high quality basic research tend to attract more investments in research. Overall, these results underline how different profiles of universities attract different profiles of R&D activities. This suggests that tailored policies aimed at strengthening the given profile of each university can foster the formation of local specialized clusters of science and R&D activities.

In the chapter, we also show that the quality of academic research is highly valued by investing firms. The quality of both basic and applied research is important to attract R&D investments. This suggests that policy makers can increase the attractiveness of host regions by supporting the quality and impact of academic research in the regions' universities. However, host regions characterized by the presence of universities only focused on producing high quality

applied research may fail to attract a substantial amount of investments in research.

Similarly, the analysis in chapter 3 highlights important differences in the location determinants depending on two characteristics of service industries: customer orientation and tradability. In the chapter, we show the importance of local client specialization for service firms operating in industries focused on serving industry clients, which supports the idea that these firms are not “foot-loose” (Castellani et al, 2016; Nefussi and Schkellnus, 2010; Wernerheim and Sharpe, 2003). In other words, policies aimed at attracting this type of investments may prove to be ineffective without a pre-existing demand arising from local client firms. At the same time, in the chapter we also show that location determinants are different for investments made by service firms operating in tradable and non- tradable industries. Results suggest that policy makers wishing to attract tradable service investments will need to strengthen the educational system to help workers develop the competences and skills required. This result, which also holds for chapter 2 and chapter 4, suggests that policy makers wishing to attract FDI in services (but also in R&D and in manufacturing) may increase budget allocated to support university education. Results from chapter 3 also suggest that a high level of flight connectivity and a more open market attract FDI in services. Therefore, policies aimed at lowering trade barriers and increasing the level of flight connectivity can be an effective tool to attract these investments.

Finally, results from Chapter 4 show that proximity to highly agglomerated and congested locations increases the attractiveness of less agglomerated locations for investing firms. In terms of policy implications, these findings underline the importance for local authorities of considering these broader geographical interactions for their development strategies. More specifically, our results suggest that even less agglomerated locations may emerge as attractive destinations for MNEs given the lower level of congestion characterizing them. However, the attractiveness of these locations appears to be conditional on the possibility for MNEs to benefit from agglomeration economies in highly agglomerated proximate locations. This suggests that policy makers may attract more investing MNEs by increasing the level of connectivity with highly agglomerated proximate locations.

## 5.4 Limitations and directions for further research

Although this dissertation provides several contributions to the existing literature, it is also subject to a number of limitations. These limitations at the same time suggest interesting opportunities for further research.

In all three studies, we show that firms have a clear tendency to invest in regions already hosting their subsidiaries. As documented in previous studies (Alcacer and Delgado, 2016; Defever, 2006, 2012), next to external agglomeration economies, internal agglomeration economies are important location drivers as they increase firms' ability to coordinate (Chandler 1977, Henderson and Ono, 2008) and control (Giroud, 2013, Kalnins and Lafontain, 2013) activities across the value chain, which in turn fosters firms' performance. In order to control for internal agglomeration, in all three studies we include dummy variables taking the value one if the region already hosts a subsidiary of the investing firm. However, due to a lack of data, these variables do not differentiate between the different types of value chain activities of these already established subsidiaries or the volume of existing activities. As shown by previous research on the topic (Alcacer and Delgado, 2016; Defever, 2006, 2012), the importance of internal agglomerations may vary by value chain activity both within an activity (e.g. among manufacturing plants) and across activities (e.g. between R&D and manufacturing plants). Future research may thus explore this further.

