

**CHOICE OF LOCATION AND THE ROLES OF FOREIGN SUBSIDIARIES:
EVIDENCE FROM UK REGIONS**

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ABSTRACT

In this paper we investigate the location determinants of inward foreign direct investment (FDI) in the UK at a regional level. The paper focuses on a relatively under investigated field, that of the linkage between choice of regional location- within a particular host country- and subsidiary roles. The key contribution stemming from this analysis is that we provide, for the first time, detailed support of the location factors affecting distinctive types of subsidiaries. The external environment affects differently the two types of subsidiaries under investigation with agglomeration features playing the most significant role. At the same time idiosyncratic FDI factors do seem to play the most important role for both types of subsidiaries. Important policy implications are then raised, regarding the design of well-targeted FDI promoting policies aiming both at upgrading regional potential as well as specific sectors and companies.

Keywords: UK Regions, subsidiaries, agglomeration, location choice.

JEL Classification: F23, L20, R10

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1. INTRODUCTION

Foreign Direct Investment (FDI) and its agents i.e. Multinational Corporations (MNCs) are understood to play a major role in the economic development of nations through their impact on trade, their ability to generate jobs and to produce new knowledge through technological and managerial advances (UNCTC, 2003). At the same time, the contemporary MNC is a continuously evolving institution which influences and at the same time gets influenced by its external environment. This results in a more complicated and dynamic organization structure, which can deal more effectively with internal and external competitive pressures. Consequently, subsidiaries are not allocated necessarily *ad hoc* specific roles and a more decentralized approach to production structure becomes central to the strategic evolution of the MNE (Birkinshaw and Hood, 1998; Birkinshaw, 1996; Crookell and Morrison, 1990).

This paper focuses on an under investigated field, that of the linkages between choice of regional location- within a particular host country- and MNC subsidiary roles. In this paper we test for the location determinants of inward FDI in the UK at a regional level. Data is provided by 190 leading subsidiaries operating in the UK collected through a postal questionnaire survey conducted in 1994/1995.

Why then the UK? Despite the severe fall in global FDI in recent years (World Investment Report, 2003) the UK continued to be the most attractive European site of FDI followed by France, acquiring a 16% and 13% of the European market in 2001 (European Investment Monitor, 2002). In addition, since the early 1990s, the UK constitutes a distinctive case of FDI pro-active initiatives with the setting up 12 different investment development agencies for each one of its 12 regions (www.investuk-usa.com/locations). Each agency aims at both upgrading and promoting its own region's potential and quality in bringing in appealing foreign investment projects that will boost the regions' prospects of growth. Indicative are the examples of Wales with the "Welsh Development Agency" which declares the existence of more than 450 subsidiaries of MNCs, "Northern Ireland" priding in the

243 foreign companies operating in Northern Ireland, “One North East” stating that over 500 foreign subsidiaries are located in North East or the “Scottish Development Agency” referring to their 1,500 strong inward investors.

The rest of the paper is organized as follows: In section two the theoretical background and hypotheses are developed, followed by section three which begins with the description of the dataset, then analyses the econometric methodology and finally it explains the empirical model formulation. Econometric results are discussed in section four and we conclude in section five.

2. THEORETICAL BACKGROUND AND HYPOTHESES

As emphasized by Dunning (2003, p.46) “there is a renewed interest in the spatial aspects of FDI: and how these affect both the competitive advantages of firms and modes of entry into, and expansion in, foreign markets”. He states two major reasons for this: Firstly, the changing extent, character and geography of MNC activity in the *1980s and 1990s* and secondly the emergence “of new research agendas of economic geographers, trade theorists and international political economists” that seek to incorporate into mainstream thinking the role of MNCs in determining “the economic structure and dynamic comparative advantage of regions and countries”.

2.1 CONCEPTUAL FRAMEWORK AND RELATED LITERATURE REVIEW

In particular, “New Economic Geography” (NEG) postulates a number of hypotheses about the location of MNCs (Krugman, 1991; Krugman and Venables, 1995). Inspired by Marshall’s seminal analysis (1890/1916) NEG theorists argue that specific industries are expected to become geographically concentrated and specific countries seem to be advantageous in attracting foreign activities within their grounds. According to Ottaviano (2003) the innovation of NEG lies in the fact that it explains the choice of location on microeconomic parameters and thus it has combined the existence of scale economies, strong market power, the flexibility in the mobility of customers and suppliers and the persistence of low trade costs. All these factors can explain the agglomeration of firms in one location (Venables, 1996; Markusen and Venables, 1998; Fujita et al., 2001).

Whilst the essence of agglomeration is central to NEG theoretical models, in the empirical literature there is only a limited number of studies³ examining the influence

of NEG predictions. Most of the relevant empirical literature analyzes the determinants of industrial activity, with a particular emphasis on firms' clustering, at a national level (Wheeler and Mody, 1992; Devereux and Griffith, 1998). Nevertheless, there are a few exemptions that deal with thinner geographical analyses within countries (see Carlton, 1983; Friedman *et al.*, 1992). Head *et al.* (1995) examine Japanese manufacturing investments in the US and provide at the same time a map of their geographical distribution among the states. Guimaraes *et al.* (2000) present a spatial distribution of FDI start-ups in Portuguese concelhos. Crozet *et al.*, (2002) maps location choices by foreign investors in France focusing especially on agglomeration effects and on the impact of French and European regional policies. Whilst the agglomeration hypothesis is strongly supported, investment incentives do not seem to have raised the attractiveness of French regions. Recent work by Driffield and Hughes (2003) examines the impact of FDI and domestic investment on regional development in the UK. Their findings show on one hand that foreign firms purchase less locally than domestic firms. On the other hand they confirm that the higher labor productivity of foreign companies has greater spillover effects to indirect employment in the region compared to domestic investment. Undoubtedly, this line of literature provides an important insight on key issues related to FDI determinants at a regional level. Still an important aspect of analysis, that of the "nature of relationship between the subsidiary and its host country environment" remains uninvestigated (Birkinshaw, 1998, p. 269). In this context pioneering is a paper by Young, Hood and Peters in 1994 where they synthesize different strands of literature and "present conclusions on the potential role of MNCs in regional economic development" incorporating in their analysis the roles of subsidiaries. In a similar manner, Malmberg *et al.* (1996, p. 86) bring together "theory from economic geography and international business and strategy to address the phenomena of spatial clustering, accumulation of knowledge in local milieu and firm competitiveness". A number of authors (from the discipline of strategic management and international management in particular) have derived different typologies in order to classify subsidiary development and roles (see Rugman and Bennett, 1982; Poynter and Rugman, 1982; White and Poynter, 1984; Bartlett and Ghoshal, 1986; Birkinshaw and Hood, 2000; Taggart, 1997; Birkinshaw and Morrison, 1996; Pearce, 1995; Crookell and Morrison 1990; Papanastassiou and Pearce, 1999; Holm and Petersen, 2000). The evolution of the literature on the roles of subsidiaries has extended our understanding on the

