Offshoot or Offshored?
The Location of UK Multinationals

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Section 1   Introduction

The stock of outward investment by the UK amounted to almost $ 1.5 trillion in 2007, according to the United Nations *World Investment Report* 2007. This makes it by far the largest outward investor in Europe and only second to the US in the world. The growth of outward investment has been remarkable over that last 15 years or so. In 1990, British outward investment stood at $ 0.2 trillion, and $ 0.9 trillion in 2000. Outward investment by British companies frequently makes media headlines and gives cause to concern not only to the general public but also to policy makers.

The reasons for such outward investment are not always fully understood, even though search for lower labour costs is generally brought up as the main culprit in public discussions, blaming "offshoring". This is of course true for British companies who aim to relocate some labour intensive parts of their production to more labour abundant (and low wage) destinations. But it is only one aspect and it is not clear how important it is as a cause for the majority of investment abroad. In a nutshell, opposed to the labour cost argument is the view that British firms invest abroad to expand into new markets which will ultimately strengthen their position in a global context. In this case, firms "offshoot" and open new affiliates abroad rather than simply offshore some labour intensive production. This paper aims to investigate the relative importance of these two motives.

The literature has long been concerned with modelling the investment patterns of countries. Traditionally, many studies have used aggregate country level data to examine what determines countries decisions to invest in particular host countries. A frequently cited example is Wheeler and Mody (1992) who model outward investment flows by the US to a large number of host countries. They model outward investment as a function of characteristics of the host country and find that in particular agglomeration economies, market size and to a lesser extent labour costs are important. These aggregate type of analyses are of course limited in their ability to provide policy conclusions as they do not take into account heterogeneity in outward investment.

Our paper links in with a more recent literature which uses information on firms' investment decisions abroad. These are modelled as functions of country characteristics (generally inspired by gravity equations) and firm variables. This allows researchers to investigate in

particular also the importance of firm level heterogeneity for firms' investment decisions. Recent theoretical models, such as Helpman et al. (2004) and Antras and Helpman (2004) postulate that there are sunk costs to investing abroad and, hence, only firms that are highly productive are able to invest abroad. Using firm level data, researchers can investigate this hypothesis in the data.

We use firm level data for the UK for roughly 2,800 multinationals, for which we have information on the location of their affiliates abroad. We model the location decision as a function of firm level variables (in line with the predications by the theoretical models) as well as host country determinants. In doing so our paper is somewhat similar to recent work on modelling the location decisions of German and Swedish (Becker et al., 2005) and Japanese firms (Raff et al., 2008) as functions of firm and country characteristics. As far as we are aware ours is the first paper to examine this issue for the UK, one of the major outward investors in the world economy. Also, in our analysis of country characteristics we go beyond the current literature and include a number of country level variables proxying the institutional environment in a country, as well as the importance of the infrastructure development of a host country in terms of ICT.

Our results show that our data reflect the theoretical predictions that more productive and larger firms are more likely to invest abroad. As for country characteristics, we find that market size is an important motive for the location decisions. GDP per capita, as a proxy for labour costs, is also important, but it does not indicate that British firms locate in low cost locations, rather that they are more likely to locate in high-wage and high-skill hosts. This, hence, does not suggest that offshoring to low wage locations is a major motive behind British outward investment on average. We also find that institutions, such as government size, the quality of the legal system, regulation, and corruption matter in the location decisions. Furthermore, the availability of ICT makes a country more attractive to British investors.

The rest of the paper is structured as follows. Section 2 describes the data set and describes the patterns in the data, in terms of what types of British firms invest abroad and where. Section 3 then presents the results of the empirical model of the location decision. Section 4 draws some conclusions.

