THE GEOGRAPHY OF EUROPEAN MULTINATIONALS

An analysis of the location determinants of investment projects in EU-28 countries

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Abstract

This research focuses on the investigation of the location determinants of multinational corporations' investments in EU-28 countries. Investment projects are addressed by making a distinction between greenfield investments and M&A projects. Besides traditional factors (such as market characteristics) the effect of innovation capabilities and the institutional environment are incorporated in the analysis. The use of an MLM makes it possible to empirically assess the effect of national and regional characteristics on the location decision of MNCs. The results suggest that for investment projects of both entry modes the traditional factors to a large extent determine the location of MNCs' investments. Dependent on the entry mode and the business function of the investment, regional innovation capabilities and the institutional environment partly seem to affect the location decision of multinationals.

Keywords: Multinationals, investment, regions, European Union

JEL classification: F23, F21, R12, N14

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1. Introduction

„Foreign direct investment is an integral part of an open and effective international economic system and a major catalyst to development." (OECD, 2002, p.3).

During the current stage of the globalisation process, many argue that foreign direct investment (FDI) is of growing importance and plays a primary role (WTO, 1996, Dicken, 2007, Ascani & Gagliardi, 2015). Multinational companies (MNCs) constantly make decisions that are related to the search for new locations, acquiring or merging with other (foreign) firms or setting up entirely new plants abroad. These decisions have a significant economic impact on both, the host and the home country of the investment (Bellak et al., 2008). Policy makers in different countries all over the world therefore put great emphasis on potential benefits that are associated with the attraction of foreign subsidiaries of multinational companies. These potential benefits, so called positive externalities, vary from knowledge and technology spill-overs to an increase in the domestic productivity (Ascani & Gagliardi, 2015) and from the attraction of high-value employment to know-how and innovation capabilities (McCann & Mudambi, 2005). Besides these economic benefits FDI can help to stimulate the improvement of environmental and social conditions in recipient regions, caused by the import of more sustainable technology and the facilitation of the development of socially responsible corporate policies (Kurtishi-Kastrati, 2013). All these benefits can contribute to economic growth (Wang, 2009a) and it is therefore no surprise that the OECD (2002) states, that FDI has the ability to function as major catalyst to development of regions or countries.

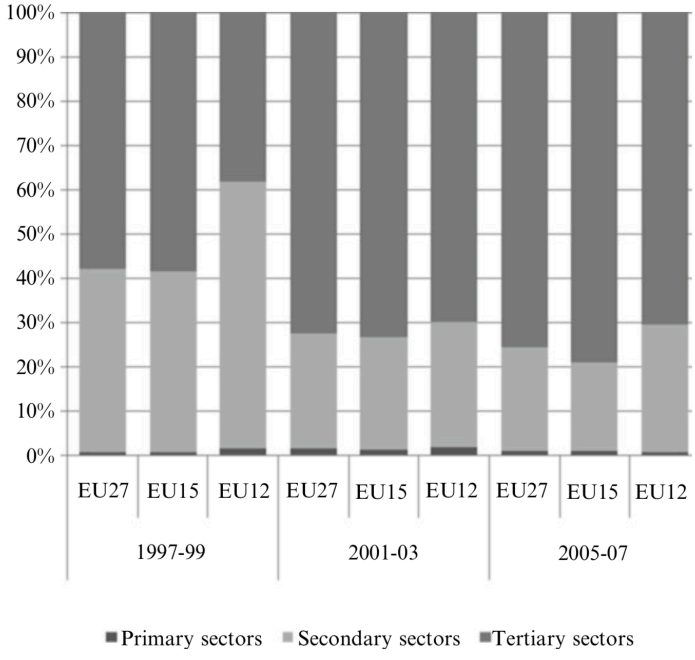
Besides the advantages of FDI the entry of foreign investors in a domestic market can also have negative impacts on the host economy. An increase in the number of foreign companies can stimulate, for example, the crowding out of domestic entrepreneurs on both, product and labour markets (Backer & Sleuwaegen, 2003). In line with this argumentation, the inflow of FDI can also decrease the entry and increase the exit of domestic firms. However, the results with respect to the crowding out effect of FDI are mixed (Agosin & Mayer, 2000). This diversity in terms of results can be explained by the fact that various economies attract different types of FDI. If a country attracts mainly domestic market-seeking investments the probability of expiring crowding out is high, due to the increasing competition between domestic firms and the establishment of the foreign subsidiary. For countries that attract more export-oriented investments this might not be the case (Bhalla & Ramu, 2005). The importance of FDI in the long-term however suggests that the crowing out effect of domestic firms by foreign ones can be reversed. This is especially due to learning, demonstration, networking, and linkage effects between foreign and domestic firms.

Furthermore, MNCs tend to bring advanced technologies to the host country. As presented earlier, this might cause knowledge and technology spill-overs on the one hand which increases the productivity of a region. On the other hand, an increase in technology bought by foreign firms can to some extent also lead to dependencies of the host country or region, since there is a declining interest in the production of new technologies by domestic firms (Vissak &

Roolaht, 2005). These dependencies of the host economy can also be found in the balance of payments, since FDI has a far greater impact for imports than for exports (Menciger, 2003). Although there are some negative effects, the numerous advantages of foreign direct investment have changed the attitude towards the attraction of inward FDI over the last decades. Most countries have liberalised their policies in order to attract economic activities carried out by foreign multinational corporations (Blomström & Kokko, 2003). These policies are aimed to lower the entry barriers, to open up new sectors, and to provide investment incentives to stimulate the attraction of inward FDI. This development can be seen as the manifestation of the growing competition for the attraction of foreign MNCs (Almond et al., 2015). However, it is important to mention that the benefits of attracting FDI do not emerge automatically and spread equally across countries, sectors, and local communities (OECD, 2002; Kurtishi-Kastrati, 2013). According to the OECD (2002) a healthy and enabling environment for business is needed in order to maximise the gains associated with the attraction of foreign economic activity. This business environment needs to encourage both, domestic and foreign investment, it stimulates innovation and improvements of skills through incentives, and contributes to a competitive climate. Besides, FDI can only function as an important vehicle for the transfer of technology and contribute to economic growth if the host country has the absorptive capabilities to deal with the higher productivity of MNCs (Borensztein et al., 1998). This means that the local circumstances matter for the ability of a region to attract FDI and to reap the maximum benefits of it. The aim of this research is therefore to provide insight into the factors that affect the location decisions of MNCs. This paper builds on the findings of Crescenzi et al. (2014) and aims to fill the gap by means of a quantitative analysis of the location factors that influence the geography of MNCs' investment projects, taking into account not only traditional location factors and innovation capabilities of a region, but also institutional factors, as it is stated that "additional empirical work [is] required to better understand the role of taxation amongst key factors influencing FDI location decisions" (OECD, 2007, p.11).

Traditionally, less knowledge intensive activities of the global value chain (GVC) were relocated outside the home country of the global ultimate owner, according to Crescenzi et al. (2014). However, the composition of FDI in the EU has changed over time. This is especially due to changes brought about by globalisation. While the share of foreign firms producing manufacturing goods in the EU has declined over time, the number of foreign firms providing services has increased (see Figure 1). Therefore, an analysis is carried out that focuses on the location decisions of multinational corporations by adopting a fine-sliced

***Figure 1**: Distribution of FDI*



Source: Capello et al., 2011

division of the different economic activities. This research focusses on the service sector and manufacturing, since Py & Hatem (2009) have concluded that there are some differences in the location determinants of manufacturing plants and service facilities. The central question of this research is formulated as the following:

To what extent does the effect of traditional factors, innovation capabilities and institutional factors differ for the location decision of European MNCs regarding their investment projects in the service sector and in manufacturing within EU- 28 countries?

Through providing an answer to the central question, this research is relevant for at least four reasons. (1) First, it introduces a third set of explanatory variables (institutional factors) to the sets that are used by Crescenzi et al. (2014), since the findings of Bartik (1985), Ang (2008), Bellak & Leibrecht (2009) and Ascani et al. (2016) provide evidence that the institutional environment of the host country/ region has a significant effect on the location decision of MNCs. Through that, this research aims to provide an as comprehensive analysis of the location determinants of MNCs' investment projects as possible. (2) Second, the analysis of the location determinants of foreign subsidiaries is not limited to greenfield investments but also takes into account merger and acquisition (M&A) projects. The choice to include M&A projects into the econometric model is based on the findings of Basile (2004) that show that the location determinants strongly differ according to the entry mode of the foreign company. (3). Third, this research provides insights on local level, including data on NUTS 3 level for more than one country. The existing academic literature on the location determinants of MNCs mainly consists of national-level studies, which is equivalent to NUTS 0 regions (e.g. Devereux & Griffith, 1998; Cleeve, 2008; Mohamed & Sidiropoulos, 2010; Ascani et al., 2016). Besides, several researches have included data on a more regional level (NUTS1: e.g. Basile et al., 2008; Crescenzi et al., 2014 or NUTS 2: e.g. Cantwell & Piscitello, 2005; Crescenzi et al., 2014) or data based on the state classification of the US (e.g. Head et al., 1995, 1999). There is only a limited number of studies that applies data at a lower geographical level than NUTS 2. Guimaraes et al. (2000) and Crozet et al. (2004) provide an analysis of the location choice of MNCs using data on NUTS 3 level for Portugal, respectively France. However, there is no research that does the same for multiple countries or for political and economic unions comparable to the EU. This research aims to fill this gap by providing insights about the location determinants of MNCs' investment projects in EU-28 countries on NUTS 3 level. (4) Fourth and lastly, the scope of the dataset used in this research is not limited to only one level of analysis, since this research also takes factors into account that are measured on country level (NUTS 0). This hierarchical structure of the data requires the use of a multilevel model (MLM), which allows the introduction of factors on two or more levels of observation. Through the application of this methodological approach, this research aims to offer new insights into the location determinants of foreign direct investment projects, since as presented earlier, the findings of different researches suggest that national as well as regional characteristics affect the location choice of MNCs.

This research is structured as follows. In the next section (2) the central question is divided into four sub-questions, based on the literature about location determinants of MNCs and their investment projects. This section ends with a conceptual model that summarizes the main

findings of the literature. In the third section the methodological framework of this research is described, including a description of the data that is used in order to execute the analysis. In section four, the results of different multilevel models are presented. Finally, this research ends with a conclusion (section five), where an answer to the main research question is formulated and a discussion (section six) including the limitations of this research and recommendations for further research is held.

2. Theory

In order to give answer to the main research question and to further specify this research, four sub-questions are formulated based on the existing literature that focusses on the assessment of determinants that explain the location of MNCs' investment projects. Therefore, this section is divided into four parts. In the first part, the location decision of MNCs is briefly introduced by describing the different entry modes a company can use in order to enter a foreign market. Then, M&A projects are discussed more in detail since this entry mode is to some extent a special case. After this elaboration, three sets of possible determinants of the geography of MNCs' investment projects are discussed, each resulting in one sub-question. Finally, this theory section ends with a conceptual model, including all relevant location determinants.

2.1. The entry mode: Greenfield investments and M&A projects

The aim of this research is to provide insights into the factors that influence the location of MNCs' investment projects. Due to the strong growth of international trade and FDI that took place during the past decades, an extensive body of academic literature already has dealt with this subject. However, there are different theoretical approaches to analyse the location choice of MNCs. The most common approach is the *Ownership-Location-Internalisation paradigm* (OLI), introduced by Dunning (1977, 1979). According to this framework, the decision of companies to undertake foreign activities is based on the interaction of three advantages: Firm-specific advantages that arise from owning certain resources like knowledge or others (Ownership), Location- advantages that are associated with the host region of the investment (e.g. resources, labour force), and finally Internalisation-advantages, meaning that a company benefits most if it exploits the firm-specific advantages at the aimed location through setting up a subsidiary, rather than through cooperation with domestic companies.

The latter type of advantages already refers to a specific kind of FDI which is called greenfield investment, involving the establishment of entirely owned subsidiaries in a new geographic market (Wang et al., 2009, Bertrand, et al., 2007). As such, these greenfield ventures provide the highest form of control over internal resources and knowledge but are also likely to have the highest costs (Hennart & Park, 1994). These costs include the establishment of both, the physical facilities and the relationships and networks that are necessary to operate effectively (Andersson et al., 1997).

As an addition to the three motives of the Ownership-Location-Internalisation paradigm, Cantwell (1989) has concluded that instead of utilizing capabilities already at hand, companies aim to invest abroad in search of capabilities that are not available in their home markets. This motive is called "technology seeking" or "knowledge seeking" and refers to the exploitation of

localized knowledge and technology that differs across locations. Consequently, MNCs may supplement their firm specific technologies by expanding internationally to access new localized knowledge (Cantwell, 1989), since some knowledge is partially tacit and the transfer requires frequent interaction (Kogut & Zander, 1992; Boschma, 2005).

Besides greenfield investments, foreign companies can use cross-border merger and acquisitions (M&A) as a second entry mode in order to facilitate their internationalisation strategy. This type of investment is defined as the take-over of (a part of) the assets of already established businesses abroad (Ó Huallacháin & Reid, 1997). Another definition used by UNCTAD (2000, p.99) underlines the difference between greenfield investments and M&As by stating that in an M&A "control of assets and operations is transferred from a local to a foreign company, the former becoming an affiliate of the latter". Though that, the acquiring firm obtains the resources of the target firm, such as knowledge base, technology, and human resources, and gains access to the market and to key constituencies at local level (Newburry & Zeira, 1997, Iammarino & McCann, 2013).

Wang (2009a) states that the decision about the internationalisation strategy of a business is closely related to the growth strategy of the company. While comparing the motives of greenfield investments and M&As, he concludes that greenfield investment is the most typical way to exploit the advantages of internal growth, while M&A is related to external growth (Wang, 2009b). Therefore, greenfield investments are attractive when firm-specific technological and organisational skills define a firm's ability to compete on the market, since the company has the possibility to duplicate (parts of) their know-how, their routines, and the physical property (Hennart & Park, 1993). If a company aims to get (immediate) access to technologies and local market experience of a target firm, these companies prefer M&A projects over greenfield investment (Ó Huallacháin & Reid, 1997, Cantwall & Santagelo, 2002). For companies, M&A projects therefore seem to be the less risky entry mode compared to greenfield investment.

Although the decomposition of FDI shows that M&As constitute the bulk of FDI (Brakman, Garretsen & Van Marrewijk, 2007), there is much evidence coming from the academic literature that greenfield projects are believed to be most favourable for economic growth and development in the host region (Javororcik & Kaminski, 2009; Neuhaus, 2005, Miskinis & Byrka, 2014). Reasons for that can especially be found in the direct effects of this type of investment that have impact on capital formation, technological and innovative progress, employment, and human resource development and the indirect effects that arise from spill-overs, leading to competitive and productivity growth in the host region. However, since Basile (2004) states that the location determinants of foreign subsidiaries differ according to the foreign entry mode, and since this research aims to provide insight in the location determinants of MNCs' investment projects and not in the effect of these investments on the host economy, it is important to not limit this research to greenfield investments, but also take into account M&A projects. MNC's investment projects in this research are therefore measured through the frequencies of M&As and greenfield investments of European MNCs per NUTS 3 region in EU-28 countries.

2.2. Specification: Cross- border Mergers & Acquisitions

Since Ascani et al. (2016) have stated that a brownfield investment can be seen as a function of a greenfield investment taken in a previous period, this type of entry mode requires some special attention. Conceptually, cross-border M&As occur for the same reasons as domestic ones. Two firms decide to merge if the responsible persons of the acquiring firm expect an increase in value or in utility through the collaboration with the acquired firm (Erel, Lio & Weisbach, 2012). Contrary to domestic mergers, the cross-border part of the deal plays an important role, since costs and risks associated with the investment in a foreign country only occur in deals where two firms located in different countries merge. Geographical distance or institutional differences might play a role for the investment decision (Erel, Lio & Weisbach, 2012).

In recent academic research of international economics, models have been developed in order to better understand the motivation of M&A projects (Neary, 2004). Usually, the decision of a company to merge or acquire another firm is related to two motives: a strategic motive (competition reduction) and an efficiency motive (cost reduction, strategic asset seeking). Thereby, M&A can take place in the same sector (horizontal) or in other parts of the value chain (vertical). According to research by Brakman, Garretsen & Van Marrewijk (2007) to a large extent investment takes place in a horizontal way. For those investments, strategic as well as efficiency motives might be important. Since market-seeking plays a primary role for horizontal M&As, taking a competitor out of the market reduces competition and increases the market share respectively the profit of a company. In terms of an efficiency motive, a firm might be motived to merge or acquire a company outside their own sector in order to control a larger part of the value chain, which also increases the profit after the investment took place. Neary (2004) builds on these standard explanations of M&As (strategic and efficiency motives) since the cross-border part of the deal is overlooked in this explanation. By taking into account the function of M&As as an instrument of comparative advantages (in line with the trade theory), he tries to provide a comprehensive explanation of M&As. This means that cross-border M&As facilitate more specialisation in the direction of comparative advantage, which leads to a situation where the production and trade patterns of two different countries come closer to the situation as it is in a competitive Ricardian world (Neary, 2003). In his argumentation about why M&A deals occur, Neary (2002) intensively focuses on the profitability of the acquired firm. His arguments are based on the findings of Salant, Switzer & Reynolds (1983) that suggest that mergers between identical firms are only profitable if the merged firms produce a very high proportion of pre-merger industry output (at least 80% when demand is linear). In this case, there is no reason to assume that there is some kind of firm heterogeneity. Neary (2002), however takes into account the cross-border part of the deal by stating that in a two-country context, international differences in technology provide a natural reason for assuming firm heterogeneity. These differences generate incentives for bilateral mergers that are profitable only in one direction, namely when a low-cost firm acquires a high-cost one (for technical explanation of this function, see Neary (2002)).

Focusing on the spatial pattern of foreign investment projects, most studies in the academic literature analyse the location decision of FDI in general, frequently taking into account only greenfield investments with the exception of O'Huallachain & Reid (1997), Basile (2004) and Wang (2009a). The findings of these researches are discussed in the following sections, since

they are related to both, greenfield as well as M&A projects. Besides, a huge body of academic literature analyses the determinants of cross-border M&As, however without considering the location where the investment is taking place or at least looking at the investment flows between countries (e.g. Gonzalez et al. 1998; Seth et al., 2000, Louri, 2001; Di Giovanni, 2005; Erel et al., 2012). Bertrand et al. (2007) therefore suggest that there is no reason to expect that the location determinates of M&As are identical or completely different from those of greenfield investments. In their analyses on national level they incorporate besides traditional location determinants of FDI (respectively greenfield investments) some specific determinants of cross-border M&As, which are market access, capitalisation, privatisation, ownership structure, and the number of previously taken M&A decisions.

Several other studies also make use of deal-level data, which includes data about individual firms, respectively the negotiations between firms (Bernard et al., 2003; Helpman, et al., 2004; Neary, 2004; Rossi & Volpin, 2004, Brakman et al., 2007). While Bernard et al. (2003) have concluded that there is a systematic relation between productivity of a firm and whether or not this firm engages in export, Helpman et al. (2004) conclude that this pattern is related to FDI. The research of Bernard et al. (2003) has shown that only the most productive firms are able to export their products and through that engage in international trade. This is especially due to the costs that are associated with trading in a foreign market. In line with this reasoning, the findings of Helpman et al. (2004) provide evidence that only the most productive firms are able to engage in FDI since FDI is even more expensive than export. Furthermore, Hennart & Reddy (1997) have found that when the investing firm is primarily interested in a part of the assets of the target firm, acquisition is only a suitable entry mode if these assets can be disentangled from the other "less interesting" assets. Whether this is possible depends on the organisational structure of the target firm. Besides, Madhok (1997) and Anand & Delios (2002) have concluded that the resources of a target firm play a primary role, since an M&A deal enables the acquiring firm to get access to it. Technological capabilities that are fungible across countries, and brand and sales capabilities that are specific to the local market are possible resources a company aims to acquire. However, mainly intangible and knowledge-based resources are most frequently valued by acquiring firms. Since these assets are difficult to manage and identify, M&A is the most suitable way to get access to these assets (Delios & Beamish, 1999).

Since this research aims to identify the location determinants of MNCs' investments on a local level, firm level data is not incorporated in the analysis making it impossible to include these factors in the analyses. In the following three sections, findings in the academic literature with respect to the location determinants of FDI are discussed by distinguishing them into three sets of factors. Based on the findings in the academic literature discussed in this section, it ends with the formulation of the first sub-question:

To what extent do the location determinants of European MNCs' investment projects differ according to their entry mode?

2.3. Traditional location determinants

With regard to traditional location determinants of MNCs' investment projects, there is much variance in terms of what these determinants contain. In this sense, the research of

Head et al. (1995) can be taken as a starting point of numerous empirical studies aiming to understand the location choice of MNCs. They see the cumulative nature of foreign direct investment of Japanese manufacturing firms in the US as an important determinant of a firm's location choice. They found that previous investment of the same industry-level or from the same country of origin positively influences the probability of additional investment in the same area (*agglomerations*). Their findings are explained by inter-firm technological spill-overs, the availability of specialised labour, and the access to intermediate inputs within the value chain. These traditional agglomeration economies are highly valued by investors because they tend to create a competitive advantage in the region (see Marshall, 1920). These results are supported by the findings of Head et al. (1999), Guimaraes et al. (2000), and Crozet et al. (2004), who all investigated analyses on the location determinants of foreign investment on sub-national level and by Py & Hatem (2009) who applied these results on national level in Europe.