importance of two factors that shape these roles, i.e., factors related to the external environment of the subsidiary and factors related to the internal environment of the MNE network (Birkinshaw et al., 1998; Birkinshaw et al., 2002)¹. In regards to the first issue, Porter's contribution is seminal through his acknowledgement of the fact that innovative activities will tend to cluster in certain geographical areas (Porter 1990; Hakanson and Nobel, 2001). We should not also neglect how decisively Bartlett and Ghoshal (1989) highlight the strategic importance of the local market both in terms of market size and quality of resources. Young et al. (1994, p.669) (building on Porter) put forward the proposition that regions should also upgrade their factor conditions as well as the other three dimensions of Porter's *diamond* in their pursuit of a larger share in qualitative FDI. Malmberg et al. (1996) equally underline the importance of the conditions of the immediate (in terms of proximity) external environment on a firm's performance and development. Recent work on "embeddedness" also places emphasis on the characteristics of the external environment hosting the subsidiary (Hakanson and Nobel, 2001). Although from a different direction, Brand et al. (2000) and Andersson and Forsgren (2000) stress the importance -for the development of the local subsidiary as well as the of the MNE group - of the realization of linkages with the local business environment. Thus, there are many cases of subsidiaries that perform specific value -added activities, which are fundamentally "embedded" in their respective host- countries production systems (evidence is provided by; Kuemmerle, 1999; Dunning, 1996; Cantwell, 1995; Jarillo and Martinez, 1990). Benito et al. (2003, p.445) state that "The host country's location advantage plays an important role in determining the level of competence of a subsidiary". They further elaborate their argument by linking the level of subsidiary competence to the quality of location characteristics and they continue by arguing that FDI in high-value added activities tends to be "sticky" endorsing in this way the significance of embeddedness.

Synthesizing on this background the purpose of this paper is: Firstly, to test for these regional characteristics that determine the choice of location of subsidiaries in distinctive UK regions. Secondly, to detect potential differences in the choice between different types of subsidiaries according to their level of competences and

¹ However, we should not ignore and forget pioneering work by Hymer (1976), Vernon (1966), Casson and Buckley (1976), Dunning (1993), Hedlund (1981) in the analysis of FDI.

formal mandate. Here, in this paper, we adopt a typology emerging from White and Poynter (1984) and we distinguish among three major subsidiary roles:

Truncated Miniature Replicas (TMRs) which tend to produce well established final products already existing in the MNE group value chain. In the literature we have also identified “implementers” or “branch factories” as the subsidiaries with relatively low competences that their main task is to implement the groups existing and already shaped strategy (Bartlett and Ghoshal, 1986; Ghoshal and Nohria, 1993; Young et al. 1994; Taggart and Hood, 1999). Rationalized Product Subsidiaries (RPS) involved in the production of intermediate goods. Finally, World Product Mandates (WPM) are assigned with the introduction of innovative products and thus expand the product line of the MNE group. These are, thus, innovative subsidiaries with a high level of competences and correspond to “strategic leaders” (Bartlett and Ghoshal, 1986; “centers of excellence” (Andersson and Forsgren, 2000); “global innovators” (Gupta and Govindarajan, 1991; see also Rugman and Verbeke (2001) for a thorough discussion on the internal patterns of competences creation in MNC groups). Finally, we introduce an additional form of TMR that has a more specialized- narrow product mandate, i.e. a Specialized Miniature Replica (SMR) and is related to horizontal integration (Papanastassiou and Pearce, 1999; Venables, 1999). In concluding, we quote Birkinshaw et al (1998) who clearly state that “ While there is no shortage of typologies suggesting that subsidiaries vary in their contributory role,...., there is no definitive evidence for the sources of such variation (p. 222)”.

2.2 HYPOTHESES FORMULATION

Acknowledging the fact that there is insufficient empirical evidence on the effect of “environmental determinism”, in particular, on the observed variation of roles of subsidiaries (Ottaviano, 2003; Neary, 2001; Birkinshaw and Hood, 2000) the key contribution coming out of this analysis is that we document empirically location factors, at a narrow regional level, such as large market size, Research and Development (R&D) intensity, skilled labor, infrastructure, etc. that are tentatively of great importance for MNCs’ strategic location decisions. In what follows and building on *Porter’s diamond* (though not exhausting it) we provide an explicit argumentation on the selection of the location attributes tested in this paper:

1. *Market size*- More specifically, Gross Value Added (GVA) measures the contribution to the economy of each producer, industry or sector in the United Kingdom. We apply GVA as a direct indication of the regions' genuine supply potential excluding in this way government intervention that is incorporated in Gross Domestic Product (GDP)². *Gross domestic product* is the most pervasive depiction of Market Seeking behaviour in previous studies of the determinants of FDI at a national level (Braunerhjelm and Svenson, 1996; Wheeler and Mody, 1992; Veugelers, 1991). In addition an indirect supplement, suggests that the larger is a national market the less likely it is that economies of scale will be lost in local production. In our case we investigate the impact of market size at a narrow regional level. We would thus expect that the supply side interpretation of GVA will prevail in this sort of analysis. At the same time and building on the concept of "congestion" and "negative externalities" a large regional market may act as a disincentive to foreign producers due to high rents and thus discourage establishment in particular for TMRs which are more cost sensitive. Following this, a positive relationship is expected between GVA and location choice of a WPM and a negative for TMRs.

Hypothesis1: A large regional market will make the region more attractive location choice for a subsidiary and in particular for WPMs and may act as a disincentive for TMRs..

2. *Sophistication of local demand*- High purchasing power is a well-established determinant in the relevant literature, as it indicates potentially sophisticated consumer preferences and, thus, advanced level of development. Holm et al. (2003) apply- in their analysis of foreign subsidiaries operating in Sweden- an indicator termed "pressure from subsidiary's customers" as a dimension of dynamism exhibiting the local environment. The gross domestic product per capita is incorporated (GDPPPI) in the model and is expected to affect positively on MNCs' decision for the establishment of their subsidiaries, especially in the WPM sub-sample.