Another limitation accompanying all three studies, is that the analyses are restricted to the United States. The choice is motivated by the fact that the U.S. is the largest recipient of FDI worldwide with 385 billion (US dollars) in 2016, accounting for more than 25% of the total FDI worldwide flow (UNCTAD, 2017). At the same time, the availability of data on the number of industry establishments and employees at very detailed geographical levels allows us to have a precise identification of agglomeration economies that would not be possible in any other setting. Nonetheless, this limits the generalizability of our results. In particular, with respect to the study in chapter 2, the important role played by academic research in attracting R&D investments may be driven by the leading positions that the U.S. has in science. We may thus have an overrepresentation of knowledge sourcing as the motivation behind firms' location decisions, which may not occur in other geographical settings, where local market adaptation may instead be more important. A similar point could be made for the study reported in chapter 3. Indeed, as pointed out by Gonzales et al. (2012), the U.S. is one of the countries with the highest share of employment in tradable services, even exceeding the share of employment in manufacturing, suggesting a comparative advantage of the U.S. in tradable services. With respect to the flows of FDI, we also see that tradable services are overrepresented

in our sample and this may follow from the higher demand for these kind of services in the country. Future research may thus examine whether the findings we obtained also hold in a different geographical setting. In this regard, one issue arises from the fact that the Gleaser and Kerr (2009) framework used to disentangle the different benefits associated with agglomeration economies requires very detailed data on regional industry employment, which are often not available, even for developed economies. Until these data will be made available for other settings as well, future research may not be able to examine the role of agglomeration economies in attracting foreign direct investments across countries and geographic settings.

A limitation that all studies share with respect to the geographical setting we employed, regards the choice of the Metropolitan Statistical Area as the unit of analysis. Indeed, while the use of MSAs improves comparability and appears the most appropriate setting for the study of agglomeration economies, given the way in which they are geographically defined (commuting patterns), they do not fully cover the U.S. territory. The Bureau of Economic Analysis, the government agency in charge of the provision of regional data for the U.S., used to provide data at a broader geographical level which was covering the U.S. entirely ('economic areas') but they stopped publishing (historical) data at this level. With respect to the three chapters, this limitation appears to be more relevant for chapter 4 where the coverage of investments in the U.S. is 85.02%. In contrast, in chapter 2 there are no investments made outside MSAs, while in chapter 3 only 4.59% are located outside MSAs.

In all three studies, we examine the location decisions of MNEs investing in the United States. While the focus on U.S. allows us to provide a more refined analysis of the location determinants of foreign direct investments given the detailed data available for this country, it also poses an issue of selection. Indeed, it is possible that those MNEs investing in the U.S. may be systematically different from those MNEs investing elsewhere. Indeed, we show that those MNEs investing in the U.S. are larger compared to MNEs without investments in the U.S. This limits the generalizability of our results

In all three chapters, we examine the role played by agglomeration economies. By construction, it is possible that if a location attracts a constant flow of FDI investments in a certain industry sector  $i$ , suppliers, buyers labor and knowledge will become more specialized for the needs of industry  $i$ . While for an individual firm the characteristics of the MSA can be taken as given and we use a 1-year time lag between our explanatory variables and the dependent variable, at the more aggregate level this may raise concerns of endogeneity in the longer term. By definition agglomeration economies arise from firms collocating near one another, which implies a self-reinforcing effect of FDI flows.

Even the use of a 1-year time lag between our explanatory variables and the dependent variables and the several sensitivity tests we run in all three chapters do not allow us to fully rule out concerns of reverse causality. Therefore, the causal nature of the effects that we estimate must be taken with caution and so are the policy implications we draw in the section above. At the same time, in chapter 4 our results indicate that MNEs may prefer to locate their investments in less agglomerated locations given the lower level of congestion costs and the possibility to benefit from agglomeration economies in highly agglomerated locations at distance. This suggests that the self-reinforcing effect of FDI flows may stop once congestion costs outweigh the benefits arising from co-location.

Finally, one general limitation arises from the fact that in all three chapters, we examine firms' location decisions through the lens of regional and industrial economics. Studies in these domains explain the tendency of firms to cluster from the availability of co-located firms providing agglomeration economies (e.g. Alcacer and Chung, 2014; Belderbos and Carree, 2002; Head et al., 1995). However, according to the organizational and institutional theory, a firm's tendency to cluster could also be interpreted as a reaction to uncertainty which in turn leads the firm to mimic other firms' actions (Belderbos, 2011; Gimeno et al., 2005; Delios et al., 2008). So far, only few attempts have been made to combine and distinguish the two approaches, suggesting ample scope for future research.