Head & Mayer (2004) build on these findings but conclude that FDI does not only follow previously taken decisions. According to their research about the location decision of Japanese firms in Europe, they conclude that demand concentration is an important determinant, meaning that foreign firms also tend to locate where the concentration of the local demand is high.

Another stream of literature that combines ownership and location advantages of the OLI framework with technology and country characteristics is the so-called *new trade theory*. Within this stream of literature, authors have included factors such as market size and market growth in their analyses (Schneider & Frey, 1985; Wheeler & Mody, 1992; Head & Mayer, 2004; Botrić & Škuflić, 2006; Basile, 2008; Cleeve, 2008; Mohamed & Sidiropoulos, 2010). These studies point out that the location decision of MNCs tend to be very sensitive to the market size, which means that a larger market size attracts more foreign investors. However, here it is important to make a distinction in terms of the territorial unit of the analyses. While several studies analyse mainly the effect of the national market size (Schneider & Frey, 1985; Wheeler & Mody, 1992; Head & Mayer, 2004; Botrić & Škuflić, 2006; Cleeve, 2008; Mohamed & Sidiropoulos, 2010), Basile (2008) includes the sub-national market size. Crescenzi et al. (2014) takes both types of measurements into account. The results on both, national and sub-national level show the expected positive effect on the attraction of MNCs.

With respect to the effect of labour market conditions on the location choice of foreign subsidiaries the findings in the academic literature show to some extent inconsistencies. While Guimaraes et al. (2000) and Defever (2006) find a positive relationship between labour costs and the number of foreign subsidiaries of MNCs, other studies conclude that there is no significant relationship between labour costs and FDI (Woordward, 1992; Devereux & Griffith, 1998; Head et al., 1999; Head & Mayer, 2004) or even a negative significant effect (Botrić & Škuflić, 2006; Py & Hatem, 2009). A possible explanation for these different findings might be, that on the one hand higher wages can reflect the availability of skilled workers, therefore having a positive effect, but on the other hand do higher wages lead to an increase in costs of companies, therefore having a negative effect. Same counts for the unemployment rate, which on the one side refers to high availability of labour (positive effect on FDI as in Botrić & Škuflić, 2006; Py & Hatem, 2009) and on the other side meaning that there is a lack of suitable work force (negative effect as in Disdier & Mayer, 2004). These differences can be caused by differences in terms of the type of activity that is relocated in a foreign region.

Finally, some studies use measurements of urbanisation in order to estimate the effect of urban agglomerations and land costs on the attraction of foreign direct investment. Research by Ascani et al. (2016) provides evidence that urban agglomerations attract more foreign manufacturing facilities while this is not the case for the service, sale and logistics sector (SSL). The results of Basile (2004) also show a positive impact of the measurement of urbanisation on the number of MNCs' foreign subsidiaries, which implies that MNCs prefer regions with relatively high land costs for their foreign subsidiaries. According to Basile (2004), a possible explanation for this finding might be that a higher level of urbanisation does not only refer to higher land costs but also to an agglomeration of consumers, making regions more attractive for foreign investors. The results of Guimares et al. (2000) about the location determinants of investment projects in Portugal also suggest that companies prefer regions with an urban character. However, specifying these investment projects in foreign majority-owned investments and domestic investments, the results for the foreign owned investments do not support the findings of Ascani et al. (2016) and Basile (2004) that urbanisation/ land costs matter for the location decision of MNCs.

Including these findings, the second sub-question of this research can be formulated as follows:

To what extent do traditional location determinants affect the location decision of European MNCs regarding their investment projects in the service sector and in manufacturing within EU- 28 countries?

2.4. Regional innovation capabilities

The second set of factors which has an effect on the location decision of MNCs can be summarized as innovation capabilities of a region. Crescenzi et al. (2014) state that this set of factors is frequently overlooked in recent quantitative researches but has rather become the focus of in-depth case studies. However, this type of researches generally has to deal with a lower degree of generality compared to more formal quantitative research (Cantwell & Iammarino, 2003). In order to fill this gap, Crescenzi et al. (2014) have included this set of factors in their research, based on the finding that innovation has gradually become a key determinant of economic growth (Crescenzi, 2005). In their research on regional level (NUTS 2) they conclude that all factors measuring the innovation capabilities of a region have a significant positive effect on the attraction of MNCs' investments in EU-25 countries, which is in line with existing literature on regional innovation (Pike et al., 2006). Guimaraes et al. (2000) apply an analysis of the location determinants of FDI in Portugal on local level (NUTS 3) and conclude, contrary to Crescenzi et al. (2014), that the human capital has no significant effect on the attraction of foreign investments.

Besides this limited number of researches that take into account the effect of innovation-related factors on the location decision of MNCs on regional level, several studies have studied this relationship on national level. Dunning (2013) concludes in his research, that MNCs prefer to invest in regions with a high regional productivity. This argumentation is based on the assumption that wage rates rise with productivity growth, however at a slower pace than the productivity growth. According to Dunning (2013) this means that a higher rate of productivity growth leads to a decrease in unit costs and an increase in profitability and international

competitiveness, making more productive regions more attractive for foreign investments. Cleeve (2008) finds in his research about the attraction of foreign direct investment to sub-Saharan Africa that human capital has the expected positive effect on the location decision of foreign investors. Ascani et al. (2016) also include the educational level as a control variable in their analyses and conclude that there is a significant relation between the educational level and the attraction of MNC's foreign subsidiaries. These findings are in line with the conclusions of research by Mina (2007) on the location determinants of FDI flows in GCC countries. Schneider & Frey (1985) study the effect of specialized workforce on the location decision of FDI into less developed countries by measuring the educational attainment of different countries. Striking to the previously mentioned researches, they conclude that there is no significant effect. In order to extend the limited body of academic literature including the effect of regional innovation capabilities on the location decision of MNCs, and to get more insight in this effect, the third sub-question of this research is formulated as:

To what extent do innovation capabilities of a region affect the location decision of European MNCs regarding their investment projects in the service sector and in manufacturing within EU- 28 countries?

2.5. Institutional factors

Several studies take an institutional approach as a starting point in order to analyse the geography of MNCs. According to this approach, the institutional environment of a region or a country matters for the location decision of MNCs. However, in the academic literature there are many different ways to include this institutional approach in an econometric analysis.

As previously, a distinction can be made based on the different levels of analyses and on the different factors that are taken into account in order to include factors related to the institutional environment. Starting with government corruption as a factor to address the institutional approach, Asiedu (2006) and Cleeve (2008) conclude that corruption has a significant negative effect on the foreign direct investment volume to sub-Saharan Africa. This is in line with the findings Mohamed & Sidiropoulos (2010) about the FDI inflow volume of MENA countries. The results of Wijeweera et al. (2009), however do not support these findings. The unit of analysis in these researches are countries since corruption is mainly a national issue. In the analysis about the effect of economic institutions on the FDI location decision, Du et al. (2008) conclude that government corruption has the expected negative influence also on regional level. Because government corruption varies in China across regions, it allows the researchers to study the impact of the severity of government corruption on FDI on a sub-national level.

With respect to the impact of taxation on the location decision of foreign subsidiaries of MNCs different studies incorporate different measurements. Using the research of Hartman (1984) as a starting point of the literature about the impact of taxes on FDI, it can be concluded that FDI seems to be strongly sensitive to taxation. More recent research by De Mooij & Ederveen (2006) also focuses on taxation as a determinant of the location of FDI. Based on a meta-analysis they calculate a median FDI tax-rate elasticity of about -3, thereby taking into account FDI mainly between homogeneous countries (e.g. FDI from US to Europe or within Europe/US). A percentage point decrease in the corporate tax rate will increase foreign direct investment by

about 3 percent, according to De Mooij & Ederveen (2006). By using sub-national panel data on FDI inflow in Malaysia, Ang (2008) concludes that the statutory corporate tax rate has a significant negative effect on the total number of FDIs. This is in line with the findings of Head et al. (2004) about the location of Japanese investment in the EU. Wijeweera et al. (2009) do not find similar results while including the top marginal corporate income tax rate into the analyses of FDI inflows in 45 different countries.

Bellak & Leibrecht (2009) also take taxation into account while studying the determinants of foreign direct investment in central and eastern European countries. Based on the findings of Devereux & Griffith (1999) they decide not to include the statutory corporate income tax, but rather chose to investigate the effect of the effective average tax rate (EATR), since the EATR is the conceptually accurate measure of the corporate income tax burden when analysing the effect of taxation on the location decision of MNCs regarding their investment projects. Based on their findings, it can be concluded that taxation has the expected negative effect on the FDI volume. Buettner & Ruf (2007) exclusively focus on the effect of different types of taxes on the location of FDI. Contrary to the findings of Bellak & Leibrecht (2009) they do not support the findings of Devereux & Griffith (1999) that EATR matters for the location decision of MNCs. Rather, they conclude that the statutory corporate income tax rate functions as a determinant for the location decision of German multinationals.

Moreover, Ascani et al. (2016) uses a business regulation index that contains different types of costs associated with inter alia taxes. Based on their findings they conclude that this index has a significant positive effect on the location decisions of MNCs, which corresponds to their expectations, since a higher index reflects a less regulated institutional environment.

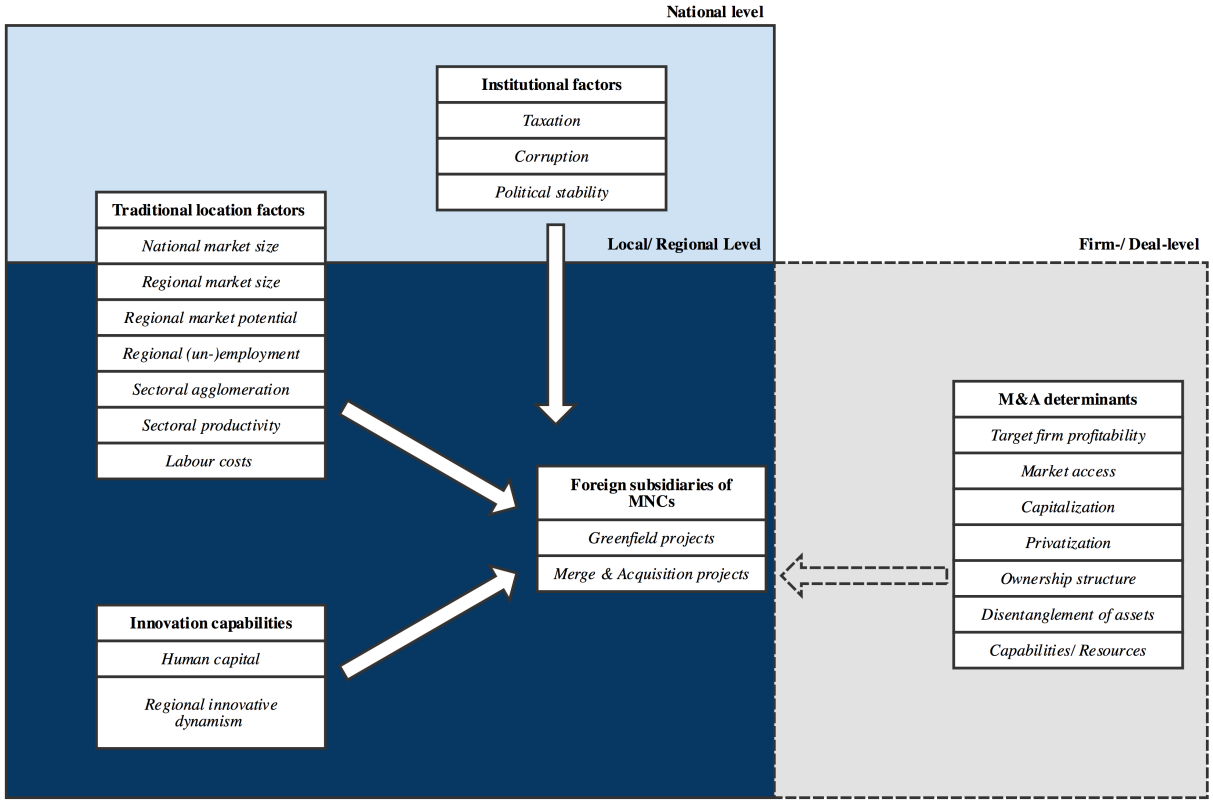
Besides corruption and taxation, there are several other factors taken into account by various studies in order to address the institutional approach while analysing the location decision of MNCs. In order to measure the institutional environment, Asiedu (2006) includes the effectiveness of the rule of law and concludes that this factor has the expected positive effect on the attraction of FDI. Biswas (2002) uses another factor in order to address the institutional environment and includes the regime duration into the analysis of US foreign direct investment. She comes to the conclusion that there is an unexpected negative effect on FDI, which means that the higher the duration of a regime in a country, the lower the attractiveness of that country to foreign investors. Cleeve (2008) combines two indicators, political freedom and civil liberty, into one institutional index and concludes that this index does not have a significant effect on the attraction of foreign direct investment. All these researches aim to incorporate the effect of political stability on the location decision of MNCs, while they differ in terms of methodology. Most results show that political stability has the expected positive effect on the attractiveness of a region. Contrary to these findings, Schneider & Frey (1985) conclude that political instability has a significant negative effect on the inflow of foreign direct investment, which means that relatively instable countries are more likely to attract FDI.

Based on the findings in the existing academic literature it has become clear that there is to some extent disagreement about the impact of institutional factors on the location decision of MNCs. The fourth sub-question is therefore formulated as:

To what extent do institutional factors affect the location decision of European MNCs regarding their investment projects in the service sector and in manufacturing within EU- 28 countries?

2.6. Conceptual Model

Figure 2: *Conceptual Model*



The conceptual model contains all factors that seem to have a significant impact on the location decision of MNCs, according to previous researches. The model is split up into three different segments, indicated by their background colour. The dark blue part of the model contains two sets of explanatory variables (traditional location factors and regional innovation capabilities) and the dependent variable (greenfield and M&A projects). These variables are measured on local/ regional level (NUTS 3, respectively NUTS 2 due to a lack of available data, see section 3 for further explanation). Based on findings in the academic literature it can be concluded that these two sets contain factors that drive the location decision of investment projects (Crescenzi et al., 2014). In the upper segment (light blue) the institutional factors are included in the model. According to previous researches these factors also seem to play an important role for the location decision of MNCs. However, the existing literature does not indicate which set of factors has the greatest impact on the location decision. In this research the assumption is made that institutional factors do not drive the desire of FDI but can cancel the opportunity to do so and therefore have a significant impact on the location decision of MNCs. These factors are measured on national level (NUTS 0). The segment on the right-hand side (grey) contains M&A determinants that are presented in the relevant section (2.2.). These factors are mainly measured on firm-/ deal-level. As already mentioned, firm-/ deal-level factors are not included in the analysis due to the fact that this research aims to analyse the location decision of European MNCs on regional level.

3. Method and Data

In order to achieve the goal of this research and to analyse the effect of three sets of factors (traditional location factors, innovation capabilities, and institutional factors) on the location decision of MNCs, different quantitative analyses are carried out. In this section, first the empirical model is described, including a description of the method that is used. This sub-section is followed by a specification of the dependent variable and how it is measured in the context of this research. In the following three sub-sections, each set of explanatory variables is discussed individually with a special focus on the way that factors, related to these sets, are addressed in earlier researches and how they are measured in the context of this research.

3.1. The empirical model

In order to answer the main research question through answering the four sub-questions, different statistical analyses need to be carried out. The dependent variable in this research is the location of MNCs' investment projects, as described in section 2. This variable is split up into two measurements according to the entry mode of the investment (greenfield investments and M&A projects). Both are measured by taking into account the number of related projects per NUTS 3 region (continuous scale) which means that a count data model is applied. Since this research aims to provide insight into the difference concerning the location determinants of foreign direct investment projects in manufacturing and in the service sector, both measurements, respectively entry modes, are divided into three categories. The first one takes into account all business activities, the second one exclusively focuses on manufacturing projects and the last one on service sector projects.

The independent variables (all continuous scale) included in this research can be aggregated into three sets of factors. Data for the individual proxies is provided by different sources (see Appendix I). Because this data includes different levels of aggregation (NUTS 0, NUTS 2 and NUTS 3) the observations are not independent. The assumption of an ordinary least square regression (OLS) is therefore not met, meaning that this method is not the most suitable to analyse the dataset. A multilevel model (MLM), characterized by a series of regression models, in which the homoscedasticity assumption of OLS is relaxed, offers the possibility to deal with this aggregation-level problem and to include hierarchical data (Field, 2014). This is done through the expansion of the random part of the model (single variance term is replaced by a series of random terms). This can be seen in the equation of the complete model [5], where in total nine different error terms are included. These error terms (u_{jx}) are multiplied with the predictors, which means that the resulting total error differs for different values of X_{ij}. In an ordinary multiple regression homoscedasticity is assumed, which means that the variance of the residual errors is independent of the values of the predictors. The situation where the variance of the residual errors dependents on the value of the predictor is called heteroscedasticity and makes the use of an OLS unsuitable for the analyses of hierarchical data (Hox et al., 2017).

In the following equations, level 1 variables are all predictors measured on NUTS 3 (respectively NUTS 2) level, since this level of analysis is more detailed than the NUTS 0 one, which functions as the grouping level. Level 1 units (NUTS 3 regions) are donated by *i* and

level 2 units (NUTS 0 regions) by *j*. Level 1 units are nested in level 2 units (each NUTS 3 region is part of exactly one NUTS 0 region). The data structure is allowed to be unbalanced, which means that *j* runs from 1 to *N* (in this case to 28 since this analysis focuses on investment projects within EU-28 countries) while *i* runs for a given *j* from 0 to n_j.
A multilevel model is estimated individually for all six measurements of the location of MNCs' investment projects. This is done in order to analyse the effects of the different location determinants on the two different entry modes and the concerning business activity that is carried out abroad. The equations are formulated by making use of the following abbreviations:

γ_{00}	*= intercept*	$rPAT_{APP\ ij}$	*= local patent intensity*
i	*= individual observation unit*	$rRNDEX_{ij}$	*= regional R&D expenditure*
j	*= aggregation level*	$rGVA_{ij}$	*= regional Gross Value Added*
$nGDP_j$	*= national GDP per capita*	$nCOR_j$	*= government corruption*
$lGDP_{PC\ ij}$	*= local GDP per capita*	$nPST_j$	*= political stability*
$lGDP_{GR\ ij}$	*= local GDP growth rate*	$nSCIT_j$	*= statutory corporate income tax*
$lEMPL_{ij}$	*= local employment rate*	$nEATR_j$	*= effective average tax rate*
$rINC_{ij}$	*= regional disposable income*	u/e	*= error term*
$lPOP_{DENS\ ij}$	*= local population density*	σ^2	*= variance of residual errors*
$rEDU_{ij}$	*= local education level*	σ	*= covariance*

Due to the fact that the model contains different sets of variables and due the hierarchical structure of the data, the analysis is carried out stepwise for each measurement of the independent variable through the consecutive adding of sets of predictors. The analysis for each measurement of the independent variable starts with an intercept only model, using an ordinary least square method (OLS), without including the grouping variable or any independent factors. The following equation summarizes the model:

$$Foreign\ direct\ investment_{ij} = \gamma_{00} + e_{ij} \quad \textbf{[1]}$$

This analysis is followed by a random intercept only model. Here, the model does not contain any explanatory variables but a random term which allows the intercept to vary across countries. In order to determine if this addition has led to an improvement of the quality of the model a LogLikelihood test is applied.

$$Foreign\ direct\ investment_{ij} = \gamma_{00} + u_{0j} + e_{ij} \quad \textbf{[2]}$$

If the LogLikelihood test shows significant results, the quality of the model has increased through adding a grouping variable. In this research, the grouping variable are NUTS 0 regions since each NUTS 3 region is part of exactly one NUTS 0 region. As described above, in the following models successively one set of explanatory variables is added to the model. Starting with the traditional location determinants, the model equation looks like the following:

$$\begin{aligned} Foreign\ direct\ investment_{ij} = \quad & \gamma_{00} + \gamma_{01}\, nGDP_j + \gamma_{10} lGDP_{PC_{ij}} + \gamma_{20} lGDP_{GR_{ij}} \\ & + \gamma_{30} lEMPL_{ALL_{ij}} + \gamma_{40} rINC_{ij}\, \gamma_{50} lPOP_{DENS_{ij}} \\ & + u_{1j} lGDP_{PC_{ij}} + u_{2j} lGDP_{GR_{ij}} + u_{3j} lEMPL_{ALL_{ij}} \\ & + u_{4j} rINC_{ij} + u_{5j} lPOP_{DENS_{ij}} \\ & + u_{0j} + e_{ij} \end{aligned} \quad \textbf{[3]}$$

After conducting the model for the traditional location determinants, the innovation capabilities are introduced in the equation in order to estimate the effect of these regional characteristics on the number of foreign direct investment projects. The regional GVA is specified according to the business function, indicated by the * in the formula.

$$
\begin{aligned}
Foreign\ direct\ investment_{ij} = \quad & \gamma_{00} + \gamma_{01}\, nGDP_j + \gamma_{10} lGDP_{PC_{ij}} + \gamma_{20} lGDP_{GR_{ij}} \\
& + \gamma_{30} lEMPL_{ALL_{ij}} + \gamma_{40} rINC_{ij} + \gamma_{50} lPOP_{DENS_{ij}} \\
& + \gamma_{60}\, rEDU_{ij} + \gamma_{70} rPAT_{APP_{ij}} + \gamma_{80} rRNDEX_{ij} \\
& + \gamma_{90}\, rGVA^*_{ij} \\
& + u_{1j} lGDP_{PC_{ij}} + u_{2j} lGDP_{GR_{ij}} + u_{3j} lEMPL_{ALL_{ij}} \\
& + u_{4j} rINC_{ij} + u_{5j} lPOP_{DENS_{ij}} + u_{6j} rEDU_{ij} \\
& + u_{7j} rPAT_{APP_{ij}} + u_{8j} rRNDEX_{ij} + u_{9j} rGVA^*_{ij} \\
& + u_{0j} + e_{ij} \qquad \textbf{[4]}
\end{aligned}
$$

The last set of explanatory variables contains institutional factors. Due to the fact that in this research two different measurements are used in order to estimate the effect of corporate taxation on the number of foreign direct investment projects in a region, the term TAX in the equation must be replaced by the statutory corporate income tax rate (nSCIT) for model [5.1.] and by the effective average corporate tax rate (nEATR) for model [5.2]. Based on the significance of both factors and the LogLikelihood ratio it can be concluded which type of tax has an effect on the location decision of MNCs and which model fits the data in a proper way.

$$
\begin{aligned}
Foreign\ direct\ investment_{ij} = \quad & \gamma_{00} + \gamma_{01}\, nGDP_j + \gamma_{10} lGDP_{PC_{ij}} + \gamma_{20} lGDP_{GR_{ij}} \\
& + \gamma_{30} lEMPL_{ALL_{ij}} + \gamma_{40} rINC_{ij} + \gamma_{50} lPOP_{DENS_{ij}} \\
& + \gamma_{60}\, rEDU_{ij} + \gamma_{70} rPAT_{APP_{ij}} + \gamma_{80} rRNDEX_{ij} \\
& + \gamma_{90}\, rGVA^*_{ij} + \gamma_{02} nCOR_j + \gamma_{03} nPST_j + \gamma_{04} nTAX_j \\
& + u_{1j} lGDP_{PC_{ij}} + u_{2j} lGDP_{GR_{ij}} + u_{3j} lEMPL_{ALL_{ij}} \\
& + u_{4j} rINC_{ij} + u_{5j} lPOP_{DENS_{ij}} + u_{6j} rEDU_{ij} \\
& + u_{7j} rPAT_{APP_{ij}} + u_{8j} rRNDEX_{ij} + u_{9j} rGVA^*_{ij} \\
& + u_{0j} + e_{ij} \qquad \textbf{[5]}
\end{aligned}
$$

Finally, for each measurement of the dependent variable it is tested if the model fit of a random slope model is significantly better than the fit of the random intercept model. Due to the fact that no comparable MLM has been executed earlier, for each independent variable a random slope model is conducted (iterative process) in order to estimate the best model fit. If the results provide evidence that the random slope model significantly better fits the data, this model is presented in the results table. If this is not the case, the random slope model is not included in the results table.