²The link between GVA and GDP can be defined as GVA (at current basic prices; available by industry only) plus taxes on products (available at whole economy level only) less subsidies on products

Hypothesis 2: The more sophisticated the demand conditions in a region the more increased the probability to set a subsidiary and in particular a WPM.

3. *Labor Costs* - Taking advantage of endowment availability is of a major concern to investors who require a set of primary inputs in order to operate with labour being the most important one. Wage considerations would, thus, impulse on investors' choices within the framework of profit maximization. Bernard et al. (2003) showed that the relative wages variation across regions of the UK resulted in different "sets" of manufacturing industries. As a purely cost captivating factor, regional compensation of employees (CET) is used and we expect a negative relationship with the choice of localizing FDI. This effect should be reinforced for TMRs whilst it could be positive for WPMs. In this latter case it should reflect analogous sophisticated skills.

Hypothesis 3: The lower the labour costs in a region the higher the probability to set up a foreign subsidiary and in particular a TMR.

4. *Local Infrastructure* – A basic prerequisite for establishing a production plant anywhere is the existence of a minimum level of physical infrastructure in order to facilitate production, transportation and distribution of both final goods and inputs. Mariotti and Piscitello (2001) distinguish between "generalized capabilities" of an area that includes the area's infrastructure and "specialized capabilities" which incorporate knowledge and skills available in the area. In their analysis of the impact on the local environment on the internationalization choices of Italian SMEs as a proxy for generalized capabilities they apply road and transport infrastructure. A similar variable is applied in this analysis i.e. road availability and highways (TNM), and we expect a positive effect.

Hypothesis 4: The stronger the local infrastructure in a region the higher the probability to set up a subsidiary regardless of role.

5. *Technological capabilities* – The need for upgraded and elaborated products, inputs and processes, stemming from intense technological competition induces investors to

(available at whole economy level only) equals GDP (at current market prices; available at whole

seek for environments well endowed with knowledge ‘infrastructure’ (Hakanson and Nobel, 2001). BASICRES indicates the commitment of the region to upgrade the human capital potential. At the same time, the existence of strong research communities (universities, research centers, institutions etc.) acts as a centripetal force to knowledge-seeking investors and, hence, a positive sign is expected in particular for WPMs. A similar approach is also followed by Mariotti and Piscitello (2001) whilst Holm et al. (2003) assess the degree to which the subsidiary has access to skillful personnel.

Hypothesis 5: The more committed a region to R&D the higher the probability to set a foreign subsidiary and in particular a WPM.

6. *Technological performance* – Within the framework of increased global competition, innovative activities play a crucial role to MNEs’ decisions. To capture regional innovativeness and thus, competitiveness, we use the number of European patent applications (EPA) registered in the respective region. Bottazzi and Peri (2003) capture the effect of research-generated externalities among European regions by applying regional patent data. This could act in both directions depending on how investors view competition. If the main interest were to be near leading firms (oligopolistic reaction, ‘following the leader’ effect- Knickerbocker), then a positive sign would be obtained. On the other hand, intense competition crowds out investors under the fear of retaliation, ie., price – wage wars. In such a case, a negative impact would be expected.

Hypothesis 6: The more competitive the region in technological performance the higher the probability to set up a subsidiary and in particular a WPM.

7. *Regional suitability* – Agglomeration of firms belonging to the same sector has now been well-documented evidence in related bibliography (Porter, 1990). Maskell and Malmberg, (1999, p.175) argue that: “A geographical agglomeration of firms within a given business sector in a region will make the region especially suited to meet the specific location requirements of the firms within the region. Even assuming that a new firm or an incumbent is completely free in its choice of location, the optimal location would usually be a region with long track record of servicing firms in just that

economy level only).

sector: only such a region has had the opportunity to develop the desired capabilities”. Building on the aforementioned argument we measured the suitability of a region with two indicators: Firstly, with the number of previously established MNE subsidiaries belonging to the same sector locally (AGGLOMSE). Benito et al. (2003) also include in their analysis a variable called CLUSTER to capture whether a subsidiary operates in an industry with cluster characteristics. Secondly, the presence of same nationality firms traditionally represents a major concentrating factor (cultural), as investors tend to ‘believe’ in their country-mates decisions. Accordingly, the number of already present subsidiaries originating from the same country (AGGLOMHO) may enhance regional choice. The importance of foreign presence in a host economy was estimated by Birkinshaw and Hood (2000) in their analysis of foreign owned subsidiaries in Canada, Sweden and Scotland. The authors measured foreign presence in terms of foreign assets and turnover. Holt et al (2003) discuss, in the choice of location of regional headquarters, “home- country conditions”.

Hypothesis 7: The stronger the existing foreign presence(in terms of industrial and home country clusters) in the region (as an indicator of suitability) the higher the probability to attract foreign subsidiaries irrespectively of their role.

3. SAMPLE DESCRIPTION AND ECONOMETRIC SPECIFICATION

3.1 Data collection and descriptive statistics

The analysis of the present study is based on a questionnaire sent out to 812 UK subsidiaries in 1994-1995. Firms were extracted from the International Directory of Corporate Affiliations (1992). The broad purpose of the survey was to investigate various aspects of the positioning of R&D in the activity of subsidiaries of foreign MNEs operating in the UK. The sampling process aimed at subsidiaries with parent-companies enlisted in Fortune 500. Respondents amounted to 189, which represents 23.3% of total number of questionnaires sent out. Our sample is an accurate representative of UK FDI sectoral distribution as it is compatible with aggregated inward FDI data (www.statistics.gov.uk)³.

³ The only sector that it is not represented in our sample is Textiles which is the second major recipient of inward investment.

Regional breakdown of the UK was based on common classification of UK National Statistics, however, for simplicity, we merged some of the neighbouring regions, and we resulted in seven broad regions, namely, London and Home Counties, Midlands, Northern Ireland, North, Scotland, South and Wales. Regional data were obtained from various issues of the “Regional Statistical Yearbook” published by Eurostat.

An illuminating picture in regards to the location of foreign subsidiaries within the boundaries of the seven UK regions is provided in Figure 1 where we map total foreign activity. Not surprisingly, London and the Home-Counties gather the majority of subsidiaries, followed by Midlands and North. The least populated –in terms of subsidiaries- region is Northern Ireland, whilst South, although located very close to London, is the second least preferable region.