Section 2   Data and the Number and Location of UK Multinationals

The primary source of information on firms used in the study is the FAME (Financial Analysis Made Easy) database of private and public companies made available by Bureau van Dijk. This data is derived from the accounts that companies are legally required to deposit at Companies House and includes all public limited companies, all companies with employees greater than 50, and the top companies based on turnover, net worth, total assets, or shareholders funds (whichever is largest). From that database we focus our analysis on firms with a SIC code 15-36 (manufacturing industries) and between 45-74 (business services). Although the information window on firms is 10 years (1995 to 2005) within the FAME database we observe information on the location of foreign subsidiaries in only the last year of each firms' record.[1]   Further details on the *OneSource* dataset can be found in Oulton (1998) and previous applications found amongst others include Conyon, Girma, Thomson and Wright (2002), Girma, Greenaway and Kneller (2004), Girma, Kneller and Pisu (2007) and Greenaway and Kneller (2007).

Perhaps the most obvious patterns regarding multinationality and the location of subsidiaries from this database are: 1) multinationals are rare; 2) that often multinational in only a small number of countries; and 3) their subsidiaries are most commonly located in other OECD countries.

To provide more detail: of 53,149 UK owned firms in our sample (12,040 manufacturing firms and 41,109 service firms) just 925 manufacturing and 1,928 service sector firms have foreign subsidiaries. These represent 7.7 per cent of the total number of the manufacturing firms and 4.7 per cent of all service sector firms in the FAME dataset (including foreign owned firms). Being a multinational is a rare event. These multinationals tend to locate their subsidiaries in a small number of locations. As shown in Figures 1a/b, of the total UK multinationals 1,949 have only one foreign subsidiary, 336 have two, 159 have three and 81 have four. There are therefore only 112 manufacturing and 216 service firms with more than four foreign subsidiaries. These represent just 0.6 per cent of all of the firms in the sample.

Finally, overwhelmingly these subsidiaries are located in other OECD countries. Of the 925 domestic multinationals in the manufacturing sector 96 per cent have at least one subsidiary located within the OECD member countries (74 per cent of firms have a subsidiary within the EU and 36 per cent within the US), while just 20 per cent have subsidiaries in non-OECD countries. Only 8 per cent (72 in total) have subsidiaries in either China or India. In the service

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[1] For the benefit of the statistical estimation further below we concentrate on the location (each country) in which multinationals operate and avoid the complication of when firms operate several subsidiaries in the same location.

sector the figures are similar. Of the 1,928 UK multinationals in this sector, 95 per cent have at least one subsidiary located within OECD member countries (77 per cent of firms within the EU and 24 per cent in the US) and just 18 per cent in non-OECD countries (17.8 per cent). Here choosing China and India is even more rare at 4.5 per cent.

To provide further detail, multiplying firms with the number of locations in which they have subsidiaries gives a total number of 2,721 separate subsidiary locations in manufacturing and 4,864 in services. For manufacturing, of the total number of subsidiary-locations, 76 per cent are within the OECD, (50 per cent within the EU and 12 per cent within the US) and for services 79 per cent of subsidiaries are located in OECD countries (56 per cent within the EU and 9.7 in the US).

More complete evidence on the regional breakdown of the location of subsidiaries can be found in Table 1, while in Figure 2a/b we show the 25 most common locations for subsidiaries and the percentage of multinationals that have a subsidiary in that country. The dominant pattern in both is that multinationals choose to locate subsidiaries within other OECD countries, although as Figure 2a/b make clear there are some fast growing developing countries such as China, India, Brazil and South Africa also figure in the top 25.

The dominance of using other OECD countries to host subsidiaries is strengthened when we consider the number of firms choosing multiple locations in the OECD, compared to those choosing a non-OECD country (either with subsidiaries in an OECD, or even more strongly if just the non-OECD country). For example, there are 843 manufacturing firms that have subsidiaries either in Europe or the US. Of these, 60 per cent have subsidiaries only in Europe, 21 per cent have subsidiaries in both and 19 per cent only in the US. In comparison, of the 889 manufacturing firms that have subsidiaries in the OECD or in Central and Eastern Europe, 91 per cent have subsidiaries only in the OECD, 8.2 per cent have a subsidiary in both locations and just 4 firms, 0.45 per cent of the total, have a subsidiary only in Central and Eastern Europe. For South East Asia the percentage of firms with a subsidiary in South East Asia (alone or with an OECD country) is 13 per cent of firms for other locations the figure is 14 per cent.