3.2. Data

3.2.1. The location of MNCs' investment projects

Foreign direct investment is defined as a "cross-border investment made by a resident in one economy (the direct investor) with the objective of establishing a lasting interest in an enterprise (the direct investment enterprise) that is resident in an economy other than that of the direct investor" (OECD, 2008, p. 17). In this research, the focus is on the establishments of these investments and not of the capital flow itself. Therefore, this research aims to analyse the location determinants of foreign subsidiaries of MNCs. According to the OECD (2008) the lasting interest is characterized by at least a 10% ownership of the subsidiary by a foreign investor, referring to a long-term relationship. In order to include the location of these investment projects in the MLM, data is provided by the Amadeus database compiled by the Bureau van Dijk. This database consists of company accounts reported to national statistical offices concerning 11 million public and private companies in 41 European countries. This company-level dataset provides the year, the country and region where the company was founded, the ownership structure and the sector of activity. Based on this dataset a selection is made including firms that were newly created in EU-28 countries in a period of 2012 to 2017 with a percentage of assets owned by non-residents of at least 10%.[1] This count data about the number of greenfield investments refers to the quantity of investment projects in a region. A second selection is made in order to include the number of M&A projects in EU-28 countries. Therefore, all target companies are selected in the Amadeus database and aggregated by their location on NUTS 3 level. For both entry modes, the Amadeus database did not provide information about the NUTS 3 region of a company for Austria, Greece, Malta and UK. In order to aggregate data on investment projects in these countries, the postcode of each individual investment project is translated into the corresponding NUTS 3 region. Data for this transformation is provided by Eurostat (2018). In table 1 the distribution of investment projects is provided on national level. In total 11.404 greenfield projects and 8.387 merger and acquisition projects were carried out by European MNC in EU-28 countries during a period of 2012 to 2017 according to the Amadeus database.[2]

However, sample size requirements of an MLM do not allow to include all EU-28 countries in the econometric model. This is especially due to the smallness of some countries and consequently the small number of NUTS 3 regions (see Appendix II for a comparison between the official number of NUTS 3 regions per country and the number of NUTS 3 regions included in this research). Based on the findings of Maas & Hox (2005) about group size requirements in multilevel analyses, countries with an insufficient number of NUTS 3 regions (<10) are necessarily excluded from the analyses. These countries are Cyprus, Estonia, Ireland, Luxemburg, Latvia, Malta and Slovakia. Since the dataset covers the post- crisis period from 2012 to 2017, Greece is also excluded from the econometric model, due to the singularity of the recovery process of the Greek economy.

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[1] This selection is based on Capello et al. (2011). However, using the Amadeus database it was not possible to reconduct the data used in the corresponding article even though the selection method seems to be the same. This might be due to different available versions of the Amadeus database.

[2] Due to a lack of comprehensive data it is not possible to take into account the number of employees bought by these investment projects, referring to the intensity of foreign direct investment in a region.

***Table 1**: Distribution of investment projects by European MNCs for the period 2012-2018 per country*

	Number of greenfield investment	Number of M&A projects
Austria	241	126
Belgium	245	139
Bulgaria	79	47
Croatia	47	36
Cyprus	102	67
Czech Republic	327	227
Denmark	271	146
Estonia	50	40
Finland	145	73
France	516	508
Germany	1034	778
Greece	7	8
Hungary	61	45
Ireland	846	692
Italy	645	692
Latvia	85	58
Lithuania	27	25
Luxemburg	418	315
Malta	108	67
Netherlands	1607	801
Poland	337	229
Portugal	175	82
Romania	397	256
Slovakia	176	85
Slovenia	28	36
Spain	445	430
Sweden	377	231
United Kingdom	2608	2148
Total	**11404**	**8387**

Source: Author's calculation on Amadeus database

Besides the two different entry modes, the database also includes information about the core business function of the foreign subsidiaries. This information is provided by applying the NACE Rev.2 classification. The term NACE is derived from the French Nomenclature statistique des activités économiques dans la Communauté européenne and classifies economic activities in the European Union (Eurostat, 2006). Based on the extensive description of the NACE Rev. 2 guidelines provided by Eurostat (2006), business activities are divided into service and manufacturing by applying the following distinction:

Table 2: *Differentiation manufacturing and service sector (NACE Rev.2)*

Business activity	NACE Rev. 2	Description
Manufacturing	B, C, D & E	Manufacturing, mining and quarrying and other industry
	F	Construction
Service	K	Financial and insurance activities
	M & N	Professional, scientific, technical, administration and support activities
	R,S,T & U	Other services

Source: Eurostat (2006)

Through the specification of the data according to the business activity of the investment project, it is possible to carry out a fine sliced analysis differentiating foreign subsidiaries of the service sector from those that are active in manufacturing. The dataset contains 6004 greenfield and 2290 M&A projects for the service sector and 1849 greenfield and 2933 M&A projects for manufacturing. This is in line with the expectation as Figure 1 already shows a growing importance of FDI in the service sector (Capello et al. 2011).

3.2.2. Explanatory variables

In order to analyse the location decision of MNCs, three sets of explanatory variables are included in the econometric model. In Appendix I detailed information is provided including the proxy for each variable, the territorial unit, and the source of the data for each variable. The description of the three sets of explanatory variables is followed by a table that presents the descriptive statistics of all variables included in this research.

Traditional location determinants:

The first set of explanatory variables can be summarized as the traditional location determinants since they are "standard" proxies, customary in the literature on the location decision of MNCs. As presented in Section 2, the variables included in this set refer to the general market conditions on both, national and regional scale. To start with the market size most studies investigate the effect of the national market size through including the national gross domestic product (GDP) or the GDP per capita into the analyses (Schneider & Frey, 1985; Wheeler & Mody, 1992; Head & Mayer, 2004; Botrić & Škuflić, 2006; Cleeve, 2008; Mohamed & Sidiropoulos, 2010). These studies conclude that the location of foreign direct investment projects is very sensitive to the national market size. Basile (2008) includes data on sub-national level through including the regional GDP per capita and the regional gross value added (GVA). Crescenzi et al. (2014) include measurements on national and regional level. The national GDP per capita thereby functions as a proxy for the market size, while the total regional GDP measure the absolute size the local economy. Since both proxies have a significant effect on the location decision of MNCs, the regional as well as the national market size are included in the analysis, measured by the national and the regional GDP per capita in Euro at current price level.

Same as in Basile (2008) the regional GVA for all economic activates is part of the explanatory variables, but in this case refers to the productivity of a region and not to the regional market size. Due to the fact that both, the regional GDP and the regional GVA are used as measures for the regional market size in different researches, correlation might be an issue. Therefore, a correlation matrix for all variables included in this research is provided (see Figures 4 & 5). Since Head & Mayer (2004) conclude that the regional market potential has a significant positive effect on the location decision of MNCs, the regional GDP growth rate is used as a proxy for this factor.

As presented in the previous section MNC's investment projects are characterized by a cumulative nature (Head et al., 1995; Head et al., 1999; Guimaraes et al., 2000; Corezet et al., 2004; Crezenzi et al., 2014). In order to include this factor in the econometric model a proxy for the number of people working in manufacturing and in the service sector reflects the agglomerative power of both business activities in a region.

With respect to the labour market conditions different studies presented in Section 2 show that the effect of the unemployment rate as well as the effect of the labour costs on the location decision of MNCs is not clear yet (e.g. Defever, 2006; Head & Mayer, 2004). In order to extend the academic literature with respect to the effect of labour market conditions, two proxies are included in the analysis. The unemployment rate is addressed by the total employment per 1000 persons in a region. This is done, because data on the number of employed people is more accurate than the number of unemployed people, which is due to the compulsory registration of employed people. Due to a lack of available data on NUTS 3 level about the labour costs, the average disposable income per person per NUTS 2 region is included in the analysis. Since this is not the actual average wage of a person in a NUTS 3 region, the assumption is made that data on NUTS 2 regions is the same for each corresponding NUTS 3 region. However, this means that conclusions are drawn on an aggregation level lower than that of the actual data, which implies that the data is disaggregated. This can cause ecological fallacy, which refers to the incorrect assumption that certain relationships between variables observed at the aggregated level are the same at lower level of aggregation. This means that NUTS 2 level data contain less extreme observations than NUTS 3 level data, due to the fact that it is aggregated. Through the use of more precise data the results would come slightly closer to the reality which implies smaller standard deviations. However, due to the fact that the variable functions as a control variable, this might not cause any methodological issues.

Finally, in order to incorporate the effect of urbanisation, which is associated with higher land costs, the population density is used as a proxy in this research. This is in line with the argumentation of Bartik (1985) who stresses that population density does not only refer to the level of urbanisation but also to the land costs, since residential and industrial users compete for land. More recent research by Basile (2004) on the location determinants of FDI also has shown that the population density has a significant impact on the location decision of MNCs. Due to the relative smallness of the observation unit in this research (NUTS 3 regions) the choice is made to use the population density rather than the number of people living in urban agglomerations (as in Ascani et al., 2016) or other proxies, following the argumentation of Bartik (1985) and Basile (2004).

Regional innovation capabilities:

The second set of explanatory variables reflects the innovation capabilities of a region. This set of factors is included in order get more insight into the effect of the innovative local context on the attraction of investment projects of foreign MNCs. The results of existing researches demonstrate that further research is needed in order to specify this relation at least for two reasons. First, there is only a limited number of quantitative researches that takes this set of explanatory variables into account. Second, the findings in the academic literature show some extent of disagreement, as presented in the theoretical section (Section 2.4).

The results of Crescenzi et al. (2014) provide evidence that both, the R&D expenditure as percentage of the regional GDP and patent intensity, proxied by the number of EPO patent applications per capita, have the expected positive effect on the location decision of MNCs. Evidence on national level is provided by Cleeve (2008), who includes the secondary school enrolment ratio and the adult illiteracy rate in order to measure human capital and from Ascani et al. (2016) and Mina (2007), including the ratio of secondary school age population and the total population, respectively total school enrolment. Crescenzi et al. (2014) also include the education of employed people, proxied by the percentage of employed people with a tertiary education level (Isced79 level 5-7) in their analyses in order to measure the quality of the local supply of labour.

In this research, three different proxies are included that jointly measure the innovation capabilities of a region. Based on the existing academic literature, human capital is defined by the participation rate in tertiary education (level 5-8) of the age class 25-64 years. However, data for this factor is only available on NUTS 2 level. Therefore, it is chosen to include this data by considering the assumption that this data on NUTS 2 level allows to be disaggregated to NUTS 3 level (same as for the regional disposable income, see previous subsection). Due to a lack of local data, same applies for the following variables that are part of the regional innovation capabilities.

In order to proxy regional innovative dynamism, two variables are included in the econometric analyses, following Crescenzi et al. (2014). First the R&D expenditure is measured as percentage of the regional GDP. Second, the patent intensity is used as a proxy. In order to include this variable, data about the number of patent applications to the EPO per million inhabitants is provided. Here it is important to mention that there are some difficulties with respect to the underlying data for this variable since patents might be counted for regions where MNCs are headquartered while the actual innovation takes place in another region. This means that the data is provided for the patent applicants and not for the inventors of the patent (Belderbos et al. 2017).

In addition to the three predictors that are included in all models, one further proxy is added to the models that are specified according to the business function of the investment. For investment projects (both entry modes) with primary focus on manufacturing or within the service sector, the Gross Value Added (GVA) is part of the set of the innovation capabilities. Based on the conclusion of Dunning (2013) who states that the regional productivity (output per worker) matters for the attraction of foreign direct investments by MNCs, the GVA per worker is included in the relevant analyses. As for the number of investment projects, the GVA value is specified according to the NACE Rev.2 classification (see Table 2).

Institutional factors:

As discussed in the second section, there are several studies taking into account the effect of the institutional environment on the location decision of MNCs. Most of these researches show that government corruption has a negative effect on the attractiveness of a location. Cleeve (2008) has concluded that the corruption perception index (CPI) has a negative effect on the inflow of FDI. However, Wijeweera et al. (2009) do not find significant results for the relation between government corruption and FDI inflow, while including the same measurement for government corruption. Due to the uncertainty about the effect of the CPI on the location decision of MNCs it is chosen to follow Cleeve (2008) and Wijeweera et al. (2009) and to include this index as an explanatory variable in this research.

As previously described, there are several possibilities to include corporate taxation into the analyses of the geography of foreign subsidiaries of MNCs. Based on their findings, Devereux & Griffith (1999) conclude that the effective average tax rate (EATR) is a conceptually more accurate measure of the corporate income tax than the statutory one, caused by the fact that the EATR includes depreciation allowances. However, the discussion of the studies of Bellak & Leibrecht (2009) and of Buettner & Ruf (2007) show that there is to some extent inconsistency in the academic literature about the effect of different measurements for corporate taxation. Buettner & Ruf (2007) conclude that the statutory corporate income tax has a stronger predictive power for the location decision of MNCs than the EATR. The result that the statutory corporate income tax has a significant negative impact on the location decision of foreign investors is supported by several studies (Hartmann, 1984; Head et al., 2004; De Mooij & Ederveen, 2006; Ang, 2008). Contrary, Bellak & Leibrecht (2009) have concluded that the EATR has no significant effect on FDI inflow. Due to the inconsistency of the literature about the effect of different measurements of corporate income taxation, this study includes both, the statutory one and the effective average in order to contribute to the academic literature and to fill this knowledge gap. Data for both variables is provided by the Centre for European Economic Research (2017). In their annual research they provide extensive data on corporate taxation rates, using the same model as Devereux & Griffith (1999) in order to conduct the EATR. In their rapport, information about the EATR is presented for different economic activities, including industrial buildings, intangibles, machinery, financial assets, and inventories. In this research however, the overall mean of the EATR is used in order measure the effect of the effective average corporation tax on the location decision of MNCs.

Finally, political stability is included in this research as a location determinant of MNCs' investment projects. Based on several investor surveys, Asiedu (2006) constructs a variable that measures the rule of law, using data derived from the International Country Risk Guide (ICRG). Biswas (2002) measures political stability through the duration of a regime by applying the definition of Clague et al. (1994) who state that for a democracy the duration of a regime refers to the number of consecutive years that the country has been a democracy, while for an autocracy, duration refers to the number of years that a particular autocrat has been in power. Cleeve (2008) uses indices for political freedom and civil liberty and combines them in order to measure political stability. Since all different measurements show the same effect on the location decision of MNCs, this research introduces as new proxy for political stability. Therefore, data from the World Bank (2016) is used. Political stability and absence of

violence/terrorism measures the perception of the likelihood of political instability and/or politically-motivated violence (including terrorism). The estimate gives the country's score on the aggregated indicator in units of a standard normal distribution ranging from approximately -2.5 to 2.5.

3.2.3. Descriptive statistics

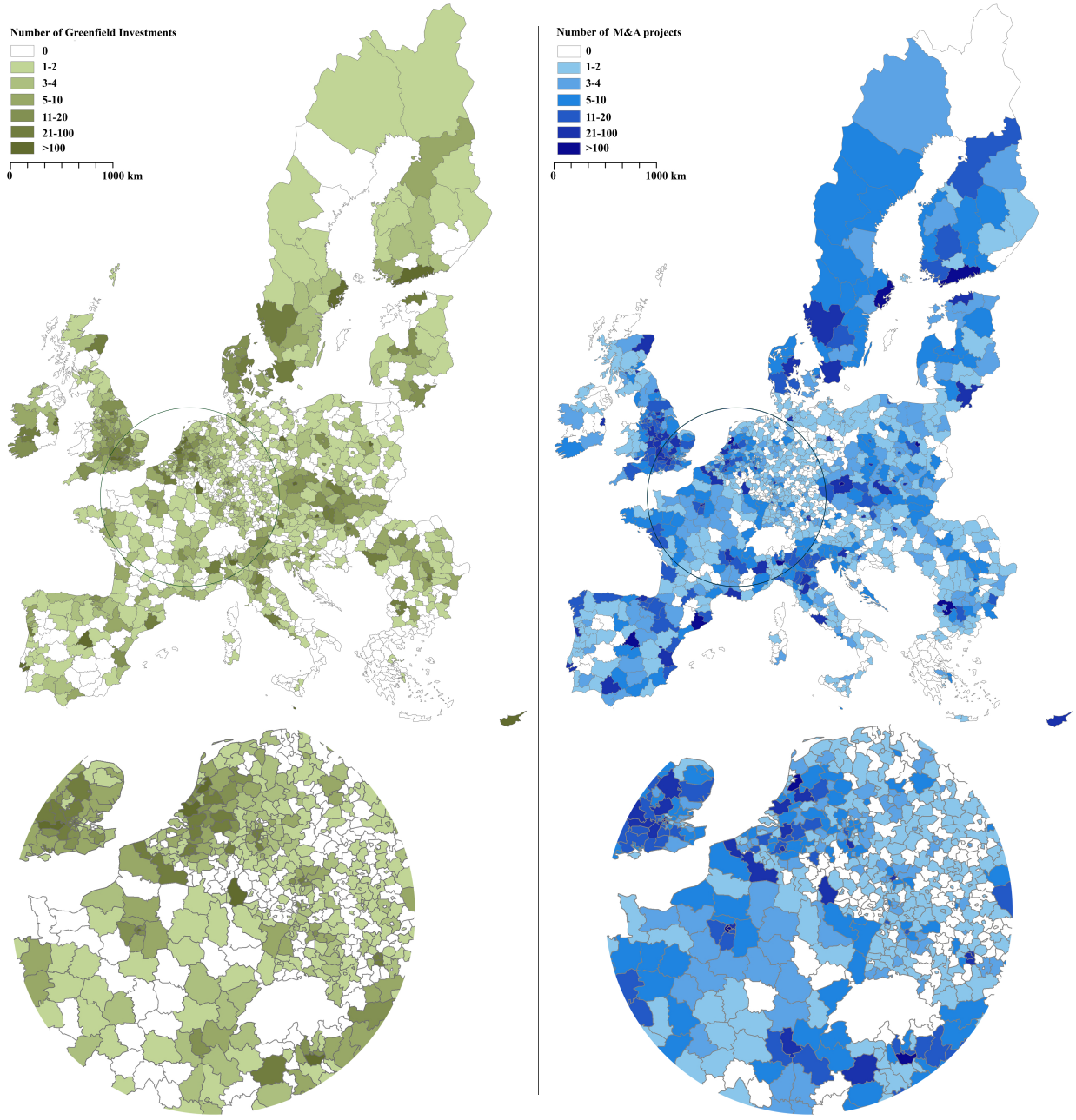
***Table 3**: Descriptive statistics of all variables*

		Descriptive Statistics				
Variable	**Description**	**Mean**	**St. Dev.**	**Min**	**Median**	**Max**
Foreign Direct Investment						
Nr_GI	Nr. Greenfields	7,90	40,58	0	1	960
Nr_MA	Nr. M&As	6,60	18,40	0	2	244
GI_MANU	Nr. Greenfields (manufacturing)	1,42	4,13	0	0	59
GI_SERVICE	Nr. Greenfields (service)	3,97	29,25	0	0	846
MA_MANU	Nr. M&As (manufacturing)	2,33	4,54	0	1	66
MA_SERVICE	Nr. M&As (service)	1,79	6,79	0	0	119
Traditional determinants						
nGDP	National GDP per capita	30.857,31	10.975,95	6.300	37.300	47.800
lGDP_PC	Regional GDP per capita	28.506,49	22.073,83	3.015,90	27.393,60	475.495,10
lGDP_GR	Regional GDP growth	21,03	181,03	-943,00	3,92	977,00
lGVA_ALL	GVA (all)	9.706,68	15.502,29	170,90	5.491,78	185.755,80
lEMPL_ALL	Employment (all)	175,09	219,30	3,70	120,99	3.079,90
rINC	Disposable income	16.599,50	4.573,24	5.400	17.300	39.000
lPOP_DENS	Population density	620,22	1.507,11	1,90	155,20	21.242,80
Innovation capabilities						
rRNDEX	R&D expenditure	1,80	1,34	0,06	1,49	8,80
rEDU	Tertiary enrolment rate	29,33	9,01	11,50	27,90	74,80
rPAT_AP	Nr. Patent applications	113,46	119,41	0,23	81,33	590,06
rGVA_ MANU_PC	Productivity (manufacturing)	0,01	0,004	0,001	0,01	0,02
rGVA_ SERIVCE_PC	Productivity (manufacturing)	0,01	0,01	0,001	0,01	0,12
Institutional factors						
nPST	Political stability	0,56	0,29	-0,06	0,51	1,02
nSCIT	Statutory corporate income tax	26,03	6,90	10,00	25,00	35,40
nEATR	Effective corporate tax rate	24,22	6,04	9,00	23,50	33,40
nCOR	Corruption	70,56	13,38	43	81	88

Note: N = 1204

The descriptive statistics of all variables included in this research are presented by means of a table (see Table 3). The number of observations, the mean, the standard deviation, the median, the minimum, and the maximum are given for each variable independently. For the number of employed people in the service sector and in manufacturing per NUTS 3 region, the amount of missing values is the highest (missing N = 499) compared to all other variables. Due to the lack of data, the variables are not included in the following MLM, which means that the agglomerative power of both sectors cannot be included in the analyses. After deleting all cases with missing values and excluding countries that do not met the sample size requirements, the number of observations (NUTS 3 regions) is 1204. With respect to the number of greenfield investments Amsterdam shows the highest concentration with 960 projects. For M&A projects, Madrid has the highest value followed by London.