Insert Figure 1 here

Of much interest was to classify subsidiaries locally by their origin, i.e., whether they come from Europe, America, or the Pacific Rim. London and the Home Counties seem to be dominated by American firms whereas European firms turn out to prefer “North”.

Insert Figure 2 here

Finally, a sectoral distribution is provided by Figure 3. For better and clearer presentation, we aggregated them into high-tech and medium-tech, in order to be able to detect any differences in their location patterns. A considerable number of high-tech MNCs is located around the London area, whilst medium-tech subsidiaries are found mostly in “North”. (An analytical breakdown of UK regions may be found in Table 1 of Appendix I. The exact distribution of subsidiaries of our sample can be found in Tables 1-3 in Appendix II. Table 4 in Appendix II provides an aggregate distribution of firms by sector and region of origin).

Insert Figure 3 here

3.2 Econometric methodology and model specification

In this paper we adopt the econometric methodology developed by Crozet et al., (2002) and Head et al., (1999) and Friedman et al., (1992). Thus, the present model assumes that investors maximize an intertemporal profit function subject to uncertainty in regards to location selection once they have already decided to build a manufacturing plant in the U.K. The profit function consists of a deterministic part typically called the attributes of the choices and a random component arising from maximization errors, other unobserved characteristics of choices or measurement errors in the exogenous variables. Hence, the profit function of an investor i , locating in region j may be written in the following form:

$$U_{ij} = \ln X_{i1} + \ln X_{i2} + \dots + \ln X_{im} + e_{ij} \quad (3.1)$$

where $U_{ij} = (\ln X_{i1}, \ln X_{i2}, \dots, \ln X_{im})$ with X_{im} representing a set of m observable characteristics of alternative locations i , and e_{ij} is a random variable associated with unobserved location attributes potentially influential to investor's choice. Investor i will choose to locate in region j (and continue to operate there afterwards), rather than choosing location k , if the following expression holds:

$$U_{ij} > U_{ik}, \forall k, k \neq j \quad (3.2)$$

Since the profit function contains a stochastic part, the probability that location j is selected among alternative choices by investor i may be then defined as:

$$P_{ij} = \text{Prob}(U_{ij} > U_{ik}), \forall k, k \neq j \quad (3.3)$$

Under the assumption that the j disturbances are independent and identically distributed with Weibull distribution, the probability takes the following form (McFadden, 1984):

$$P_{ij} = \frac{e^{U_{ij}}}{\sum_{k=1}^n e^{U_{ik}}} \quad (3.4)$$

This is the conditional logit model or McFadden's choice model. Using equation (3.4) and assuming that U_{ij} is a linear combination of the explanatory variables, estimation of relevant coefficients is obtained using maximum likelihood. To further test the validity of our results, we performed a test for controlling the Independence of Irrelevant Alternatives (IIA) property. This property states that the ratio of probabilities of choosing two locations, P_j / P_k , is independent of the characteristics of

any third location, or, in other words, the choices must be equally substitutable to investors. (See Table 2 in Appendix III.)

From the aforementioned analysis, it is evident that we model the probability of a plant's location in any given region at period t as a function of a set of explanatory variables related to the choice variable. In this case the choice reflects one of the 7 UK regions.⁴ We then formulated 2 models:

In the basic model, we test solely for location choices attributed to regional characteristics for the whole sample and take the following form:

$$choice_{ji} = \beta_1 GVA_i + \beta_2 GDPPI_i + \beta_3 CET_i + \beta_4 TNM_i + \beta_5 EPA_i + \beta_6 BASICRES_i \quad (1)$$

where $choice_{ji}$ corresponds to the choice of region i by subsidiary j.

An augmented version of the above, detects idiosyncratic agglomeration patterns both in terms of country of origin and in terms of sectoral orientation. Thus, the specification becomes:

$$choice_{ji} = \beta_1 GVA_i + \beta_2 GDPC_i + \beta_3 CET_i + \beta_4 TNM_i + \beta_5 EPA_i + \beta_6 BASICRES_i + \beta_7 AGGLOMHO_i + \beta_8 AGGLOMSE_i \quad (2)$$

where $choice_{ji}$ corresponds to the choice of region i by subsidiary j. (A detailed presentation of variables in terms of descriptive statistics and their sources can be found in Appendix III). Information on AGGLOSE and AGGLOHO was extracted from the survey.

Furthermore, the two models were tested for two distinctive sub-samples accounting for the roles of subsidiaries. Data on the roles were extracted from the questionnaire survey. In order to classify subsidiaries by their role respondents in the survey were asked the following question:

Please grade each of the following roles in terms of their importance in your operations as:

(4) our only role.

⁴ The specification of the McFadden technique does not allow to use attributes not associated with the dependent variable. Thus, incorporation of subsidiary level characteristics turns the model unspecified.

(3) our predominant role.

(2) a secondary role.

(1) not a part of our role.

- (a) to produce for the UK market products that are already established in our MNE group's product range -TMR.**
- (b) to play a role in the MNE group's European supply network by specialising in the production and export of part of the established product range- SMR.**
- (c) to play a role in the MNE group's European supply network by producing and exporting component parts for assembly elsewhere -RPS.**
- (d) to develop, produce and market for the UK and/or European (or wider) markets, new products additional to the MNE group's existing range- WPM.**

One sub- sample contains information on TMRs and SMRs (merged together) and the other on WPMs. We limited the number of samples to the two roles of subsidiaries that are involved in the production of final goods for reasons of comparability i.e. in order to test directly subsidiaries with low and high competences as developed by Birkinshaw and Hood (2000) and Benito et al (2003).

4. ECONOMETRIC RESULTS AND INTERPRETATION

Results on various models are presented in tables 1 and 2. Due to detected high correlation among certain variables we orthogonalised variables GVA,CET, TNM and EPA to avoid problems associated with multicollinearity and spurious regression (Greene, 2002). The correlation table and eigenvalues can be found in Appendix III.

Insert Table 1 and 2 here.