The comparison with the service sector, while confirming the general pattern, highlights some differences between the two sectors. Firstly, of the 1,717 firms with subsidiaries in Europe and/or the US, the balance is now in favour of locations in the US. Just 13 per cent of firms have subsidiaries in Europe only whereas 73 per cent have a subsidiary only in the US. Firms

in the service sector also appear to have a somewhat narrower geographic spread than those in manufacturing. Of the service sector firms with subsidiaries in the OECD and Central and Eastern Europe, 5.5 per cent have subsidiaries in both, compared to 8.2 per cent in manufacturing. Consistent with the manufacturing sector the proportions with subsidiaries only in Central and Eastern Europe are very similar. The differences are similar for other regions also. For South East Asia the percentage of MNEs with a subsidiary in another OECD country is 8 per cent (11 per cent in manufacturing) and for the Other region 9.5 per cent (11.5 per cent for manufacturing).

This evidence is in line with findings from a comparable dataset for firms in the euro area by Geishecker et al (2007). They also find that only a very small fraction of firms have affiliates abroad (around three per cent), that the average multinational has affiliates in only few locations (three on average) and that the most frequent locations of foreign affiliates are in other developed countries, mainly other European countries or the US.

Multinationality and Firm Characteristics

Within this paper we are also interested in the relationship between the location decisions of multinational firms and the characteristics of those firms. In this section we provide some initial evidence on this point. In Table 2 below we separate firms according to their size in the UK and the percentage of firms within each of those size bands that are multinational. As expected there is a strong relationship between multinationality and firm size in the UK. In the smallest size category (<25 employees) the rate of multinationality is almost identical in services and manufacturing: around 3.0 per cent of firms with less than 25 employees have a foreign affiliate, compared to 3.7 per cent for firms with 25-50 employees. This occurs despite there being disproportionately more small firms in the service sector. After this point there is some divergence between the two sectors, with rates of multinationality higher in manufacturing. In the very largest size band (employment greater than 250) the difference is at its greatest. Some 12 per cent of service sector firms in this size band are multinational compared to 20 per cent of manufacturing firms.

Another way to demonstrate the same phenomenon is to consider the average number of locations used for subsidiaries for each of the employment categories. Although the median number of subsidiaries is one for all firms with employment less than 250, and 2 for firms with

employment greater than this, the averages display a strong sense of skew to the distribution. The mean number of locations is just over one (1.2) when employment is between 1 and 249 (with no difference between size bands) and 4.6 locations when employment is greater than 250 employees.

Table 2 also displays the percentage of multinationals that have subsidiaries in one, two, three or more than four locations. Again there are some differences between sectors here. Overall service sector multinationals are more likely to have subsidiaries in more than one location and perhaps most noticeably they are much more likely to have subsidiaries in more than four locations than in manufacturing. These differences are much smaller however for the largest employment category, where the distributions appear much more similar. Again, this evidence is consistent with the patterns described in Geishecker et al. (2007).

While Tables 2 provides initial evidence of a general relationship between firm characteristics (size) and multinational activity in Table 3 we provide more formal evidence by estimating a probit model of the incidence of multinationality controlling for a range of firm and industry characteristics. To test for the robustness of the results we vary the firm level variables across the regressions, while to allow for differences between the manufacturing and service sectors we estimate regressions for these sectors separately. In columns 1 and 2 we include a measure of firm size, measured as the log of employment, as well as a measure of firm productivity and whether the firm exports (as both a simple 0/1 indicator as well as the share of exports in total output). In columns 3 and 4 we change the measure of firm size of the firm measured by sales to the domestic market and the measure of labour productivity with the amount of capital per employee. The coefficients reported in this table are marginal effects.