Figure 3: *Distribution of greenfield investments and M&A projects for the period 2012-2017*



Source: Author's graphic representation on Amadeus database

3.2.4. Data transformation

Before the results of the different analyses are presented in the next section, two important transformations of the data need some special attention. First, in order to prevent a violation of the assumptions of an MLM, the dependent variable is transformed by applying the logarithm to the base 10. This is done for all six measurements of the dependent variable, respectively the number of foreign direct investments by entry mode and economic activity. Due to the fact that the Log $(0)_{10}$ is undefinable, each value is added by one, to anticipate possible errors in the dataset.

Second, besides the transformation of the dependent variables, the data of the predictors in the model also require special treatment. Due to the fact that all variables are measured on different scales, rescaling of the independent variables is needed in order to estimate the model (*standardisation of the predictors*). This rescaling is done by means of the following equation:

$$rescaled\ (x) = \frac{(x - mean\ (x))}{sd\ (x)}$$

As presented in this equation the rescaled value of each predictor x is calculated by subtracting the mean of the predictor form the original value of x and then divided by the standard deviation of x.

4. Results

In this section the results of the analyses are discussed. As pointed out earlier, each of the six different measurements of the dependent variable are included separately in one analysis in order to determine the difference between the location determinants of the greenfield investments and M&A projects, respectively in the service sector and in manufacturing. Before the results of these analyses are presented, the assumptions of a multilevel model are discussed, since violating the assumptions of statistical analyses can cause a decreasing explanatory power of the model (Maas & Hox, 2004). After presenting the findings with respect to the assumptions for all six models, section 4.2. deals with the results of the different multilevel models.

4.1. Assumptions

Since multilevel analyses are an extension of the basic linear models, the assumptions of these models are fairly similar (Field, 2014). Therefore, in this section the results of a multicollinearity test are presented first. Pearson's r is used due to the fact that all variables included in this research are on continuous scale. In the second part, the results with respect to the linearity assumptions are reported, followed by those of the normality assumption of the residuals and of the random coefficients. This section ends with a brief discussion of the results with respect to the homogeneity assumption.

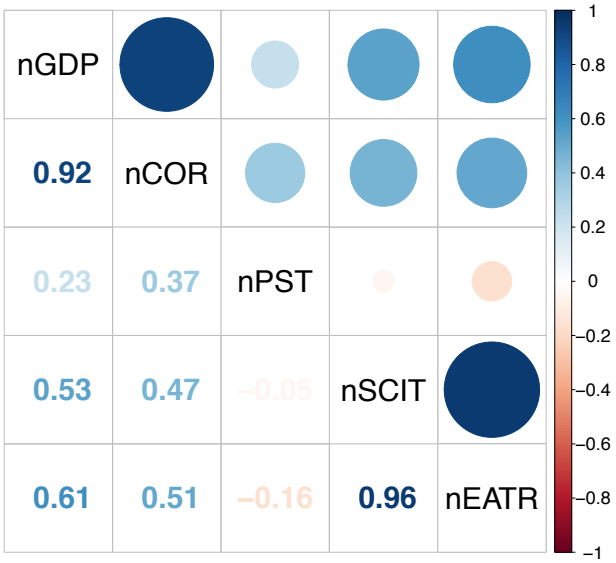
4.1.1. Correlation

In order to test if correlation between variables included in the analyses causes any problems, Pearson's r is calculated for all possible binary relations using standardized data of the predictors. The results of these tests are presented by means of two matrices (Figure 4 & 5).

The upper right part of each matrix indicates the strength and the direction of the correlation by the size and colour of the circle. In the lower left part of both matrices, the correlation coefficients are presented. Same as for the circles, the colour indicates the strength and direction of the correlation. A Pearson's r coefficient of +1 indicates that two variables are perfectly positive correlated, while a coefficient of -1 represents two variables that are perfectly negative correlated (Field, 2014). Values above 0.8 or below -0.8 are usually classified as strong correlations. Since in this research data of two different territorial units is included, the correlation matrix is split up in two, the first one dealing with all variables measured on NUTS 0 and the second one with all variables measured on NUTS 3 level.

The correlation matrix of all NUTS 0 level variables (Figure 1) indicates that there is a strong relationship between the national GDP per capita and the corruption perception index. This means that countries with a high corruption perception index also tend to have a higher national GDP per capita, which is in line with the expectation since a high CPI reflects a lower level of corruption. Due to the high correlation coefficient (r =0.92) it is not possible to include both variables in the same multilevel model. Since numerous studies have shown that the national market size has a great impact on the location decisions of MNCs, the corruption perception index is excluded from the basic model. However, in order to introduce the effect of government corruption, for each measurement of the independent variable the analysis is also carried out with the CPI as predictor, excluding the national GDP per capita (see Appendix VII). Besides, the correlation coefficient of the statutory corporate tax rate and the effective average tax rate shows that the two variables are correlated (r > 0.8), which is logical, since both are measurements of corporate taxation.

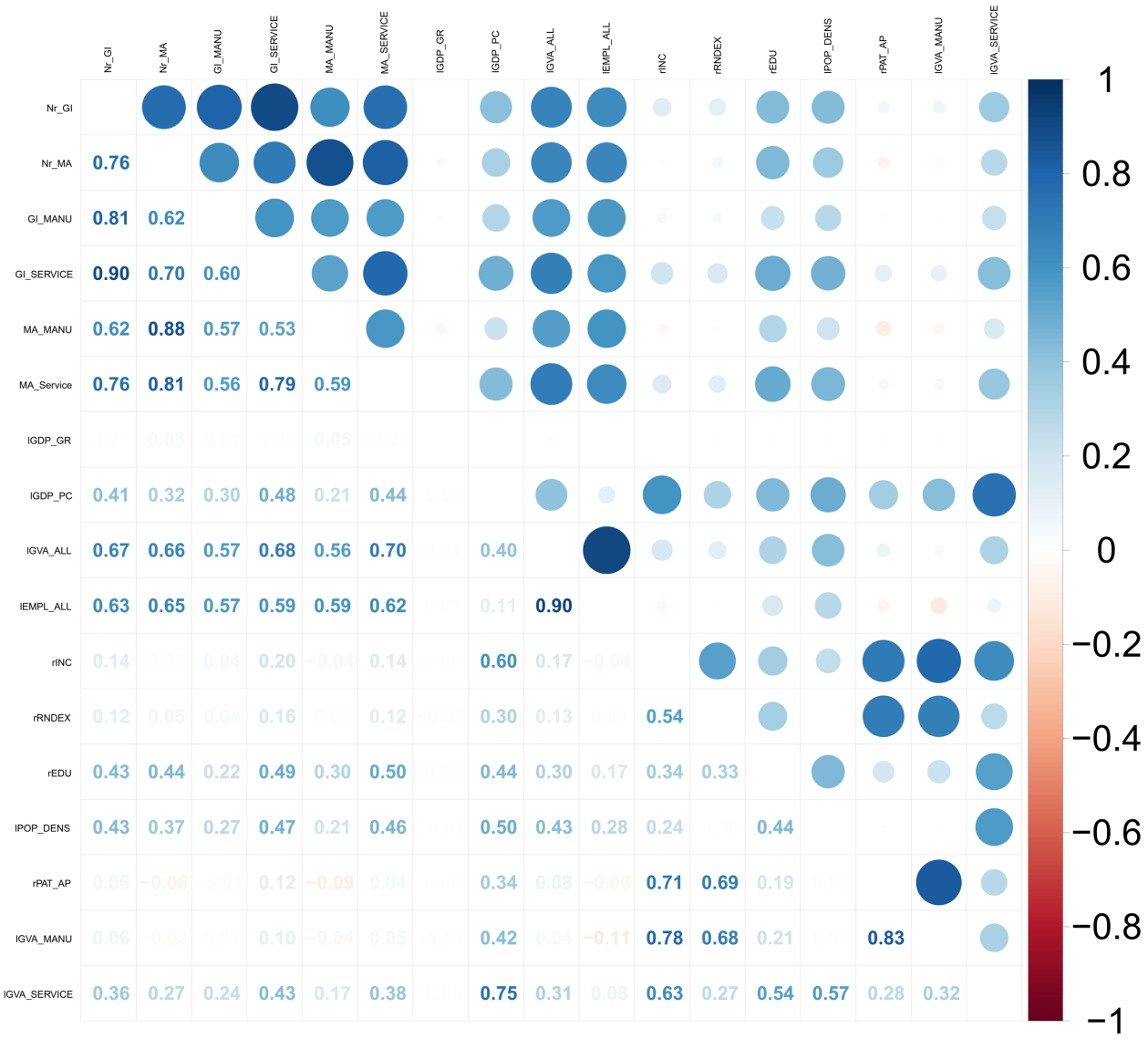
***Figure 4**: Pearson's r for NUTS 0 variables*



For the NUTS 3 level data, multicollinearity between different variables is a bigger issue. Starting with the measurements of the dependent variable, it can be concluded that they all seem to be highly correlated. Correlation between these variables, however, does not cause any problems since for each measurement of the number of greenfield investments and for each measurement for the number of M&As an independent analysis is carried out. A Pearson's r coefficient of above 0.8 for the regional GVA for all business activities and the number of employed people (all business activities) indicates a strong correlation between the two factors. The findings of Basile (2008) suggest that the regional GVA functions as a significant location determinant of foreign direct investment. In his research the value is used as a proxy for the regional market size. Since this regional market size is already included in this research through taking into account the effect of the regional GDP per capita on the number of investment projects, the regional GVA is not necessary for covering the effect of the regional market size and is therefore not included in the analysis.

The GVA per capita for manufacturing is included in this research as a proxy for the regional productivity in the manufacturing sector. Here, Pearson's r shows a high correlation with the number of patent application, referring to the regional patent intensity (r =0.83). Since both factors are measurements of the regional capabilities with respect to innovation, it is in line with the expectation that these factors are to some extent correlated. However, due to the fact that the correlation coefficient is above 0.8, both variables cannot be included in the same model. Because the correlation coefficient only shows high values for the GVA per capita in manufacturing, the number of patent applications is only excluded for models with as dependent variable the number of investment projects in manufacturing. For all other models, the number of patent applications is used as an explanatory variable as part of the innovation capabilities.

***Figure 5**: Pearson's r for NUTS 3 variables*



4.1.2. Linearity, normality and homogeneity

Before the different assumptions of an MLM can be tested, a complete model for each measurement of the dependent variable was conducted that includes all relevant factors. While the model assumptions were clearly violated using the original data, the log-transformation of the different measurements of the dependent variable is applied (see section 3.2.3). In this section, the findings with respect to the assumptions of an MLM using the transformed data are discussed.

In order to test the linearity assumption of a multilevel model, a normal Q-Q Plot with the standardized residuals is provided. The graphs included in Appendix II show that most of the dots are close to the line which means that for all different measurements of MNCs' investments the linearity assumption is met. Before the data was transformed, the standardized residuals did not fit the line. After the transformation a linear multilevel model is appropriate. The transformation of the data is done with all six measurements of the dependent variable separately, due to a violation of the linearity assumption in all cases otherwise.

A histogram of the standardized residuals is used in order to check if the normality assumption of a multilevel model is met. The histograms for all measurements of the dependent variable are included in Appendix III. They show that the standardized residuals are fairly normal distributed since they are centred over 0 and approximately the same between -2 and +2, respectively -3 and +3.

Besides the assumption that the residuals are normally distributed, the distribution of the random effects in a multilevel model also tend to be normally distributed around the overall model. Same as for the distribution of the residuals, the results show that the normality assumption of the random coefficients is met for all random intercept models. The corresponding results are provided in Appendix IV.

In order to test the homogeneity assumption, a plot is used where the fitted values are presented against the standardized residuals. The plots for all measurements of the dependent variable are provided in Appendix V. Based on these plots it can be concluded that most of the data is located between -2 and +2 in horizontal and in vertical terms and no clear pattern is observable, which means that the homogeneity assumption is met.

4.2. Multilevel model

In this section, the results of six different multilevel models are presented by means of four tables. As described in section 3.1. each model is built stepwise, starting with an intercept only model which is followed by a random intercept model. Then, the model is extended by including additional sets of explanatory variables. Finally, a random slope model is reported, in case it fits the data significantly better than the complete random intercept mode. For the number of greenfield investments (section 4.2.1.) and the number of M&A projects (section 4.2.3.) the table presents the results of the stepwise model. In section 4.2.2. and 4.2.4. the results of the analyses of the number of greenfield investments and M&As in manufacturing respectively the service sector are discussed. Here, three complete models are presented for each business function. The first one includes the effective average tax rate, while the second one takes into account the statutory corporate income tax. The third model shows the results of a random slope model in case it fits the data significantly better.

4.2.1. The regional attraction of greenfield investments

The impact of different location determinants on the regional concentration of greenfield investments is presented in Table 4. In the first column the base model is provided, including only the intercept. In the second model the intercept is allowed to vary across the 20 countries that are included in the analyses. The intraclass correlation in this model is 0.239 indicating that 23,9% of the variance is explained on country level. Since this model does not contain any explanatory variables, the residual variance (σ^2_e) represents unexplained error variance.

The traditional location determinants are included in the third column. Starting with the national GDP per capita the estimated results show a negative but statistically non-significant impact on the number of greenfield investments in a region. Contrary to the existing literature (e.g. Schneider & Frey, 1985; Head & Mayer, 2004; Mohamed & Sidiropoulos, 2010) this implies that the actual market size on national level does not determine the location of greenfield investments in EU-28 countries. All other traditional location determinants show the expected positive effect on the regional attraction of greenfield investments. The regional market size, proxied by the regional GDP per capita, shows highly significant results, indicating that the size of the regional market has an important impact on the location decision of MNCs for their greenfield investments. The results for the growth rate of the regional GDP show that there is no statistical significant effect on the number of greenfield investments in a region. This means that only the actual regional market size plays a role in determining the location of a greenfield investment, not the market potential. Contributing to the ongoing discussion with respect to the effect of (un-) employment on the attraction of FDI, the results of the analysis of the number of greenfield investments are in line with the findings of Disdier & Mayer (2004), which means that the higher the number of employed people (per 1000 inhabitants) in a region, the higher the number of greenfield investments in the same region. Furthermore, the results show that the average disposable income of a region has a significant positive effect on the attraction of greenfield investments. This is in line with the findings of Guimaraes et al. (2000) and Defever (2006), as they have concluded that FDI is concentrated in regions where, on average, higher wages are paid. The findings of this research with respect to the labour market conditions also support the assumption of Crescenzi et al. (2014) that MNCs prefer more developed "core" regions, since the results provide evidence that greenfield investments are concentrated in regions with a higher regional GDP per capita, where labour is relatively scarce and expensive. A possible explanation can be the high financial risks that are associated with greenfield investments in general (Ó Huallacháin & Reid, 1997). The assumption that MNCs prefer core regions is also supported by the finding with respect to the population density. Following Basile (2004) and Ascani et al. (2016) the results suggest that regions with a higher population density, measuring the effect of urban agglomerations, significantly attract more greenfield investments.

After including innovation capabilities in the fourth column of Table 4 the findings with respect to the impact of the population density, however, become statistically non-significant, which implies an omitted variable bias. Focusing on the individual predictors of the regional innovation capabilities, it can be concluded that only the educational attainment has a significant positive effect on the number of greenfield investments. This means that after controlling for other factors, MNCs prefer regions with a relatively high participation rate in

tertiary education for their greenfield investments, which is in line with existing researches (e.g. Schneider & Frey, 1985; Cleeve, 2008; Ascani et al., 2016). The insignificance of the results for the population density indicates that not the population density but rather the number of high educated people matters for the location decision of MNCs for their greenfield investments. For the number of patent applications, the results show a positive but statistically non-significant relation with the number of greenfield investments. The same counts for the regional R&D expenditure. The exploration of the model fit shows that the LogLikelihood has decreased, which means that the quality of the model as a whole has decreased in comparison to the previous model where only traditional location determinants are included.

After including the institutional factors, the model fit also does not show any significant improvement. This is due to the fact the most variables included in this set of predictors do not have a statistically significant effect on the number of greenfield investments in a region. Only the results for the effective average tax rate (EATR) show a significant negative effect on the number of greenfield investments. For the statutory corporate income tax, the results are statistically non-significant, indicating that this predictor has no effect on the number of greenfield investments. Contributing to the discussion in the academic literature, the results support the conclusion of De Mooij & Ederveen (2006) that corporate taxation has a negative impact on the attraction of foreign direct investment. The results are also in line with the findings of Devereux & Griffith (1999) and Bellak & Leibrecht (2009) who have concluded that the effective average corporate tax rate is a conceptually better measurement of corporate taxation in the analysis of the location determinates of FDI.

With respect to the effect of political stability on the number of greenfield investments, the results indicate that there is no statistically significant relation. A model including the corruption perception index (CPI), measuring government corruption is provided in Appendix VII. The results show a statistically non-significant positive effect on the number greenfield investments. Since a higher value for the CPI refers to a lower level of corruption, the positive sign of this non-significant relation is in line with the expectation.

In the last column of Table 4 the results of the random slope model are presented. This model allows the slope of the relationship between the number of employees and the number of greenfield investments in a region to vary across countries (NUTS 0 regions). The decision to include the number of employees as the random slope variable is due to the better model fit compared to the random slope models that allow other predictors to vary across NUTS 0 regions. Besides, the random slope model fits the data significantly better than the complete MLM (column five and six). This means that the effect of the number of employees on the number of greenfield investments differs not only in terms of the average number of greenfield investments (intercept) but also in the intensity of the relationship (slope) across countries.