In table 1 we provide evidence on the significance of regional factors that affect the presence of MNC subsidiaries for the complete sample for both models. As it can be seen in table 1 and according to our hypotheses, GDPPI, which represents demand conditions, acts as a stimulus to the choice of location. On the other hand GVA, which measures the market size of the regions has no impact on the decision to set up

a production facility to the region. At the same time the strong negative sign on wages (CET) suggests that conditions in the local labour market have a strong impact on the decision to invest and is obvious that lower wages encourages FDI. Basic or general infrastructure also has a positive impact whilst only one of our two variables capturing specialized conditions i.e. BASICRES turns out to be statistically significant. The positive sign underlines that R&D potential of the region acts as a strong agglomerative factor. Related results are obtained by Mariotti and Piscitello (2001) who find strong evidence on those variables that create a “marshallian atmosphere” in particular areas in Italy. Hansen, (1987) provided evidence of the role played by both factor inputs and agglomeration economies in the interurban location behavior of 360 branch and transfer plants in Sao Paolo, Brazil. Similarly, Henderson and Kuncoro, (1996) suggest that firm location decisions respond to typical market variables as well as to existence of local historical industrial environment in order to benefit from the built-up stock of local information in regards to institutions, linkages and technology, in Java, Indonesia.

When we add the two idiosyncratic agglomeration factors, i.e., AGGLOMSEC and AGGLOMHO (Model 2), our results remain significant with these new variables playing the most important role, suggesting that the presence of other subsidiaries of the same sector and nationality respectively acts as a major attractive force to investors (both are statistically positive at 1%). A Bayesian Information Criterion (BIC) was estimated in order to test the additive explanatory power of the two idiosyncratic variables. The difference of 24.35 in BIC provides very strong support for the augmented model. Head and Ries, (1996) and Cheng and Kwan (2000) with work on Chinese regions confirmed the self-reinforcing effect of FDI on itself. However, Holm et al (2003, p.400) found that their measurement of “subsidiary impact on the local economy” (i.e. subsidiary functioning as an actor attracting new investments to the local economy) did not prove that influential. Benito et al (2003) provided support for their EU-Member variable and not for their cluster variable.

In table 2 we distinguish between the two different subsidiary roles. Results in table 2 support the argument that different roles of subsidiaries have different priorities in regards to what they will take into consideration once they decide to select a location. The LR $\chi^2 = 131,8$ ($\text{prob} > \chi^2 = 0,000$) confirms that the two basic models for

WPMs and TMRs respectively are statistically different⁵. Thus, more independent subsidiaries, with more advanced competences seem to rely less on the local environment i.e. WPMs. This result contradicts previous findings by Holm et al (2003) that support a positive link between a subsidiary's environment and its competences. One possible explanation for that is that the majority of previous studies on the roles of subsidiaries and local economy characteristics are conducted at a national level. In our case, the breakdown is conducted in a much narrower base, i.e. that of a region within a country. At this level of analysis, general regional characteristics do not matter that much for sophisticated subsidiaries with world or regional mandates. However, it does matter how successful it has been the region in creating similar industrial clusters and attracting other foreign direct investment. This creates a "safe neighborhood" feeling. We thus observe that in the case of WPMs the two idiosyncratic agglomerative factors act as a strong measurement of a region's previous success in attracting FDI and play the most important role in their choice of location (difference of 7,42 in BIC provides strong support for the aforementioned result). Holt et al (2003) in their study on the location choice of regional headquarters also verify that "home-base similarity" is one of the most important location decision priorities in technology sector firms. Benito et al (2003) results discussed previously are reinforced in their regression model where level of competence is the dependent variable.

On the other hand the immediate local environment does matter more (one way or the other) for less independent subsidiaries, i.e. TMRs. More specifically, TMRs seem to be deterred by the existence of a strong business local environment as this is embodied in the GVA and EPA variables. Thus domestic rivalry is considered as a negative element for those subsidiaries with low competences (Porter, 1990; Holt et al. 2003). Or to rephrase it by applying Birkinshaw and Hood (1998) argumentation on their finding on the negative relationship between "contributory role" of a subsidiary and local competition, it is evident that subsidiaries with low contributory roles feel unease in highly competitive environments. TMRs are encouraged by the existence of sophisticated consumers and advanced local infrastructure when none of these variables matters in the WPM integrated model. However, equally to the WPM, the two idiosyncratic variables gain the outmost significance in line to Maskell and

⁵ The LR chi2 test value is 132.16 (prob>chi2=0,000) for the augmented WPM and TMR models.

Malmberg (1999) (a difference of 10,59 in BIC provides strong support for this effect). In summarizing our results, it is evident that external regional characteristics strongly influence the choice of location among subsidiaries resulting in a variation of distribution of subsidiary types among UK regions. The divergence becomes evident when it is addressed directly for two distinctive roles of subsidiaries. WPMs, which are more autonomous, do not really respond warmly to either general or specialized regional conditions. TMRs though respond positively to demand conditions and basic infrastructure whilst competitive supply conditions and market size apparently do not always act as a stimulus. At the same time strong industrial clusters which confirm the availability of *specific expertise and advantages* as well as home country affinity enhances that region's prospects to attract FDI.

5. CONCLUSIONS AND POLICY IMPLICATIONS

Do regional characteristics matter in the choice of location of MNC subsidiaries? Are different types of subsidiaries more eclectic towards certain regional factors? Our results provoke a yes answer to both questions. Looking closer at the empirical evidence it is striking that all the regional variables (with the exception of EPA) work remarkably well for the complete sample. This suggests that subsidiaries in the UK do take into consideration cost factors (negative sign for CET) as well as agglomerative factors such as size of the local market, good physical infrastructure and R&D. When the two idiosyncratic variables are added (AGGLOMSE and AGGLOMHO) the model continues to perform well although these two factors emerge stronger compared to the location ones. Thus, it seems to exist a "join the club" element, which embodies a signal for the availability of suitable resources for a subsidiary's operations. At the same time the existence of a potential competitor does not alienate other subsidiaries of the same sector or nationality as this element of affinity apparently contributes to the attractiveness of a region.

When we turn to the two separate models for WPMs and TMRs what is really striking is the performance of the basic TMR model. Apparently in a developed country such as the UK investors seek to satisfy practically all their needs even for a more standardized type of production. This is the conventional explanation. Another possible explanation is that TMRs do not remain for long TMRs (in such a host country) therefore the necessary conditions should exist that will assist their evolution into more sophisticated production units, i.e. WPMs (see Papanastassiou and Pearce,

1999 for their discussion on *creative transition*). In the augmented model the two idiosyncratic variables do seem to absorb most of the location effects by surfacing as significantly strong.