Table 4: *Results number of greenfield investments*

	Dependent variable: Number of Greenfield investments						
	Intercept only	**Random Intercept only**	**Traditional location determinants**	**Innovation capabilities**	**Institutional factors (EATR)**	**Institutional factors (SCIT)**	**Random Slope (lEMPL_ALL)**
(Intercept)	0.4717***	0.5181***	0.5940***	0.5583***	0.5005***	0.5128***	0.5339***
	(0.0140)	(0.0580)	(0.0543)	(0.0508)	(0.0484)	(0.0499)	(0.0405)
Traditional determinants							
nGDP			-0.0123	-0.0139	0.0488	0.0200	-0.0062
			(0.0426)	(0.0395)	(0.0472)	(0.0439)	(0.0327)
lGDP_PC			0.1004***	0.1021***	0.1006***	0.1010***	0.0959***
			(0.0122)	(0.0121)	(0.0122)	(0.0122)	(0.0113)
lGDP_GR			0.0019	0.0023	0.0022	0.0023	0.0029
			(0.0084)	(0.0083)	(0.0083)	(0.0083)	(0.0077)
lEMPL_ALL			0.2785***	0.2717***	0.2726***	0.2723***	0.4085***
			(0.0092)	(0.0093)	(0.0093)	(0.0093)	(0.0376)
rINC			0.1190***	0.0562*	0.0655**	0.0632*	0.0926***
			(0.0194)	(0.0252)	(0.0254)	(0.0254)	(0.0231)
lPOP_DENS			0.0249*	0.0173	0.0180	0.0179	0.0076
			(0.0107)	(0.0112)	(0.0112)	(0.0112)	(0.0111)
Innovation capabilities							
rEDU				0.0748***	0.0685***	0.0699***	0.0482**
				(0.0208)	(0.0206)	(0.0207)	(0.0181)
rPAT_AP				0.0092	0.0069	0.0076	-0.0046
				(0.0156)	(0.0156)	(0.0156)	(0.0146)
rRNDEX				0.0027	0.0036	0.0032	0.0022
				(0.0130)	(0.0129)	(0.0129)	(0.0119)
Institutional factors							
nPST					0.0160	0.0396	0.0007
					(0.0417)	(0.0409)	(0.0275)
nEATR					-0.1315*		-0.0767*
					(0.0553)		(0.0361)
nSCIT						-0.0992	
						(0.0514)	

Table 4: *Continued*

Model statistics							
Num. obs.	1204	1204	1204	1204	1204	1204	1204
AIC		1492.0834	533.4927	541.7331	547.3598	549.0760	395.6887
BIC		1507.3636	579.3333	602.8540	618.6674	620.3836	477.1832
Log Likelihood		-743.0417	-257.7463	-258.8666	-259.6799	-260.5380	-181.8443
Num. countries		20	20	20	20	20	20
σ^2_{u0}		0.0603	0.0489	0.0411	0.0300	0.0333	0.0268
σ^2_{e}		0.1924	0.0827	0.0819	0.0819	0.0819	0.0699
σ^2_{u3}							0.0225
σ_{u03}							0.0189

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$ | σ^2 = variance, σ = covariance

4.2.2. Greenfield investments in manufacturing and in the service sector

In order to evaluate if the location determinants of greenfield investments differ according to their main business function this section compares the results of the MLMs for greenfield investments in manufacturing and for those in the service sector (Table 5). Starting with the traditional location determinants it can be concluded that contrary to the first model (DV: all greenfield investments) for greenfield investments in manufacturing the national GDP per capita has a significant negative effect, which means that MNCs prefer regions in countries with a lower GDP per capita for their greenfield investments in manufacturing. For greenfield investments in the service sector the estimated coefficient has a positive sign, indicating that greenfield investments in the service sector tend to locate in regions with a higher national GDP per capita. However, this impact is statistically non-significant. With respect to the regional market size, estimated by the regional GDP per capita, both models show the same highly significant positive effect on the number of greenfield investments in manufacturing and in the service sector. This means that MNCs choose locations with a relatively high regional GDP per capita within a country with a relatively low national GDP per capita for their greenfield investments in manufacturing. For greenfield investments in the service sector, the regional market size seems to have a more important impact on the location decision than the national market size. Based on this finding, it can be stated that MNCs tend to locate their greenfield investments in the service sector in core regions, while greenfield investments in manufacturing are preferably located in well-developed regions within relatively less developed countries. The regional GDP growth rate has a statistically non-significant effect on the number of greenfield investments for both business activities, which means that the market potential does not function as a location determinant for greenfield investments in both sectors.

With respect to the labour market conditions, greenfield investments in both business activities show statistically significant positive results for the effect of regional employment, indicating that MNCs prefer those regions where the employment rate is relatively high. The effect of wages paid in a region, proxied by the regional disposable income, is statistically non-significant.

***Table 5**: Results number of greenfield investments (Manufacturing & Service)*

	DV: Greenfield investments (manufacturing)			**DV: Greenfield investments (service)**		
	Institutional factors (EATR)	**Institutional factors (SCIT)**	**Random Slope (lEMPL_ALL)**	**Institutional factors (EATR)**	**Institutional factors (SCIT)**	**Random Slope (lEMPL_ALL)**
Traditional determinants						
nGDP	-0.0456	-0.0546*	-0.0504**	0.0732	0.0547	0.0178
	(0.0266)	(0.0241)	(0.0175)	(0.0386)	(0.0355)	(0.0278)
lGDP_PC	0.0757***	0.0759***	0.0787***	0.1071***	0.1073***	0.1023***
	(0.0092)	(0.0092)	(0.0089)	(0.0110)	(0.0110)	(0.0101)
lGDP_GR	0.0013	0.0013	0.0014	0.0008	0.0009	0.0018
	(0.0064)	(0.0064)	(0.0061)	(0.0068)	(0.0068)	(0.0062)
lEMPL_ALL	0.1614***	0.1612***	0.2204***	0.2093***	0.2092***	0.2945***
	(0.0071)	(0.0071)	(0.0205)	(0.0077)	(0.0077)	(0.0336)
rINC	0.0393*	0.0381	0.0294	-0.0242	-0.0266	0.0044
	(0.0199)	(0.0198)	(0.0172)	(0.0239)	(0.0239)	(0.0218)
lPOP_DENS	-0.0176*	-0.0176*	-0.0245**	0.0257**	0.0255**	0.0246**
	(0.0086)	(0.0086)	(0.0087)	(0.0095)	(0.0095)	(0.0093)
Innovation capabilities						
rEDU	0.0087	0.0092	0.0106	0.0829***	0.0841***	0.0629***
	(0.0153)	(0.0153)	(0.0122)	(0.0172)	(0.0173)	(0.0151)
rPAT_APP				0.0271*	0.0276*	0.0147
				(0.0131)	(0.0131)	(0.0121)
rRNDEX	-0.0116	-0.0117	-0.0172	-0.0024	-0.0027	-0.0008
	(0.0100)	(0.0100)	(0.0094)	(0.0106)	(0.0106)	(0.0096)
rGVA_MANU	0.0302*	0.0304*	0.0355**			
	(0.0138)	(0.0138)	(0.0132)			
rGVA_SERVICE				0.0051	0.0055	0.0028
				(0.0146)	(0.0146)	(0.0134)
Institutional factors						
nPST	0.0072	0.0155	0.0018	0.0092	0.0229	-0.0112
	(0.0229)	(0.0217)	(0.0135)	(0.0341)	(0.0329)	(0.0234)
nEATR	-0.0490		-0.0196	-0.0692		-0.0369
	(0.0306)		(0.0178)	(0.0453)		(0.0309)
nSCIT		-0.0408			-0.0446	
		(0.0275)			(0.0415)	
Model statistics						
Num. obs.	1204	1204	1204	1204	1204	1204
AIC	-107.5290	-107.0072	-168.2336	68.3540	69.6500	-112.8556
BIC	-36.2213	-35.6995	-86.7391	144.7551	146.0511	-26.2677
Log Likelihood	67.7645	67.5036	100.1168	-19.1770	-19.8250	73.4278
Num. countries	20	20	20	20	20	20
σ^2_{u0}	0.0082	0.0085	0.0054	0.0200	0.0215	0.0183
σ^2_e	0.0477	0.0477	0.0446	0.0544	0.0544	0.0452
σ^2_{u3}			0.0057			0.0189
σ_{u03}			0.0050			0.0142

***p < 0.001, **p < 0.01, *p < 0.05 | σ^2 = variance, σ = covariance

The impact of population density on the number of greenfield investments in manufacturing and in the service sector clearly shows a difference between the two business activities. In line with the expectation, MNCs prefer regions with a higher population density, referring to urban agglomerations for their investments in the service sector. Contrary, investment projects in manufacturing tend to be located in regions where the population density is lower, referring to less urbanised regions that are associated with lower land costs.

Same as for the population density, the results for innovation capabilities show that there are differences in the location determents of greenfield investments according to their main business function. While for investments in the service sector the educational attainment has a significant positive effect on the number of investment projects, this impact is statically non-significant for greenfield investment in manufacturing. This is in line with the expectation since activities in the service sector are expected to have a higher value-added function compared to manufacturing activities, which increases the importance of an educated labour force. The number of patent applications has a statistically significant positive impact on the number of greenfield investments in the service sector, while this is not the case for the number of greenfield investments in manufacturing (see Appendix VIII). This means that MNCs prefer to locate their greenfield investments in the service sector in regions where the number of patent application is relatively high, while the location of investment projects in manufacturing is not determined by the regional patent intensity. A possible explanation can be found in the data that is used for the number of patent applications per region. Most frequently, if a company applicates a patent this is done via the (regional) headquarter of the company, which leads to a situation where the patent in the data is applied to the region where the headquarter of a company is located but not where the patent originally is developed. Due to different locational preferences of (regional) headquarters and manufacturing facilities (Crescenzi et al., 2014), the results concerning the effect of the number of patent applications on the number of greenfield investments in manufacturing are in line with the expectation. However, in the random slope model for the number of greenfield investments in the service sector, the results of the patent intensity become statistically non-significant, indicating an omitted variable bias. For the regional R&D expenditure both business activities show non-significant results. In order to proxy the sectoral productivity, the Gross Value Added is specified according to the business activity. Consequently, the GVA per capita for manufacturing and for the service sector is included in the analysis of greenfield investments in the relevant sector. While for the number of greenfield investments in manufacturing the results provide evidence that the sectoral productivity has a statistically significant positive impact, this is not the case for the service sector.

As third and last set of predictors, institutional factors are added to the two models. For greenfield investments of both types of business activities the results suggest that this set of explanatory factors does not have a great influence on the number of investment projects. For the number of greenfield investments in manufacturing none of the predictors that are part of the institutional factors has a statistically significant effect. The same counts for the number of greenfield investments in the service sector. The results with respect to the effect of government corruption is provided in Appendix VII. Contrary to the findings of Asiedu (2006) and Mohamed & Sidiropoulos (2010), the results for both business activities indicate that there is

no statistically significant effect of government corruption on the number of greenfield investments.
Finally, a random slope model is conducted for greenfield investments of both business activities. This is due to the fact that including a random slope variable, in this case the total number of employees, has significantly improved the model fit. Same as for the total number of greenfield investments, this means that the effect of the total number of employees on the number of greenfield investments in manufacturing and in the service sector vary across countries. For some countries the total number of employees has a huge impact on the number of investments, while for others this impact is relatively smaller.

4.2.3. The regional attraction of M&A projects

Since most of the academic literature that focuses on the location determinants of MNCs' foreign investment projects only takes greenfield investments into account, it is not reasonable to assume that the same factors determine the location of greenfield investments and M&A projects (Bertrand et al., 2007). Therefore, the same analyses as in section 4.2.1 and 4.2.2 are conducted for mergers and acquisitions. Starting with the traditional location determinants, the results presented in Table 5 show that the national GDP per capita has no statistically significant effect on the number of M&A projects in a region. Same as for the number of greenfield investments, the regional market size, measured by the regional GDP per capita, is of primary interest for the location decision. This means that MNCs prefer economically well-developed regions while the national market size plays a less important role. The regional GDP growth rate does also not have a statistically significant impact on the number of M&A projects in a region. As for greenfield investments, M&As do not preferably take place in regions where the supply of labour is relatively abundant and relatively cheap. Indicated by the positive, highly significant coefficient for the total number of employed people in a region, MNCs value regions where the number of employed people is relatively high. For the company this can be an indication for a suitable labour force, as stated by Crescenzi et al. (2014). The same counts for the positive impact of the labour costs, as this might be an indicator for relatively high qualified labour.
With respect to the effect of regional innovation capabilities, the results show that none of these predictors have a statistically significant impact on the number of M&A projects in a region. A possible explanation can be found in the relatively low number of M&A projects in the service sector. Since the amount of greenfield investments in the service sector is about three times higher, it seems that MNCs prefer greenfield investments in order to execute higher value-added business functions abroad. Due to the fact that innovation capabilities are especially required by higher value-added business activities, the small proportion of service sector projects in the total number of M&As might explain the statistically non-significant results. In order to get more detailed insights into the determinants of service sector investments via mergers and acquisitions, the next section (4.2.4) focuses on this subject.
As a third set of explanatory variables institutional factors are included in the econometric model. The results indicate that both measurements of corporate taxation have a statistically significant negative impact on the number of M&A projects in a region. Since M&A projects frequently have an efficiency seeking motive (Neary, 2004), these findings are in line with the

expectation. The results of the effective average tax rate thereby even show a confidence interval of 99% (in comparison to a 95% confidence interval for the statutory corporate income tax). Same as for the total number of greenfield investments these findings support the conclusion of Devereux & Griffith (1999) and Bellak & Leibrecht (2009) that the effective average tax rate is a conceptually better measurement when estimating the effect of corporate taxation on the number of foreign direct investments. Political stability and government corruption (see Appendix VII) do not have a statistically significant impact on the number of M&A projects in a region.

***Table 6**: Results number of M&A projects*

	DV: Number of M&A projects				
	Traditional determinants	**Innovation capabilities**	**Institutional factors (EATR)**	**Institutional factors (SCIT)**	**Random Slope (lEMPL_ALL)**
Traditional determinants					
nGDP	-0.0304	-0.0326	0.0381	0.0147	0.0107
	(0.0382)	(0.0350)	(0.0430)	(0.0390)	(0.0447)
lGDP_PC	0.0892***	0.0904***	0.0890***	0.0893***	0.0844***
	(0.0115)	(0.0115)	(0.0116)	(0.0115)	(0.0110)
lGDP_GR	0.0035	0.0040	0.0041	0.0042	0.0046
	(0.0079)	(0.0079)	(0.0079)	(0.0079)	(0.0075)
lEMPL_ALL	0.2674***	0.2629***	0.2635***	0.2634***	0.3724***
	(0.0087)	(0.0088)	(0.0088)	(0.0088)	(0.0346)
rINC	0.0971***	0.0598*	0.0670**	0.0659**	0.1003***
	(0.0183)	(0.0238)	(0.0240)	(0.0240)	(0.0234)
lPOP_DENS	-0.0096	-0.0090	-0.0091	-0.0091	-0.0253*
	(0.0101)	(0.0107)	(0.0107)	(0.0107)	(0.0108)
Innovation capabilities					
rEDU		0.0270	0.0242	0.0241	0.0070
		(0.0196)	(0.0195)	(0.0195)	(0.0189)
rPAT_AP		0.0122	0.0097	0.0102	-0.0027
		(0.0148)	(0.0148)	(0.0148)	(0.0142)
rRNDEX		0.0145	0.0154	0.0152	0.0143
		(0.0123)	(0.0123)	(0.0123)	(0.0117)
Institutional factors					
nPST			-0.0244	-0.0028	-0.0301
			(0.0378)	(0.0362)	(0.0390)
nEATR			-0.1299**		-0.1103*
			(0.0503)		(0.0514)
nSCIT				-0.1093*	
				(0.0455)	
Model statistics					
Num. obs.	1204	1204	1204	1204	1204
AIC	399.7160	417.2962	423.9172	424.8232	333.6571
BIC	445.5566	478.4171	495.2248	496.1308	415.1516
Log Likelihood	-190.8580	-196.6481	-197.9586	-198.4116	-150.8285
Num. countries	20	20	20	20	20
σ^2_{u0}	0.0388	0.0316	0.0245	0.0257	0.0318
σ^2_e	0.0740	0.0739	0.0739	0.0739	0.0659
σ^2_{u1}					0.0187
σ_{u03}					0.0112

***p < 0.001, **p < 0.01, *p < 0.05 | σ^2 = variance, σ = covariance

Finally, a random slope variable is introduced in the equation. The results are presented in the last column of Table 6. The LogLikelihood has significantly increased, which means that the model fits the data better compared to the random intercept models. Compared to the comprehensive random intercept model, the results of the random slope model show a statistically significant negative effect of the population density on the number of M&As. Controlling for a varying effect of the number of employed people in a region across countries, this means that M&A projects are preferably located in regions that are relatively less densely populated.

4.2.4. M&A projects in manufacturing and in the service sector

Same as for greenfield investments this section discusses the findings of the fine sliced analyses of M&A projects in manufacturing and in the service sector (Table 7). Focusing on the effect of traditional location determinants, it can be concluded that for M&As of both business activities the national GDP per capita has no statistically significant impact on the number of investment projects. This means that the national market size does not function as a determinant for M&As in the service sector and in manufacturing. For both business activities the regional GDP per capita has a significant positive effect, indicating that the regional market size is highly valued by MNCs for their M&A projects. This is in line with the results of Brakman, Garretsen & Van Marrewijk (2007) who have concluded that especially horizontal investments frequently have an efficiency motive, which is related to market seeking. The results for the growth rate of the regional GDP show that it is the actual market size that matters for the location of M&As in both business activities and not the market potential, due to the insignificance of the effect of the regional GDP growth rate. Besides, MNCs favour locations with a higher employment rate since it reflects a suitable labour force (Disdier & Mayer, 2004). The average disposable income as a proxy for the wages paid in a region has no statistically significant impact on the number of M&As. In line with the expectation, population density has a statistically significant negative impact on the number of M&As in manufacturing. This means that MNCs do not prefer urban agglomerations, respectively relatively high land costs for their M&As in manufacturing. For the service sector the results are statistically non-significant.

With respect to the effect of regional innovation capabilities, the results of the random slope model suggest that, controlling for a varying effect of the regional market size across countries, the educational attainment and the sectoral GVA have a statistically significant effect on the number of investment projects in manufacturing. For M&A projects in the service sector only the educational attainment has a significant positive effect. This means that MNCs value regions with a relatively highly educated population for their M&A decisions in the service sector, which is in line with the expectation that higher value-added business activities are located where the labour supply is qualified (Crescenzi et al., 2014). For service sector investments the effect of the sectoral productivity is statistically non-significant. With respect to the number of patent applications it can be concluded that this factor does not have a statistically significant impact on the number of M&As for both business activities (see Appendix VIII). A possible explanation for these results can be that this research only takes into account regional characteristics and does not incorporate company level data. As presented in section 2.2. M&As are frequently motivated by an efficiency motive (Neary, 2004), which

implies besides cost reduction also the access to firm specific knowledge. Since the number of patent applications measures the regional innovation capabilities but not the innovative power of a (target) company located in the region, this might cause the insignificance of this impact.

Table 7: *Results number of M&A projects (Manufacturing & Service)*

	DV: M&A projects (manufacturing)			**DV: M&A projects (service)**		
	Institutional factors (EATR)	**Institutional factors (SCIT)**	**Random Slope (lGDP_PC)**	**Institutional factors (EATR)**	**Institutional factors (SCIT)**	**Random Slope (lEMPL_ALL)**
Traditional determinants						
nGDP	-0.0239	-0.0331	-0.0538	0.0384	0.0285	0.0225
	(0.0342)	(0.0305)	(0.0304)	(0.0202)	(0.0188)	(0.0189)
lGDP_PC	0.0572***	0.0574***	0.2087***	0.0891***	0.0892***	0.0865***
	(0.0101)	(0.0101)	(0.0588)	(0.0095)	(0.0095)	(0.0089)
lGDP_GR	0.0076	0.0077	0.0070	-0.0057	-0.0057	-0.0045
	(0.0070)	(0.0070)	(0.0068)	(0.0059)	(0.0059)	(0.0055)
lEMPL_ALL	0.1864***	0.1863***	0.1721***	0.1848***	0.1847***	0.2469***
	(0.0078)	(0.0078)	(0.0085)	(0.0066)	(0.0066)	(0.0283)
rINC	0.0094	0.0087	-0.0424	-0.0224	-0.0247	-0.0005
	(0.0223)	(0.0222)	(0.0223)	(0.0195)	(0.0194)	(0.0185)
lPOP_DENS	-0.0368***	-0.0368***	-0.0351***	0.0144	0.0142	0.0089
	(0.0094)	(0.0094)	(0.0098)	(0.0082)	(0.0082)	(0.0082)
Innovation capabilities						
rEDU	0.0324	0.0325	0.0427*	0.0701***	0.0704***	0.0557***
	(0.0174)	(0.0174)	(0.0166)	(0.0133)	(0.0134)	(0.0124)
rPAT_APP				0.0107	0.0115	0.0001
				(0.0112)	(0.0112)	(0.0107)
rRNDEX	-0.0228*	-0.0228*	-0.0159	-0.0011	-0.0013	-0.0001
	(0.0111)	(0.0111)	(0.0107)	(0.0090)	(0.0090)	(0.0084)
rGVA_MANU	0.0770***	0.0770***	0.0734***			
	(0.0152)	(0.0152)	(0.0154)			
rGVA_SERVICE				0.0000	0.0007	-0.0012
				(0.0125)	(0.0125)	(0.0117)
Institutional factors						
nPST	-0.0037	0.0056	-0.0160	-0.0040	0.0042	-0.0155
	(0.0298)	(0.0279)	(0.0255)	(0.0171)	(0.0165)	(0.0156)
nEATR	-0.0590		-0.0669*	-0.0437		-0.0361
	(0.0397)		(0.0337)	(0.0231)		(0.0208)
nSCIT		-0.0526			-0.0323	
		(0.0352)			(0.0210)	
Model statistics						
Num. obs.	1204	1204	1204	1204	1204	1204
AIC	117.1304	117.3434	68.1045	-284.0359	-282.8033	-408.7363
BIC	188.4380	188.6510	149.5990	-207.6348	-206.4022	-322.1485
Log Likelihood	-44.5652	-44.6717	-18.0522	157.0179	156.4016	221.3682
Num. groups: NUTS0	20	20	20	20	20	20
σ^2_{u0}	0.0148	0.0148	0.0109	0.0041	0.0045	0.0055
σ^2_{e}	0.0573	0.0573	0.0539	0.0411	0.0411	0.0356
σ^2_{u1}			0.0358			
σ_{u01}			0.0122			
σ^2_{u3}						0.0132
σ_{u03}						0.0058

***p < 0.001, **p < 0.01, *p < 0.05 | σ^2 = variance, σ = covariance

Regarding institutional factors, the level of government corruption has a significant impact on the number of M&As in the service sector, which means that MNCs prefer less corrupt countries for their investment projects (see Appendix VII). All other institutional predictors have no statistically significant effect on the number of mergers and acquisitions in both business activities. Contrary to the expectation based on the cost reducing motivation of M&As (Neary, 2004), neither the statutory nor the effective average corporate tax rate has the expected significant negative effect.