What are the policy implications? Regions should continue to design their FDI attracting policies relying on a policy mix that takes into consideration both costs and quality. Foreign investors are sensitive towards both these factors. At the same time it is important to realize that MNCs shape their external environment with their presence *per se*. One possible recommendation would then be the targeting of specific sectors and specific companies. WIR 2002 calls this sort of targeted proactive policies as third generation FDI promoting policies and is not unknown to some nations like Israel or Ireland. Thus, policy makers if they want to be effective in attracting good quality FDI they should do both: upgrade their regions and target specific sectors and companies.

Future research may emphasize key characteristics of the external business environment, such as the presence of suppliers and that of local R&D performing institutions. Finally, disintegration of the analysis at a sectoral level would also be informative.

TABLES AND FIGURES

Figure 1. Regional Distribution of Firms

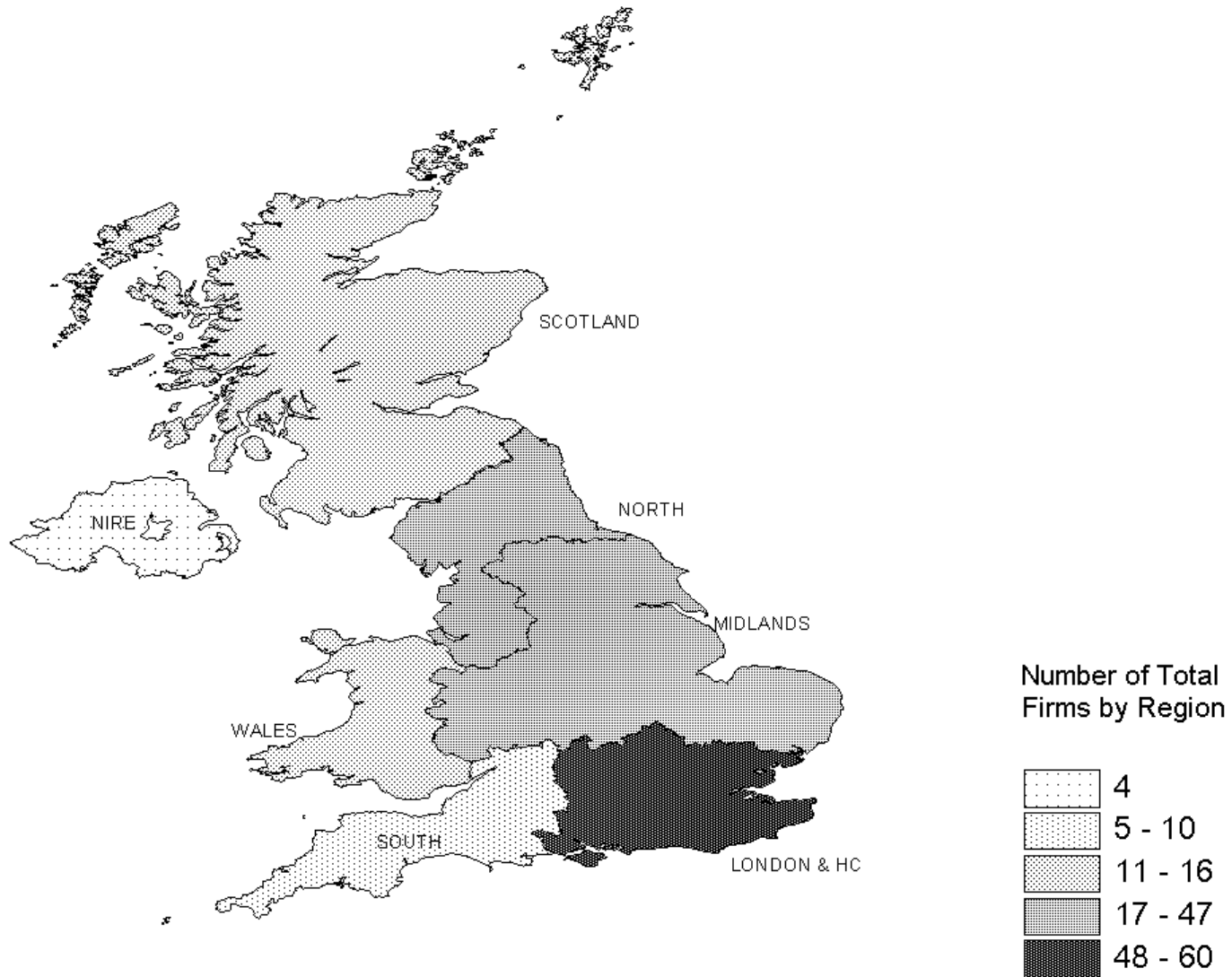


Figure 2. Regional Distribution of Firms by Country of Origin

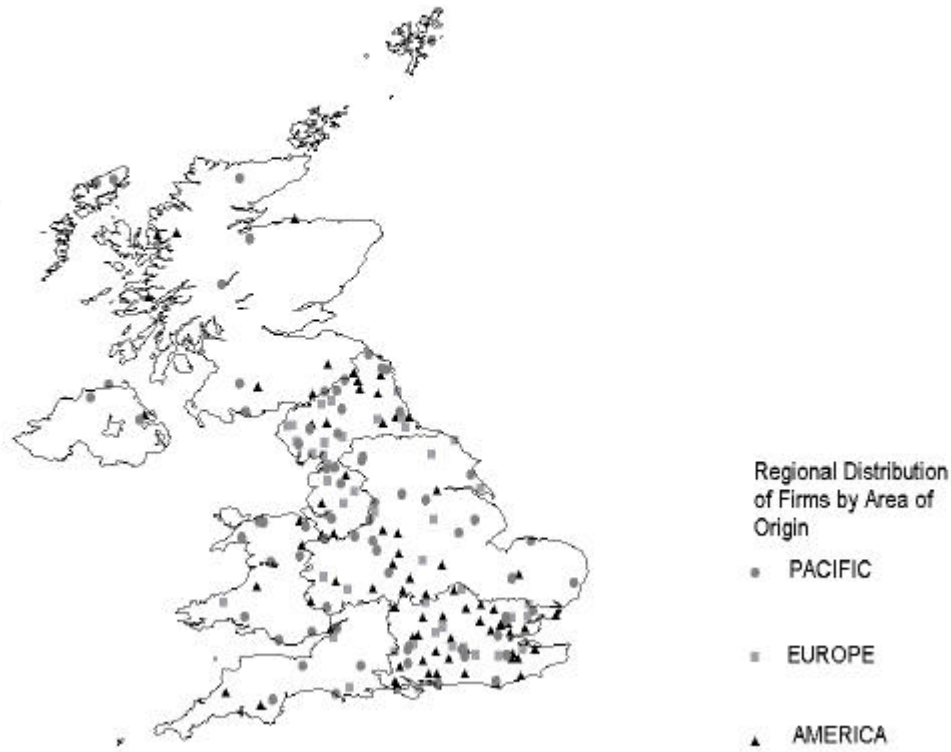


Figure 2a. Regional Distribution of Firms by Country of Origin

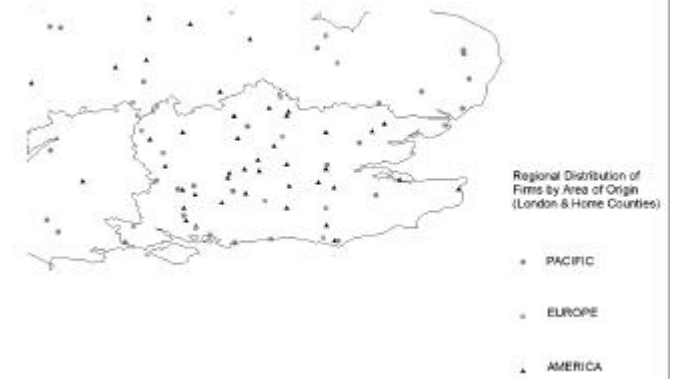
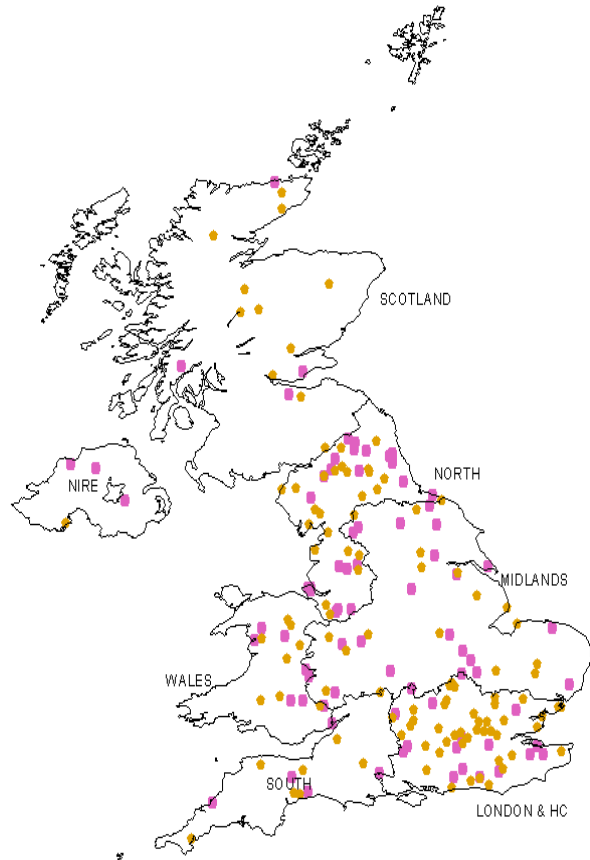


Figure 2b. Regional Distribution of Firms by Country of Origin



Figure 3. Regional Distribution of Firms by Sector



Regional Distribution of Firms by Sector (1 dot = 1 firm)

- HIGH TECH
- MEDIUM TECH

Figure 3a. Regional Distribution of Firms by Sector



Figure 3b. Regional Distribution of Firms by Sector

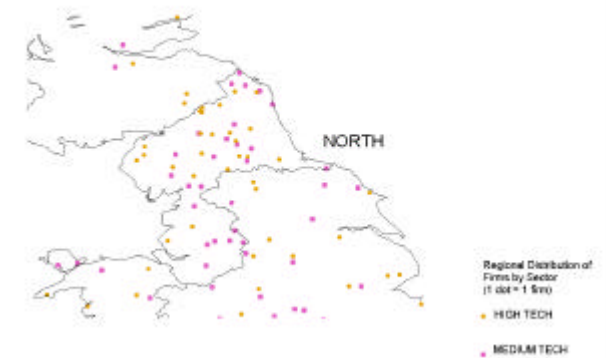


Table1. Econometric Results on the location choice of MNCs subsidiaries in U.K. regions.
 Dependent Variable: Choice of Location
 (Orthogonal GVA – CET – TNM – EPA)

	Model 1	Model 2
GDPPI	0.124* (1.790)	0.099+ (1.440)
GVA	0.206 (0.550)	-0.421 (-1.060)
CET	-0.701*** (-3.330)	-0.400* (-1.850)
TNM	0.836** (2.450)	0.624* (1.820)
EPA	-0.233 (-1.250)	-0.259 (-1.380)
BASICRES	6.575*** (2.580)	3.985+ (1.540)
AGGLOMHO		0.049*** (3.470)
AGGLOMSE		0.174*** (4.750)
N	189	189
Pseudo R2	13.38	18.09
LR X2	98.75***	133.58***

z-statistics in parenthesis

Denotes probability at : ***p<0.01, **p<0.05, *p<0.10, +p<0.15

Table2. Econometric Results on the location choice of MNCs subsidiaries in U.K. regions by
 role of subsidiary
 Dependent Variable: Choice of Location
 (Orthogonal GVA – CET – TNM – EPA)

	WPM		TMR	
	Model1	Model2	Model1	Model2
GDPPI	0.170 (1.130)	0.151 (1.000)	0.180* (1.690)	0.151+ (1.410)
GVA	0.064 (0.080)	-0.749 (-0.900)	-0.259 (-0.460)	-0.970* (-1.610)
CET	-1.000** (-2.240)	-0.666+ (-1.470)	-0.720** (-2.230)	-0.385 (-1.160)
TNM	1.143+ (1.540)	0.927 (1.250)	1.045** (1.970)	0.807+ (1.510)
EPA	-0.310 (-0.780)	-0.354 (-0.880)	-0.507* (-1.780)	-0.517* (-1.810)
BASICRES	8.335* (1.600)	5.502 (1.050)	7.383** (1.990)	4.454 (1.180)
AGGLOMHO		0.054*** (2.170)		0.075*** (3.400)
AGGLOMSE		0.225*** (3.280)		0.166*** (2.950)
N	68	68	84	84
Pseudo R2	17.98	24.14	9.86	15.76
LR X2	46.19***	61.99***	35.52***	51.97***