Finally, a random slope model is applied to the number of M&As for both business activities. The LogLikelihood has significantly increased in comparison to the comprehensive random intercept model. This means that not only the average number of M&As in the relevant sector varies across countries. For M&A projects in manufacturing the effect of the regional market size varies across countries, while for investments in the service sector the effect of the employment rate on the number of projects varies across countries.

5. Conclusion

In this research the location determinants of European MNCs' investment projects in EU-28 countries are analysed by means of a series of quantitative multilevel analyses. Investment projects are addressed by using count data on the number of investments per NUTS 3 region. In order to provide a detailed analysis, investment projects are distinguished according to their entry mode (greenfield investments & mergers and acquisitions). To test the robustness of the results and to take into account the changed composition of foreign direct investment in Europe over the last decades (see Figure 1) investment projects are also differentiated according to their main business function (manufacturing & service facilities).

The results suggest that there are no major differences in the location determinants of greenfield investments and M&A projects. Contrary to the findings of Basile (2008) who has concluded that the location determinants of FDI differ according to the entry mode and to the hypothesis of Bertrand et al. (2007) who state that it is not reasonable to assume that the location determinants of greenfield investments and M&As are identical, the results of this research show that nearly all predictors have the same effect on the number of relevant investment projects independently of the entry mode. With respect to the traditional location determinates, the results suggest that MNCs seem to value a relatively great regional market size which indicates that investment projects are preferably located in economic "core" regions (Crescenzi et al., 2014). This is also supported by the results with respect to the labour market conditions since investment project are concentrated in regions where the employment rate and consequently the labour costs are relatively high. However, contrary to the assumption that MNCs prefer core regions, the level of urbanisation, respectively land costs seem not to have an impact on the location decision of MNCs. The same counts for the national market size, which means that MNCs are especially interested in market seeking on regional rather than national scale through the application of greenfield investments and M&As.

Regarding regional innovation capabilities, the results show that MNCs prefer regions with a relatively highly educated population for their greenfield investments, while this is not the case for M&A projects. This might be due to the fact that through an M&A project, MNCs acquire the individual innovation capabilities of the target firm, making the regional innovation capabilities less interesting. Besides, regional R&D expenditure and the patent intensity seem not to matter for the location decision of MNCs.

Finally, the effect of different institutional factors is incorporated in the analyses. For both entry modes, the results provide evidence that the effective average tax rate has a negative impact on the number of investment projects. This is in line with the cost reducing motivation of foreign direct investment projects. Political stability and government corruption both seem not to determine the location of MNCs.

Comparing the location determinants of greenfield investments and M&As specified for their main business function, the results provide some interesting findings. Contrary to the total number of greenfield investments respectively M&A projects, the national market size seems to affect the location of greenfield investments in manufacturing. According to the results of the econometric model, MNCs prefer regions within relatively less developed countries, indicated by the negative effect of the national GDP per capita on the number of relevant investment projects. Same as for the total number of greenfield investments and M&As the

regional market size and the employment rate determine the location of MNCs' investments for both business functions independently of the entry mode. The effect of population density referring to the level of urbanisation, respectively land costs show some striking differences. For both entry modes, projects in manufacturing seem to be preferably located in regions with a relatively low population density, while a relatively high population density seems to attract service sector investments of both entry modes. In line with the expectation this means that manufacturing facilities are concentrated in relatively less urbanised areas while service sector investments are primarily found in urbanised regions.

With respect to regional innovation capabilities, the results show that MNCs prefer regions where the sectoral productivity is relatively high for their manufacturing facilities independent of the entry mode, while this is not the case for investments in the service sector. The educational attainment functions as an attracting factor for investment projects especially in the service sector, however not for greenfield investments in manufacturing.

In line with the findings of Devereux & Griffith (1999) and Bellak & Leibrecht (2009) this research also provides evidence that the effective average tax rate is conceptually a better measurement for the effect of corporate taxation on the location of MNCs' investment projects compared to the statutory counterpart. This conclusion is based on the fact that for all measurements of MNCs' foreign direct investment projects the model that includes the effective average tax rate better fits the data compared to the one including the statutory corporate income tax rate.

Concluding, the results of this research indicate that independent of the entry mode and the business function, traditional location determinants to a large extent influence the location decision of European MNCs. The analysis of investment projects in EU-28 countries shows that regional innovation capabilities and the institutional environment only partly seem to affect the location of MNCs' investment projects dependent on the entry mode and the business function of the investment.

6. Discussion

This research ends with a discussion of its strengths and limitations. Already in the introduction it is discussed why this research is relevant in the academic field. First of all, with respect to the methodology, this research adds new findings to the existing academic literature. Not only the combination of the use of local level (NUTS 3) and national level (NUTS 0) data, but also the methodological approach to deal with this hierarchical structure of the data provides an extension of the findings within the academic field. At the same time, the data also has some limitations. As described, the Amadeus database is used as source for the data of the measurements of MNCs' investment projects. Earlier research already has shown that this database can be used in order to filter these investment projects. Even though the steps taken by Capello et al. (2011) are followed, it was however not possible to reconstruct their dataset. A possible explanation might be that different versions of the Amadeus database are available. Based on the assumption that these different versions are random samples of one original database, greenfield investments and M&A projects are selected. The Amadeus database thereby has some limitations which made it not possible to (1) exclude holdings from the data,

leading to a high number of greenfield investment in e.g. Ireland and the Netherlands, (2) to make a distinction between different value chain stages and (3) to use besides the count data model also the number of employees brought by MNCs referring to the intensity of the investment projects in a region. Using alternative databases as for example the Location Trend Database provided by IBM or the fDI markets database compiled by the Financial Times might be a reasonable aspect to take into consideration for further research in order to confirm or reject the findings of this research.

For some explanatory factors a lack of available data on NUTS 3 level makes the use of NUTS 2 level data necessary, which can cause ecological fallacy as discussed in section 3.2.2. Besides, especially for M&A projects, deal-/ company-level characteristics play an important role. However, due to the focus of this research on the effect of regional characteristics on the location decision of MNCs, deal-/ company- level data is not included in the econometric model. For further research this might be an appropriate starting point. Applying an MLM with as level 1 unit individual companies/ deals therefore would be a suitable methodological approach.

Finally, with respect to the MLM, sample size requirements can be a limiting factor for the quality of the variance statistics. Maas & Hox (2004) have concluded that an MLM is possible even with a dataset including ten groups and a group size of five observations. They have shown that both the regression coefficients and the variance components are all estimated without bias. Even though their research provides evidence that a lower number of groups has a regardless effect on the coverage rate of the regression coefficients, this effect is much larger for the variance components. The same pattern can be found in the analysis of the group size. While the results show a coverage of 95% confidence interval for the regression coefficients, the variance statistics are less accurate when a minimum number of five observations per group is applied. However, taking other methodological approaches for this research into consideration has not changed the decision to apply an MLM with 20 groups and at least ten NUTS 3 regions per country. This is due to the fact that the use of other methodological approaches would imply that the variance on country-level is set equal to 0. This, however, is neither in line with the dataset nor with the theoretical assumptions of this research. Several studies provide evidence that national characteristics matter for the location decision of MNCs, respectively their foreign direct investment projects (e.g. Ascani & Crescenzi, 2016; Cleeve, 2008; Mohamed & Sidiropoulos, 2010). These characteristics are therefore included in this research, making the use of an MLM appropriate for the analyses of the dataset.

7. Bibliography

Agosin, M., & Mayer, R. (2000). Foreign direct investment: Does it crowd in domestic investment. *United Nations Conference on Trade and Development Geneva, Switzerland, Working Paper, 146*.

Almond, P., Ferner, A., & Tregaskis, O. (2015). The changing context of regional governance of FDI in England. *European Urban and Regional Studies, 22*(1)., 61-76.

Anand, J., & Delios, A. (2002). Absolute and relative resources as determinants of international acquisitions. *Strategic Management Journal*, *23*(2), 119-134.

Andersson, U., Johanson, J., & Vahlne, J. E. (1997). Organic acquisitions in the internationalization process of the business firm. *MIR: Management International Review*, 67-84.

Ang, J. B. (2008). Determinants of foreign direct investment in Malaysia. *Journal of policy modeling*, *30*(1), 185-189.

Ascani A., & Gagliardi, L. (2015). Inward FDI and local innovative performance. An empirical investigation on Italian provinces. *Review of Regional Research, 35*, 29-47.

Ascani, A., Crescenzi, R., & Iammarino, S. (2016). Economic institutions and the location strategies of European multinationals in their geographic neighbourhood. *Economic Geography*, *92*(4), 401-429.

Asiedu, E. (2006). Foreign direct investment in Africa: The role of natural resources, market size, government policy, institutions and political instability. *World Economy*, *29* (1)., 63-77.

Bartik, T. (1985). Business location decisions in the United States: Estimates of the effects of unionization, taxes, and other characteristics of states. *Journal of Business Economic Statistics, 3*, 14- 22.

Basile, R. (2004). Acquisition versus greenfield investment: the location of foreign manufacturers in Italy. *Regional Science and Urban Economics*, *34*(1), 3-25.

Basile, R., Castellani, D., & Zanfei, A. (2008). Location choices of multinational firms in Europe: The role of EU cohesion policy. *Journal of International Economics*, *74*(2), 328-340.

Bates, D., Maechler, M., Bolker, B., & Walker, S. (2015). Fitting Linear Mixed-Effects Models Using lme 4. *Journal of Statistical Software*, *67* (1), 1-48.

Belderbos, R., Du, H.S., & Goerzen, A. (2017). Global Cities, Connectivity and the Location Choice of MNC Regional Headquarters. *Journal of management studies.*

Bellak, C., Leibrecht, M., & Riedl, A. (2008). Labour costs and FDI flows into Central and Eastern European Countries: A survey of the literature and empirical evidence. *Structural Change and Economic Dynamics*, *19*(1), 17-37.

Bellak, C., & Leibrecht, M. (2009). Do Low Corporate Income Tax Rates Affect FDI? Evidence from Central and East European Countries. *Applied Economics*, *41*, 2691- 2703.

Bertrand, O., Mucchielli, J. L., & Zitouna, H. (2007). Location choices of multinational firms: the case of mergers and acquisitions. *Journal of Economic Integration*, 181-209.

Bhalla, V.K., & Ramu, S. (2004). International Business - Environment and Management. New Delhi: *Anmol Publications*.

Biswas, R. (2002). Determinants of foreign direct investment. *Review of development economics*, *6*(3), 492-504.

Blomstrom, M., & Kokko, A. (2003). Human capital and inward FDI. *The European Institute of Japanese Studies (Stockholm School of Economics, Sweden), Working Papers Series*,*167*.

Borensztein, E., De Gregorio, J., & Lee, J. W. (1998). How does foreign direct investment affect economic growth? 1. *Journal of international Economics*, *45*(1), 115-135.

Boschma, R. (2005). Proximity and innovation: a critical assessment. *Regional studies*, *39*(1), 61-74.

Botrić, V., & Škuflić, L. (2006). Main determinants of foreign direct investment in the southeast European countries. *Transition Studies Review*., *13* (2), 359-377.

Buettner, T., & Ruf, M. (2007). Tax incentives and the location of FDI: Evidence from a panel of German multinationals. *International Tax and Public Finance*, *14*(2), 151-164.

Cantwell, J. (1989). Technological Innovation and Multinational Corporations. Oxford: *Basil Blackwell.*

Cantwell, J., & Santangelo, G. D. (2002). M&As and the global strategies of TNCs. *The Developing Economies*, *40*(4), 400-434.

Cantwell, J., & Iammarino, S. (2003) Multinational Corporations and European Regional Systems of Innovation. London: *Routledge*.

Cantwell, J., & Piscitello, L. (2005). Recent location of foreign-owned research and development activities by large multinational corporations in the European regions: the role of spillovers and externalities. *Regional Studies*, *39*(1), 1-16.

Capello, R., Fratesi, U., & Resmini, L. (2011). Globalization and regional growth in Europe: past trends and future scenarios. *Springer Science & Business Media*.

Clague, C., Keefer, P., Knack, S., & Olson, M. (1994). Institutions and economic performance: A new look at democracies and growth. In: *Draft prepared for the Institutional Reform and the Informal Sector Conference on Economic and Political Institutions for Sustainable Development*.

Cleeve, E. (2008). How effective are fiscal incentives to attract FDI to Sub-Saharan Africa?, *The Journal of Developing Areas*, *42* (1), 135-153.

Crescenzi R., Pietrobelli, C., & Rabellotti, R. (2014). Innovation Drivers, Value Chains and Multinational Corporations in Europe. *Journal of Economic Geography 14*., 1053-1086.

Crozet, M., Mayer, T., & Mucchielli, J. L. (2004). How do firms agglomerate? A study of FDI in France. *Regional science and urban economics*, *34*(1), 27-54.

Defever, F. (2006). Functional fragmentation and the location of multinational firms in the enlarged Europe. *Regional Science and Urban Economics*, *36*(5), 658-677.

De Backer, K., & Sleuwaegen, L. (2003). Does foreign direct investment crowd out domestic entrepreneurship?. *Review of Industrial Organization*, *22*(1), 67-84.

De Mooij, R. A., & Ederveen, S. (2006). *What a difference does it make? Understanding the empirical literature on taxation and international capital flows* (No. 261). Directorate General Economic and Financial Affairs (DG ECFIN), European Commission.

Delios, A., & Beamish, P. W. (1999). Ownership strategy of Japanese firms: Transactional, institutional, and experience influences. *Strategic management journal*, 915-933.

Di Giovanni, J. (2005). What drives capital flows? The case of cross-border M&A activity and financial deepening. *Journal of international Economics*, *65*(1), 127-149.

Devereux, M. P., & Griffith, R. (1998a). Taxes and the Location of Production: Evidence from a Panel of US Multinationals. *Journal of public Economics*, *68*(3), 335-367.

Devereux, M. P., & Griffith, R. (1998b). The taxation of discrete investment choices (No. W98/16*). IFS working papers*.

Dicken, P. (2007). *Global shift: mapping the changing contours of the world economy*, 5th edn. Sage: London.

Disdier, A. C., & Mayer, T. (2004). How different is Eastern Europe? Structure and determinants of location choices by French firms in Eastern and Western Europe. *Journal of Comparative Economics, 32*: 280–296.

Dunning, J. H. (1977). Trade, location of economic activity and the multinational enterprise: a search for an eclectic approach. In B. Ohlin, P. O. Hesselborn, P. M. Wijkman (eds) The International Allocation of Economic Activity, 19–51. London: *Macmillan*.

Dunning, J.H. (1979). Explaining changing pattern of international production: in defence of eclectic theory. *Oxford Bulletin of Economics and Statistics*., *41* (4), 269–296.

Dunning, J. H. (2013). Multinationals, Technology & Competitiveness (RLE International Business). Vol. 13. *Routledge*.

Eurostat. (2006). NACE Rev.2 – Statistical classification of economic activities in the European Community. *Eurostat.*

Eurostat. (2015). Regions in the European Union. Nomenclature of territorial units for statistics NUTS 2013/ EU-28. *Eurostat.*

Erel, I., Liao, R. C., & Weisbach, M. S. (2012). Determinants of cross-border mergers and acquisitions. *The Journal of Finance*, *67*(3), 1045-1082.

Field, A. (2013). *Discovering statistics using IBM SPSS statistics*. London: Sage.

Guimaraes, P., Figueiredo, O., & Woodward, D. (2000). Agglomeration and the location of foreign direct investment in Portugal. *Journal of Urban Economics*, *47*: 115–135.

Gonzalez, P., Vasconcellos, G. M., & Kish, R. J. (1998). Cross-border mergers and acquisitions: the undervaluation hypothesis. *The Quarterly Review of Economics and Finance*, *38*(1), 25-45.

Hartman, D. G. (1984). Tax policy and foreign direct investment in the United States. *National tax journal*, 475-487.

Head, C. K., Ries, J. C., & Swenson, D. L. (1995). Agglomeration benefits and location choice: evidence from Japanese manufacturing investment in the United States. *Journal of International Economics*, *38*: 223–247.

Head, C. K., Ries, J. C., & Swenson, D. L. (1999). Attracting foreign manufacturing: investment promotion and agglomeration. *Regional Science and Urban Economics*, *29*: 197–218.

Head, C. K., & Mayer, T. (2004). Market potential and the location of Japanese investments in the European Union. *Review of Economics and Statistics*, *86*: 949–972.

Hennart, J. F., & Park, Y. R. (1993). Greenfield vs. acquisition: The strategy of Japanese investors in the United States. *Management science*, *39*(9), 1054-1070.

Hennart, J. F., & Park, Y. R. (1994). Location, governance, and strategic determinants of Japanese manufacturing investment in the United States. *Strategic management journal*, *15*(6), 419-436.

Hennart, J. F., & Reddy, S. (1997). The choice between mergers/acquisitions and joint ventures: The case of Japanese investors in the United States. *Strategic management journal*, 1-12.

Hlavac, M. (2018). Stargazer: Well-Formatted Regression and Summary Statisitcs Tables. R package (Version 5.2.1.). Available from https://CRAN.R-project.org/package=stargazer.

Hox, J. J., Moerbeek, M., & van de Schoot, R. (2017). *Multilevel analysis: Techniques and applications*. Routledge.

Huallacháin, B. Ó., & Reid, N. (1997). Acquisition versus greenfield investment: the location and growth of Japanese manufacturers in the United States. *Regional Studies*, *31*(4), 403-416.

Iammarino, S., & McCann P. (2013). *Multinationals and Economic Geography*. In: Edward Elgar: Cheltenham, UK. Chapter 7: Multinationals, Connectivity, Global Cities, 284-319.

Javororcik, B.S., & Kaminski, B. (2009). How to Attract FDI and Maximize Its Benefits. J.Winiecki, ed. Competitivness of New Europe. *Routledge*: London and New York.

Kogut, B., & Chang, S. J. (1991). Technological capabilities and Japanese foreign direct investment in the United States. *The Review of Economics and Statistics*, 401-413.

Kurtishi-Kastrati, S. (2013). Impact of FDI on economic growth: An overview of the main theories of FDI and empirical research. *European Scientific Journal, ESJ*, *9*(7).

Leifeld, P. (2013). Texreg: Conversion of Statistical Model Output in R to LaTex and HTML Tables. *Journal of Statistical Software, 55*(8), 1-24.

Louri, H. (2001). Entry through acquisition: Determinants of multinational firm choices. *Review of Industrial Organization*, *19*(2), 199-209.

Maas, C. J., & Hox, J. J. (2004). The influence of violations of assumptions on multilevel parameter estimates and their standard errors. *Computational statistics & data analysis*, *46*(3), 427-440.

Maas, C. J., & Hox, J. J. (2005). Sufficient sample sizes for multilevel modeling. *Methodology: European Journal of Research Methods for the Behavioral and Social Sciences*, *1*(3), 86.

Madhok, A. (1997). Cost, value and foreign market entry mode: The transaction and the firm. *Strategic management journal*, 39-61.

Marshall, A. (1920). Principles of Economics. *Macmillan*: London.

McCann, P., & Mudambi, R. (2005). Analytical differences in the economies of geography: the case of the multinational firm. *Environment and Planning*, *37*: 1857–1876.

Mencinger, J. (2003). Does foreign direct investment always enhance economic growth?. *Kyklos*, *56*(4), 491-508.

Mina, W. (2007). The location determinants of FDI in the GCC countries. *Journal of Multinational Financial Management*, *17*(4), 336-348.

Miskinis, A., & Byrka, M. (2014). The role of Investment Promotion Agencies in attracting Foreign Direct Investment. *Ekonomika*, *93*(4), 41-57.

Mohamed, S.E., & Sidiropoulos, M.G. (2010). Another look at the determinants of foreign direct investment in MENA countries: an empirical investigation. *Journal of Economic Development*, *35* (2), 75-95.

Neary, J. P. (2002). The road less travelled: Oligopoly and competition policy in general equilibrium.

Neary, J. P. (2003). Globalization and Market Structure. *Journal of the European Economic Association*, *1*, 245–271.

Neary, J. P. (2004). Cross-border mergers as instruments of comparative advantage. Discussion Paper No. 4325. *CEPR*.

Neuhaus, M. (2005). FDI: The growth engine in Central and Eastern Europe, *Deutsche Bank Research*, *26*.

Newburry, W., & Zeira, Y. (1997). Generic differences between equity international joint ventures (EIJVs), international acquisitions (IAs) and international greenfield investments (IGIs): Implications for parent companies. *Journal of World Business*, *32*(2), 87-102.