z-statistics in parenthesis

Denotes probability at : ***p<0.01, **p<0.05, *p<0.10, +p<0.15

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APPENDIX I

Table 1. Regional Breakdown of United Kingdom

LONDON&HC	Bedfordshire, Essex, Hertfordshire, Greater London, Berkshire, Buckinghamshire, East Sussex, Hampshire, Isle of Wight, Kent, Oxfordshire, Surrey, West Sussex
MIDLANDS	North, South & West Yorkshire, Humberside, Derbyshire, Leicestershire, Lincolnshire, Northamptonshire, Nottinghamshire, Hereford and Worcester, Shropshire, Staffordshire, Warwickshire, West Midlands, Cambridgeshire, Norfolk, Suffolk
NIRE	Northern Ireland
NORTH	Cleveland, Durham, Northumberland, Tyne & Wear, Cumbria, Cheshire, G. Manchester, Lancashire, Merseyside
SCOTLAND	North Eastern Scotland, Eastern Scotland, South Western Scotland, Highlands and Islands
SOUTH	Avon, Cornwall, Devon, Dorset, Gloucestershire, Somerset, Wiltshire
WALES	West Wales and the Valeys, East Wales

Source: United Kingdom National Statistics on-line.

APPENDIX II

Table 1. Regional Characteristics for selected variables

AREA	VARIABLE							
	GDPII	GDPIR	CET	GVA	TNM	TNMR	EPA	BASICRES
LONDON&HC	103.00	117.05%	165247	190779	925	28.38%	761	16.06%
MIDLANDS	82.75	94.03%	121796	137125	901	27.65%	313	21.66%
NIRE	71.00	80.68%	10552	10625	113	3.47%	0	40.24%
NORTH	78.50	89.20%	68574	83341	634	19.45%	375	15.88%
SCOTLAND	86.00	97.73%	41891	44648	269	8.25%	131	40.19%
SOUTH	84.00	95.45%	34359	40400	299	9.17%	138	10.52%
WALES	74.00	84.09%	18883	24024	120	3.68%	62	39.57%

Source: Eurostat Regional Statistics(Various Years),

Table 2. Regional Distribution of firms by region of origin

AREA	REGION			
	PACIFIC	EUROPE	AMERICA	TOTAL
LONDON&HC	12	14	34	60
MIDLANDS	16	8	13	37
NIRE	3	0	1	4
NORTH	16	18	13	47
SCOTLAND	7	0	8	15
SOUTH	5	3	2	10
WALES	10	1	5	16
Grand Total	69	44	76	189

Source: Author's calculations

Table 3. Regional Distribution of firms by sector

AREA	SECTOR		
	MT	HT	TOTAL
LONDON&HC	18	42	60
MIDLANDS	19	18	37
NIRE	3	1	4
NORTH	24	23	47
SCOTLAND	4	11	15
SOUTH	3	7	10
WALES	9	7	16
Grand Total	80	109	189

Source: Author's calculations

Table 4. Distribution of firms by sector and region of origin

SECTOR	REGION			TOTAL
	PACIFIC	EUROPE	USA	
MT	30	20	30	80
HT	39	24	46	109
TOTAL	69	44	76	189

Source: Author's calculations

Note: The sectoral classification is as follows: High technology Sectors include Aerospace, Electronics, Instruments, Chemicals and Pharmaceuticals, whilst Medium Technology sectors comprises of Automobile, Buildings, Mechanicals, Metals, Rubber, Food and Other industries.

APPENDIX III

Table 1. Description and Source of Variables

Variable	Description	Source
GDPI	GDP per inhabitant, 1992 EUR12=100	Eurostat "Regions Statistical Yearbook"
GDPIR	GDP per inhabitant relative to United Kingdom, 1992 UK=100	Author's Calculations
CET	Compensation of employees, 1992 mio ECU	Eurostat "Regions Statistical Yearbook"
GVA	Gross Value Added at market prices, 1992 mio ECU	Eurostat "Regions Statistical Yearbook"
TNM	Transport Networks, 1992	Eurostat "Regions Statistical Yearbook"
TNMR	Transport Networks relative to UK, 1992 UK=100	Author's Calculations
EPA	Number of Patent Applications to European Patent Organisation (1992), per mio Inhabitants	Eurostat "Regions Statistical Yearbook"
BASICRES	R&D Expenditure in Higher Education as percentage of Total R&D Expenditure, 1992	Eurostat "Regions Statistical Yearbook" and Author's Calculations

Table 2. Independence of Irrelevance Alternatives Test

Category	N. of Groups	Hausman	Degrees of Freedom	Probability*
NIRE	129	1.740	6.000	0.942
SCOTLAND	152	2.490	5.000	0.778
SOUTH	185	-0.260	5.000	1.000
NORTH	143	3.060	5.000	0.691
WALES	174	3.360	5.000	0.644
HC	179	0.630	6.000	0.996
MIDLANDS	173	2.440	5.000	0.786

?? Refers to the Probability of accepting H_0 : I.I.A. holds.

Correlation of variables

	GDPPi	ORTHGVA	ORTHCET	ORTHTNM	ORTHEPA	BASICRES	AGGLOMHO	AGGLOMSE
GDPPi	1.000							
ORTHGVA	0.814*	1.000						
ORTHCET	0.090*	0.000*	1.000					
ORTHTNM	-0.371*	0.000*	0.000*	1.000				
ORTHEPA	0.277*	0.000*	0.000*	0.000*	1.000			
BASICRES	-0.504*	-0.575*	0.413*	-0.325*	-0.118*	1.000		
AGGLOMHO	0.463*	0.600*	-0.112*	0.000*	0.021*	-0.309*	1.000	
AGGLOMSE	0.468*	0.591*	-0.150*	0.030*	0.088*	-0.351*	0.419*	1.000

* denotes significance at 5%

Eigenvalues and Condition Index

Variable	Eigenvalue	Condition Index
GDPPi	3.126	1.000
ORTHGVA	1.426	1.481
ORTHCET	1.046	1.729
ORTHTNM	1.000	1.768
ORTHEPA	0.653	2.189
BASICRES	0.573	2.336
AGGLOMHO	0.152	4.536
AGGLOMSE	0.024	11.365
Condition Number 11.365		

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Last Saved By: Anne Goodwyn
Total Editing Time: 1 Minute
Last Printed On: 01/03/2004 14:55
As of Last Complete Printing
Number of Pages: 35
Number of Words: 8,249 (approx.)
Number of Characters: 47,022 (approx.)