OECD. (2002, p.3). *Foreign Direct Investment for development. Maximising Benfitis, Minimising costs*. Paris: OECD. Available via: https://www.oecd.org/investment/investmentfordevelopment/1959815.pdf.

OECD. (2007, p.11). *Tax Effects on Foreign Direct Investment – No.17. Recent Evidence and Policy analysis*. Paris: OECD. Available via: https://www.oecd.org/investment/investmentfordevelopment/1959815.pdf.

OECD. (2008 p. 17). *Detailed Benchmark Definition of Foreign Direct Investment*. Paris: OECD, 4th ed. Available via: https://www.oecd.org/daf/inv/investmentstatisticsandanalysis/40193734.pdf.

UNCTAD (2017). *World Investment Rapport. – Investment and the digital economy*. Geneva: United Nations Publication.

Pike, A., Rodriguez-Pose, A., & Tomaney, J. (2006). *Local and regional development*. Routledge: London.

Py, L., & Hatem, F. (2009). Internationalisation et localisation des services: Une analyse sectorielle et fonctionnelle appliquée aux firmes multinationales en Europe. *Economie et statistique*, *426*(1), 67-95.

Rossi, S., & Volpin, P. F. (2004). Cross-country determinants of mergers and acquisitions. *Journal of Financial Economics*, *74*(2), 277-304.

Schneider F., & Frey B.S. (1985). Economic and political determinants of foreign direct investment", *World Development*, *13* (2), 161-175.

Seth, A., Song, K. P., & Pettit, R. (2000). Synergy, managerialism or hubris? An empirical examination of motives for foreign acquisitions of US firms. *Journal of international business studies*, *31*(3), 387-405.

Vissak, T., & Roolaht, T. (2005). The negative impact of foreign direct investment on the Estonian economy. *Problems of Economic Transition*, *48*(2), 43-66.

Wang, M. (2009a). Manufacturing FDI and economic growth: evidence from Asian economies. *Applied Economics*, *41* (8), 991-1002.

Wang, A. (2009b). The choice of market entry mode: cross-border M&A or greenfield investment. *International Journal of business and management*, *4*(5), 241.

Wang, M., & Wong, S. (2009). What Drives Economic Growth? The Case of Cross-Border M&A and Greenfield FDI Activities. *Kyklos*, *62*(2), 316-330.

Wei, T., & Simko, V. (2017). R package "corrplot": Visualization of a Correlation Matrix (Version 0.84). Available from https://github.com/taiyun/corrplot.

Wheeler, D., & Mody, A. (1992). International investment location decisions: The case of US firms. *Journal of international economics*, *33*(1-2), 57-76.

Wijeweera, A., & Dollery, B. (2009). Host country corruption level and Foreign Direct Investments inflows. *International Journal of Trade and Global Markets*, *2*(2), 168-178.

Woodward, D. P., (1992). Locational determinants of Japanese manufacturing start-ups in the United States. *Southern Economic Journal*, 690-708.

WTO. (1996). Foreign direct investment seen as primary motor of globalization, says WTO Director-General. *WTO Press Release*. *42*.

Tables:

Table 1: Distribution of investment projects by European MNCs for the period 2012- 2018 by country

Table 2: Differentiation manufacturing and service sector (NACE Rev. 2)

Table 3: Descriptive statistics for all variables

Table 4: Results number of greenfield investments

Table 5: Results number greenfield investments (Manufacturing & Service)

Table 6: Results number of M&A projects

Table 7: Results number of M&A projects (Manufacturing & Service)

Figures:

Figure 1: Distribution of FDI

Figure 2: Conceptual Model

Figure 3: Distribution of greenfield investments and M&A projects for the period 2012-2017

Figure 4: Pearson's r for NUTS 0 variables

Figure 5: Pearson's r for NUTS 3 variables

Appendix

Appendix I: Variable definition and source

Set of factors	Variable	Proxy	Territorial Units	Data (year)	Code
Dependent variables					
Foreign subsidiaries of MNCs	*Location decision of Greenfield projects*	*Number of Greenfield projects **	NUTS3	Amadeus (2012-2017)	-
		*Number of employees (greenfield projects)**	NUTS3	Amadeus (2012-2017)	-
	Location decision of Merge & Acquisition projects	*Number of M&A projects**	NUTS3	Amadeus (2012-2017)	-
		*Number of employees (M&As)**	NUTS3	Amadeus (2012-2017)	-
Explanatory variables					
Traditional location factors	*National market size*	*GDP per capita*	NUTS0	Eurostat (2015)	[med_ec1]
	Regional market size	*Regional GDP per capita at current price*	NUTS3	Eurostat (2015)	[nama_10r_ 3gdp]
	Regional market potential	*Regional GDP growth at current price (percentage change on previous year)*	NUTS3	Eurostat (2014/2015)	[nama_10r_ 3gdp]
	Regional (un-) employment	*Total Regional Employment per 1000 persons (age class: 15-74 years)**	NUTS3	Eurostat (2014)	[nama_10r_3e mpers]
	Labour costs	*Disposable income per capita*	NUTS2	Eurostat (2014)	[tgs00026]
	Population Density	*Inhabitants per km²*	NUTS3	Eurostat (2016)	[demo_r_ d3dens]
Innovation capabilities	*Human Capital*	*Participation rate in tertiary education (level 5-8; age class: 25-64 years)*	NUTS2	Eurostat (2015)	[edat_lfse_04]
	Regional innovative dynamism	*Patent applications to the EPO per million inhabitants*	NUTS3	Eurostat (2011)	[pat_ep_rtot]
		Instrumental R&D expenditure per inhabitant (in Euro)	NUTS 2	Eurostat (2013)	[rd_e_ger dreg]
	Regional productivity	*Gross Value Added**	NUTS3	Eurostat (2014)	[nama_10r_ 3gva]
Institutional factors	*Government corruption*	*Corruption Perception Index*	NUTS0	Transparency International (2017)	-
	Political Stability	*Political Stability and Absence of Violence/Terrorism Index*	NUTS0	World Bank (2016)	-
	Taxation	*Statutory corporate income tax rate*	NUTS0	ZWE (2017)	-
		Effective average tax rate	NUTS0	ZWE (2017)	-

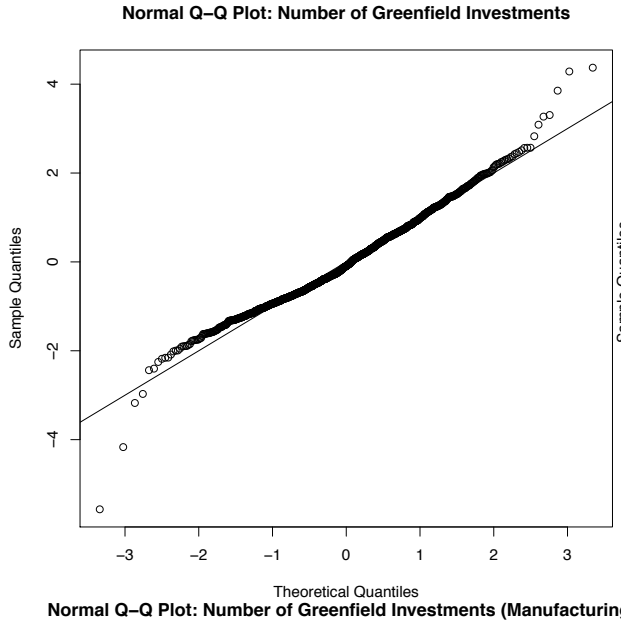
*Note: * = Variable specified for NACE Rev.2 classes (total, manufacturing and service sector)*

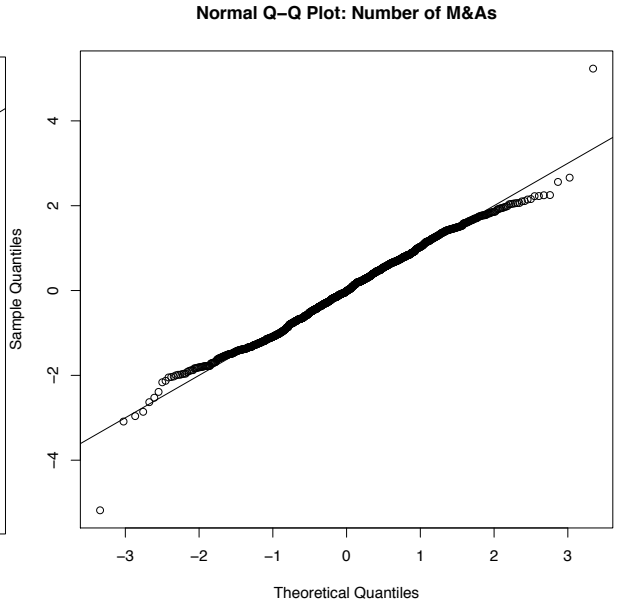
Appendix II: Distribution of NUTS 3 regions across countries

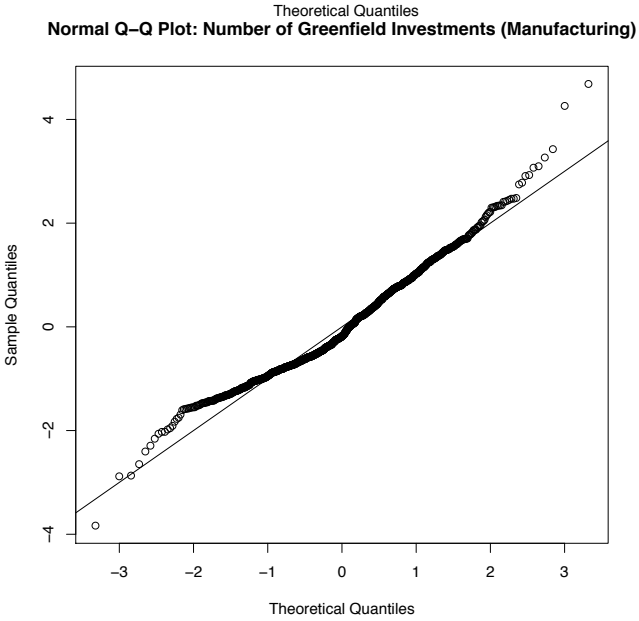
COUNTRY CODE (NUTS 0)	NUMBER OF OBSERVATIONS (NUTS 3)	TOTAL NUMBER OF NUTS 3 REGIONS (OFFICIAL)
AT	**35**	**35**
BE	**44**	**44**
BG	**28**	**28**
CY	1	1
CZ	**14**	**14**
DE	**374**	**402**
DK	**11**	**11**
EE	5	5
EL	47	52
ES	**59**	**59**
FI	**19**	**19**
FR	**101**	**101**
HR	**21**	**21**
HU	**20**	**20**
IE	8	8
IT	**110**	**110**
LT	**10**	**10**
LU	1	1
LV	6	6
MT	2	2
NL	**40**	**40**
PT	**23**	**25**
PL	**72**	**72**
RO	**42**	**42**
SE	**21**	**21**
SI	**12**	**12**
SK	8	8
UK	**148**	**173**
TOTAL	1280	1342

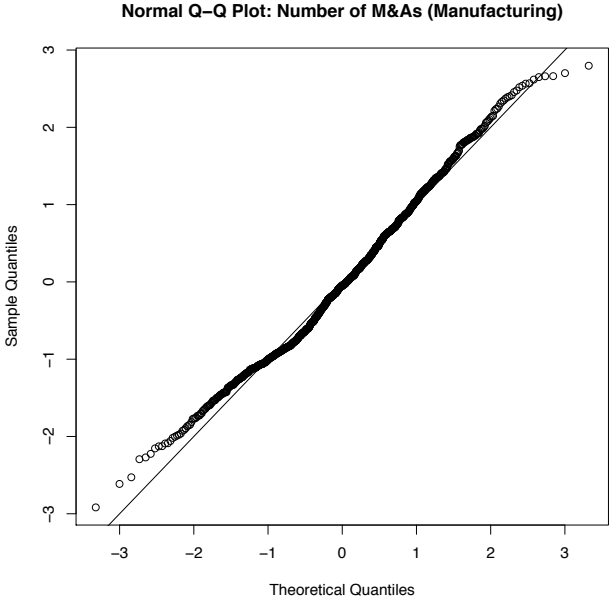
Note: *Countries included in the analyses are printed in bold*
Official numbers are provided by Eurostat (2015)

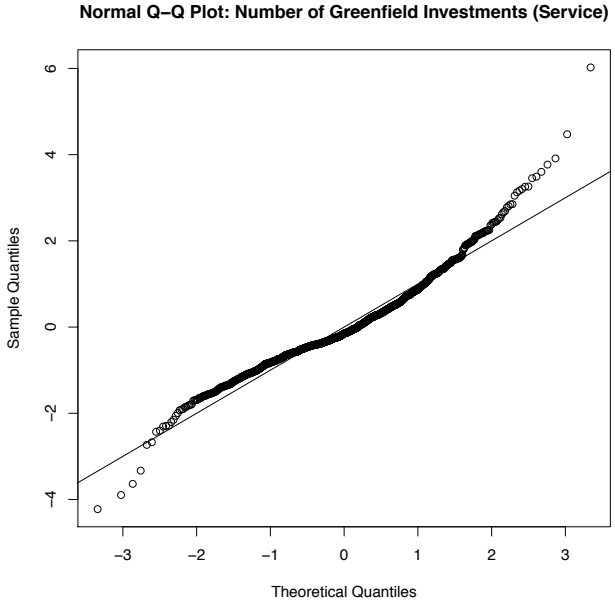
Appendix III: Linearity assumption

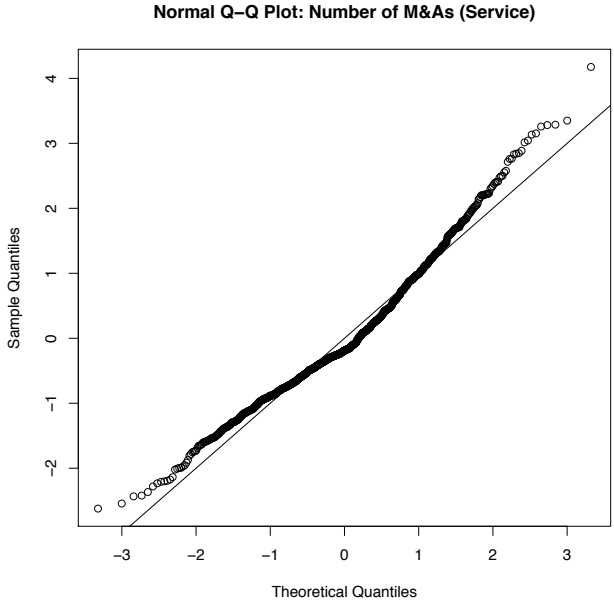




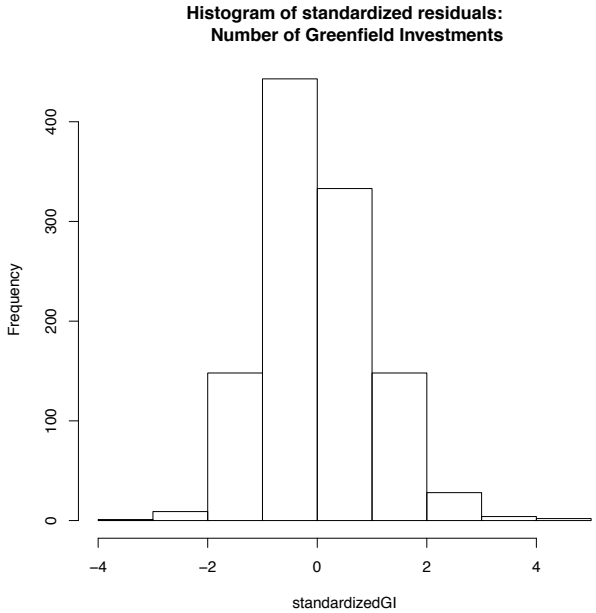


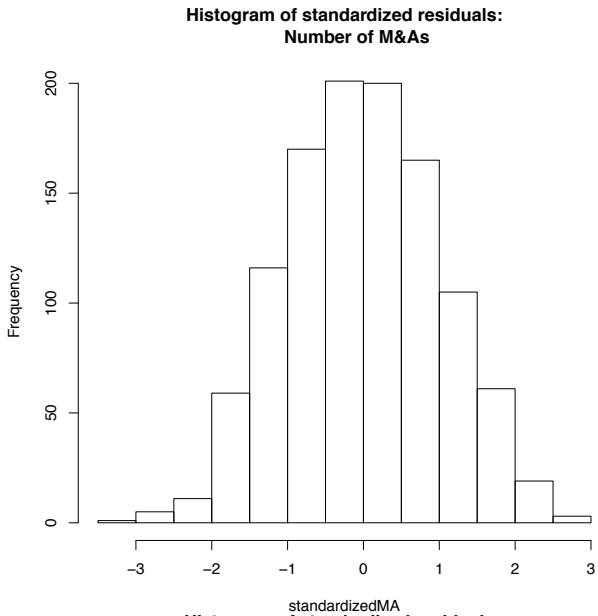


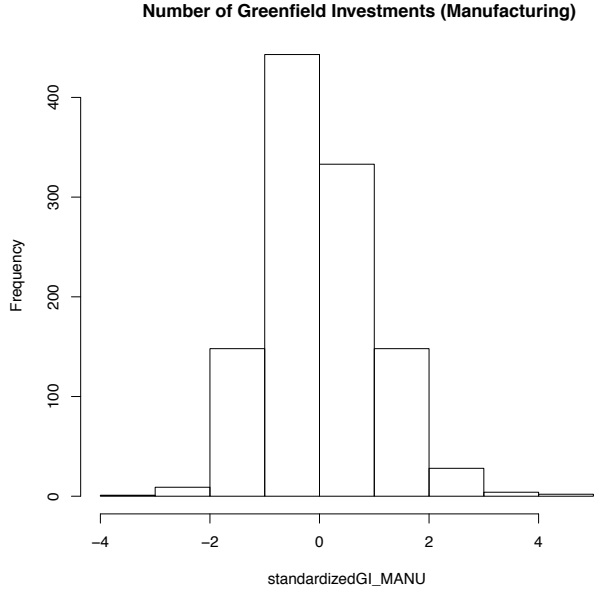


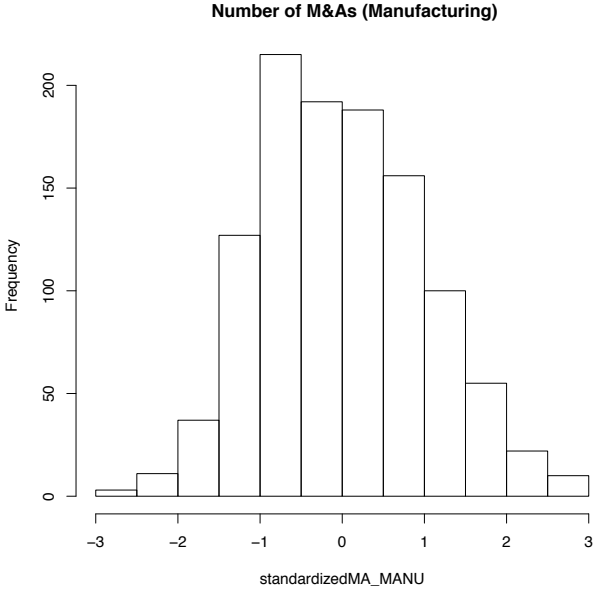


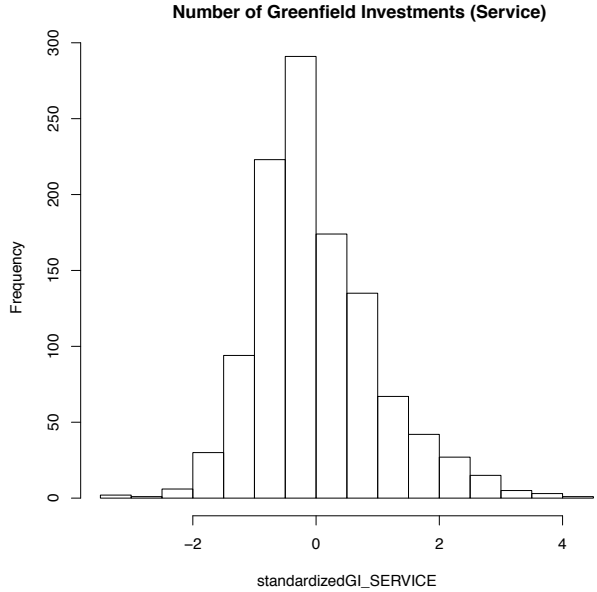
Appendix IV: Normal distribution of residuals

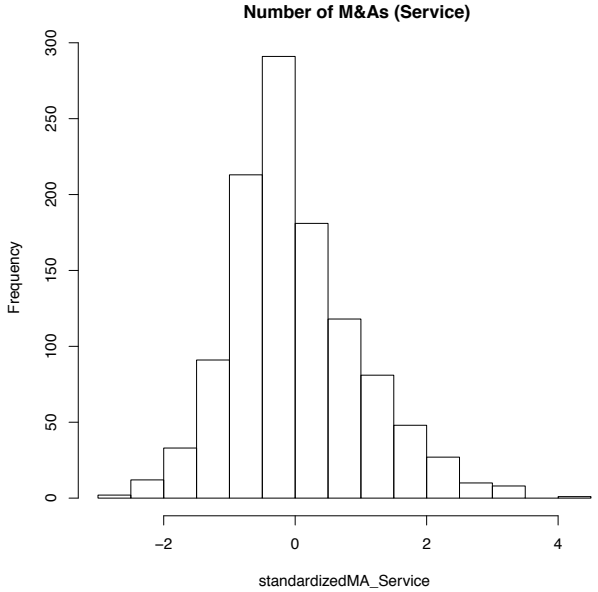




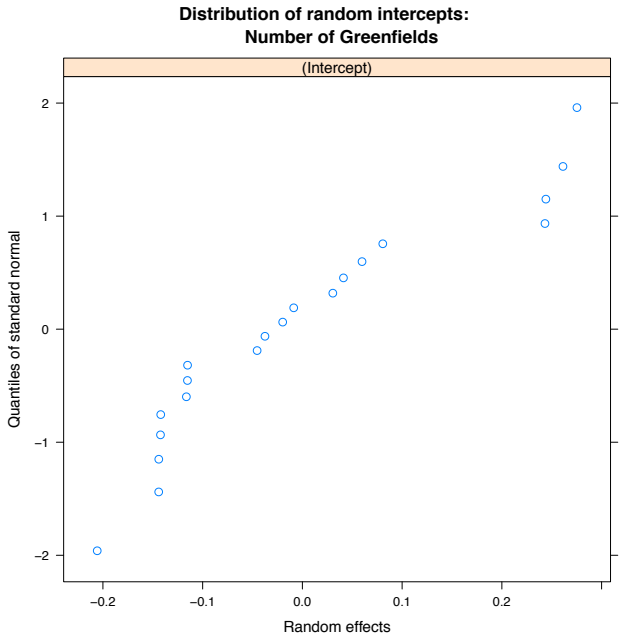


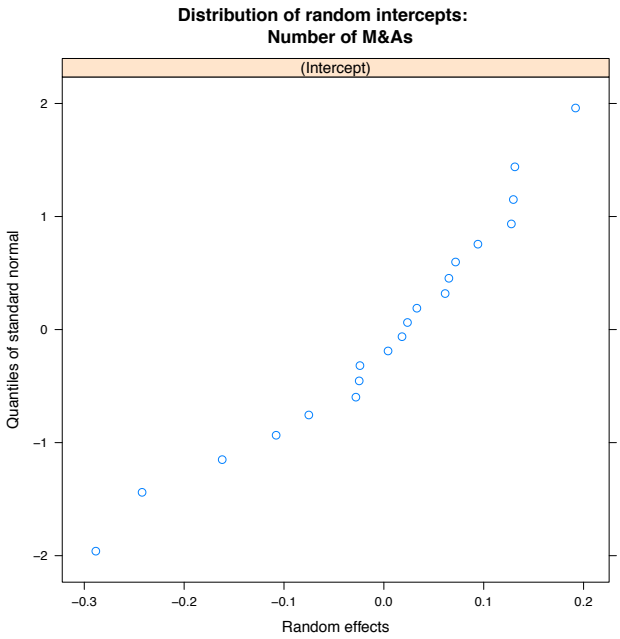


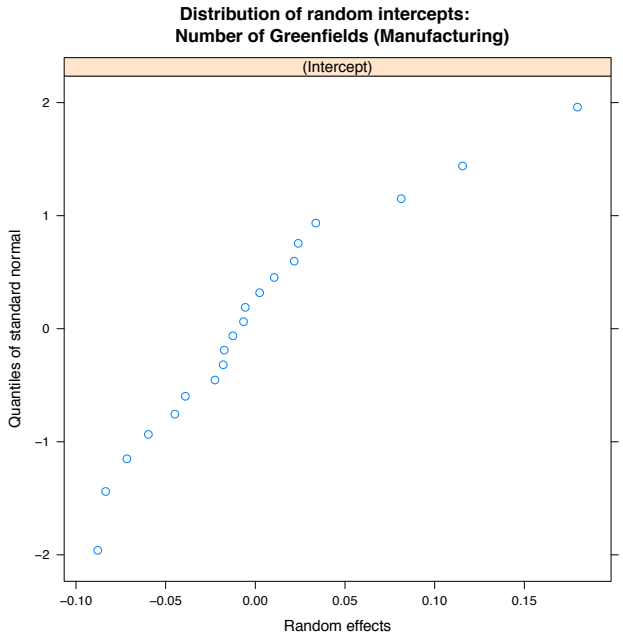


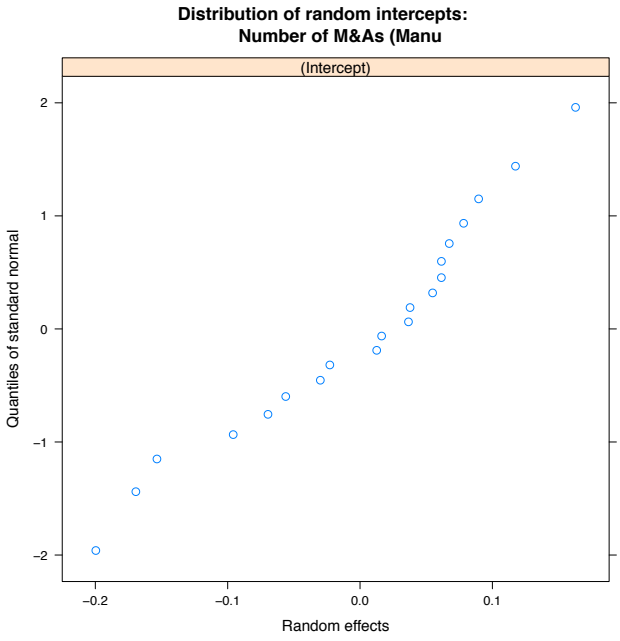


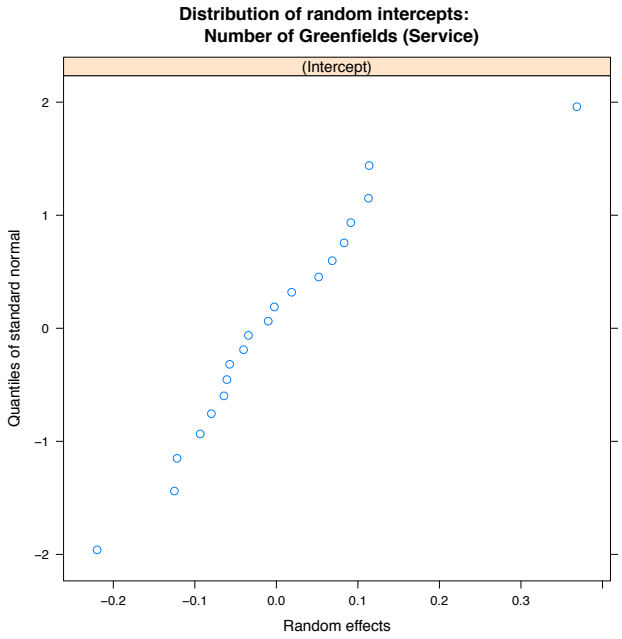
Appendix V: Normal distribution of random intercepts










Distribution of random intercepts:
Number of Greenfields (Service)
(Intercept)
Quantiles of standard normal
Random effects
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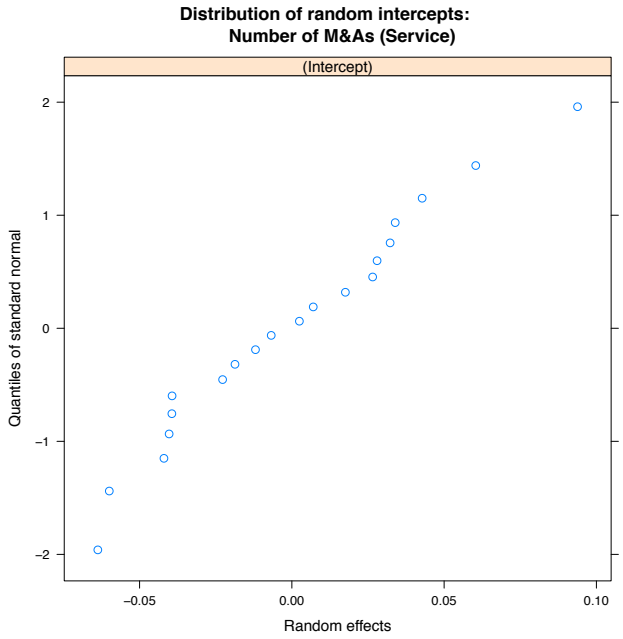
0
−1
−2
−0.2
−0.1
0.0
0.1
0.2
0.3


Distribution of random intercepts:
Number of M&As (Service)
(Intercept)
Quantiles of standard normal
Random effects
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−1
−2
−0.05
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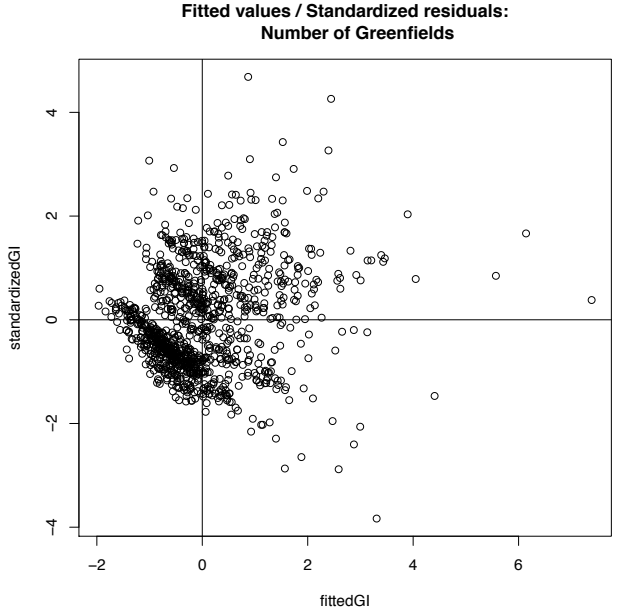
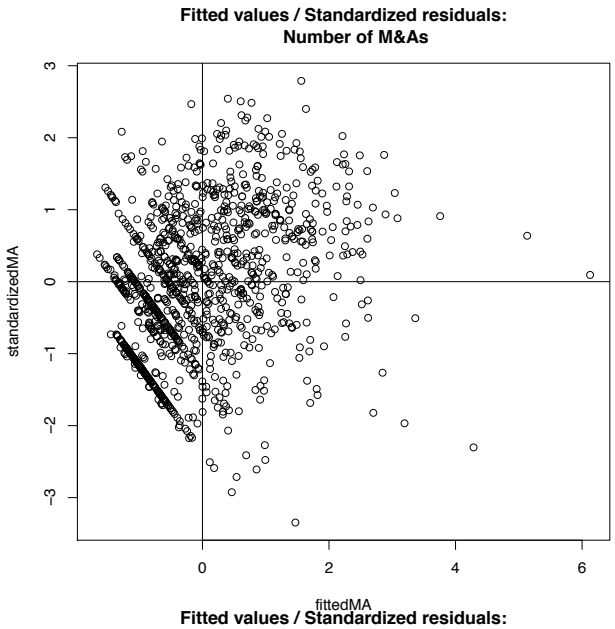
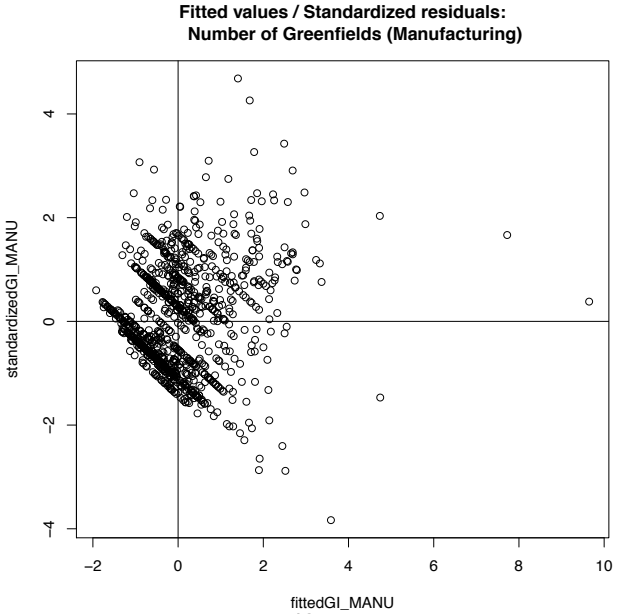
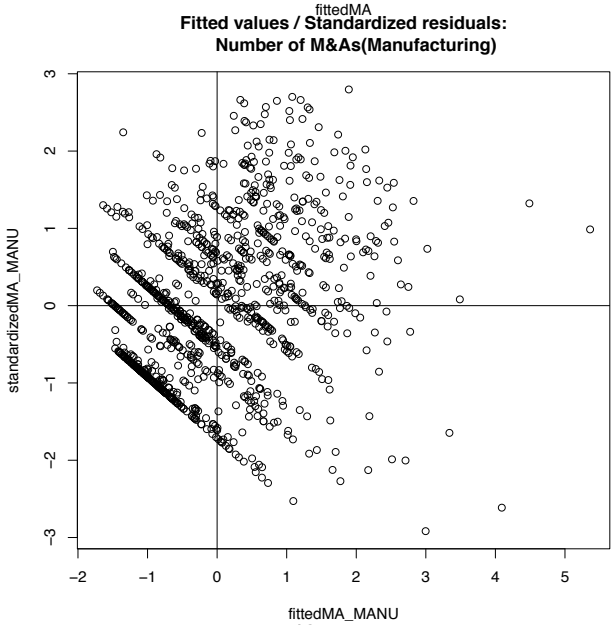
0.05
0.10

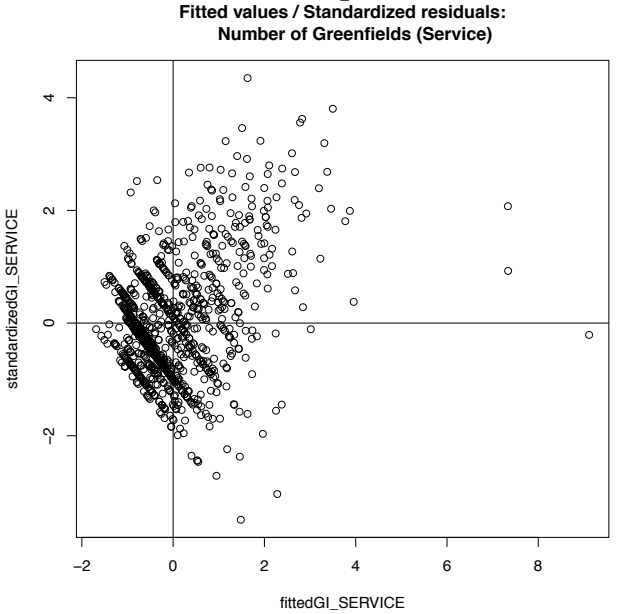
Appendix VI: Homogeneity assumption

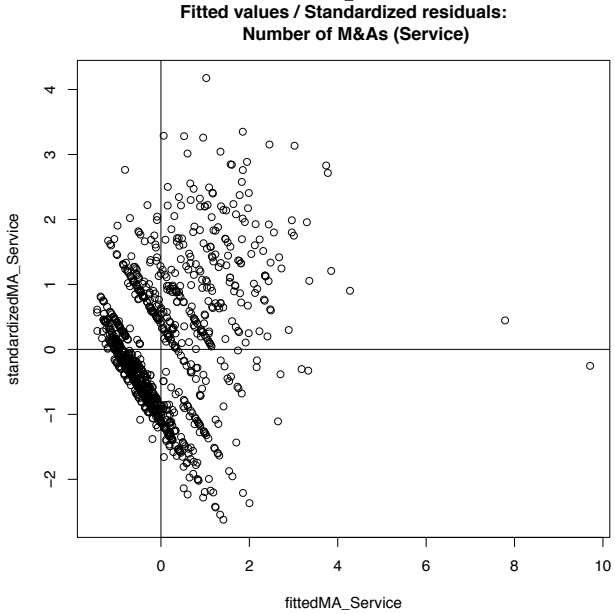












Appendix VII: Results nCOR

	Government Corruption		
	DV: NR_GI	**DV: GI_MANU**	**DV: GI_SERVICE**
Traditional determinants			
nGDP			
lGDP_PC	0.1006***	0.0754***	0.1073***
	(0.0122)	(0.0092)	(0.0110)
lGDP_GR	0.0022	0.0013	0.0008
	(0.0083)	(0.0064)	(0.0068)
lEMPL_ALL	0.2728***	0.1612***	0.2094***
	(0.0093)	(0.0071)	(0.0077)
rINC	0.0670**	0.0375	-0.0220
	(0.0254)	(0.0201)	(0.0240)
lPOP_DENS	0.0181	-0.0176*	0.0257**
	(0.0112)	(0.0086)	(0.0095)
Innovation capabilities			
rEDU	0.0666**	0.0104	0.0814***
	(0.0208)	(0.0157)	(0.0174)
rPAT_AP	0.0068		0.0270*
	(0.0156)		(0.0131)
rRNDEX	0.0040	-0.0120	-0.0019
	(0.0130)	(0.0101)	(0.0106)
rGVA_MANU		0.0298*	
		(0.0138)	
rGVA_SERVICE			0.0049
			(0.0146)
Insitutitional factors			
nPST	0.0089	0.0089	0.0045
	(0.0445)	(0.0255)	(0.0374)
nEATR	-0.1275*	-0.0591	-0.0554
	(0.0522)	(0.0303)	(0.0440)
nSCIT			
nCOR	0.0561	-0.0407	0.0711
	(0.0527)	(0.0309)	(0.0443)
Model statistics			
Num. obs.	1204	1204	1204
AIC	547.0775	-106.6770	68.9853
BIC	618.3852	-35.3693	145.3863
Log Likelihood	-259.5387	67.3385	-19.4926
Num. countries	20	20	20
σ^2_{u0}	0.0298	0.0090	0.0212
σ^2_e	0.0819	0.0477	0.0544

***p < 0.001, **p < 0.01, *p < 0.05 | σ^2 = variance, σ = covariance

	Government Corruption		
	DV: Nr_MA	**DV: MA_MANU**	**DV: MA_SERVICE**
Traditional factors			
nGDP			
lGDP_PC	0.0889***	0.0571***	0.0887***
	(0.0115)	(0.0101)	(0.0095)
lGDP_GR	0.0042	0.0077	-0.0056
	(0.0079)	(0.0070)	(0.0059)
lEMPL_ALL	0.2639***	0.1864***	0.1854***
	(0.0088)	(0.0078)	(0.0066)
rINC	0.0679**	0.0092	-0.0204
	(0.0240)	(0.0224)	(0.0193)
lPOP_DENS	-0.0089	-0.0367***	0.0145
	(0.0107)	(0.0094)	(0.0082)
rEDU	0.0219	0.0322	0.0656***
	(0.0196)	(0.0177)	(0.0135)
Innovation capabilities			
rPAT_AP	0.0092		0.0103
	(0.0148)		(0.0112)
rRNDEX	0.0158	-0.0227*	-0.0003
	(0.0123)	(0.0111)	(0.0090)
rGVA_MANU		0.0765***	
		(0.0152)	
rGVA_SERVICE			0.0012
			(0.0125)
Institutional factors			
nPST	-0.0398	-0.0055	-0.0123
	(0.0393)	(0.0322)	(0.0174)
nEATR	-0.1394**	-0.0682	-0.0446*
	(0.0462)	(0.0380)	(0.0211)
nSCIT			
nCOR	0.0654	-0.0152	0.0504*
	(0.0466)	(0.0386)	(0.0215)
Model statistics			
Num. obs.	1204	1204	1204
AIC	422.5927	117.2309	-285.5704
BIC	493.9003	188.5386	-209.1693
Log Likelihood	-197.2963	-44.6155	157.7852
Num. countries	20	20	20
σ^2_{u0}	0.0228	0.0151	0.0036
σ^2_e	0.0739	0.0573	0.0411

***p < 0.001, **p < 0.01, *p < 0.05 | σ^2 = variance, σ = covariance

Appendix VIII: Results regional Patent Intensity

	Regional Patent Intensity	
	DV: GI_MANU	**DV: MA_MANU**
Traditional determinants		
nGDP	-0.0368	-0.0047
	(0.0264)	(0.0357)
lGDP_PC	0.0751***	0.0573***
	(0.0093)	(0.0103)
lGDP_GR	0.0015	0.0079
	(0.0064)	(0.0070)
lEMPL_ALL	0.1615***	0.1860***
	(0.0071)	(0.0078)
rINC	0.0659***	0.0622**
	(0.0188)	(0.0213)
lPOP_DENS	-0.0205*	-0.0427***
	(0.0085)	(0.0095)
Innovation capabilities		
rEDU	-0.0001	0.0095
	(0.0149)	(0.0171)
rGVA_MANU		
rPAT_AP	-0.0090	0.0063
	(0.0119)	(0.0131)
rRNDEX	0.0029	0.0032
	(0.0098)	(0.0109)
Institutional factors		
nPST	0.0082	-0.0004
	(0.0229)	(0.0313)
nEATR	-0.0586	-0.0777
	(0.0306)	(0.0417)
Model statistics		
Num. obs.	1204	1204
AIC	-103.0250	142.6158
BIC	-31.7173	213.9234
Log Likelihood	65.5125	-57.3079
Num. countries	20	20
σ^2_{u0}	0.0082	0.0165
σ^2_e	0.0479	0.0585

***p < 0.001, **p < 0.01, *p < 0.05 | σ^2 = variance, σ = covariance