The firm variables behave as expected. We find that firms that are larger, measured either by output or employment, are more globally engaged (measured by the export share) are more capital intensive and more productive are all more likely to be multinationals. This occurs for both manufacturing and service sector firms, although the estimated effects are typically larger for manufacturing firms (the exception is the coefficient on labour productivity in columns 1 and 2). This would suggest that firms in the manufacturing sector are more responsive to changes in their underlying characteristics. For example, from column 1 the result indicate that a one per cent increase in employment size is associated in an increase in the probability of becoming a multinational by 0.023 in the manufacturing sector and around half of that in the service sector. This is around one-third of the observed probability that the firm will be a multinational in the manufacturing and quarter of that in the service sector. By comparison, a

one per cent increase in labour productivity is associated with a much smaller increase in the probability of being a multinational (0.004 in manufacturing and 0.006 in services), while that for exports differs between sectors.

Of the other firm characteristics we find that whether or not a firm is an exporter or not is not statistically important (indicated by the export dummy) for whether a firm becomes a multinational in the manufacturing sector the extent of involvement in export markets does matter (the export share is significant). In the service sector we find that both effects are important, with estimated marginal effects that are large relative to the other firm variables.

In Table 4 we investigate the issue of location by reporting the number of firms that have subsidiaries in particular regions or groups of countries by the size of the firm. As is clear from the table, the larger firms tend to have subsidiaries in more locations, whereas small firms are more likely to choose to locate within one of the other OECD countries. Within this general pattern however it is the case that the smaller service sector firms choose a more diverse set of locations. This appears to suggest the relationship between firm size and where the firm locates is stronger within the manufacturing sector. For example, of the total number of manufacturing firms with subsidiaries in the US or Western Europe 57 per cent have more than 250 employees. In the service sector just 42 per cent of firms with subsidiaries in the US or Western Europe have more than 250 employees. Beyond Europe and the US the effect is even stronger. The percentage of MNEs with subsidiaries in Central and Eastern Europe that have more than 250 employees is 75 per cent in manufacturing and 59 per cent in services; for Other countries it is 83 per cent in manufacturing and 59 per cent in services and for South East Asia, China and India it is 89 per cent in manufacturing but only 67 per cent in services.

Section 3 The decision where to offshore

The previous section suggests that the diversity of the location decision of subsidiaries of multinational firms is likely dependent upon both firm and country characteristics. Multinational firms that are big and productive were shown to be associated with having a greater number of subsidiaries with a wide geographic spread, although across all firms subsidiaries tend to be clustered in particular locations. In this section we investigate the country, firm and industry factors that determine which locations firms choose.

To explore this issue, we organise our data such that we have a 0 or 1 for each firm-country pairing. The variable is set equal to 1 when the firm invests in a given location and 0 otherwise. We have 925 manufacturing multinational firms spread over 139 country locations and 1,928 service sector multinationals spread over 132 separate locations giving a total of 383,071 possible firm-country combinations. Of these just 1.98 per cent (7585 subsidiaries) of the total number of firm-country combinations are non-zero.

To measure the elements of firm performance likely to be important we build upon the results of the previous section and use a measure of employment, labour productivity and whether the firm exports. These are all expected to be positively related to having affiliates in a given location; the best firms invest in the greatest number and most diverse set of locations. The country variables are built up systematically through the regressions. The core set of country variables we add are country size (GDP), wealth (GDP per capita) and distance from the UK. It is expected that larger and wealthier markets will be attractive to more UK firms. In addition, issues of management control and cultural similarity are expected to become more difficult as physical distance from the UK increases. Multinationality is therefore expected to decrease with distance. Historical and cultural links with distant locations, such as Australia, New Zealand and India, are however, also likely to be important factors considered by UK firms when establishing affiliates aboard. As such the relationship with distance is unlikely to be simple. To capture these historical links we add to the regression a variable that captures the use of English as the main language.

To measure the effect of harmonisation of trade and investment policy within EU member countries we also add a dummy variable that equals one when the partner country is a member of the EU. The other control variables include whether there is any residual effect from being a member of the OECD that is not captured by the other variables; and a border dummy that equals 1 for the Republic of Ireland. Also included in the regression, although not reported in the table, are a series of industry dummy variables to capture other general industry differences. We develop the determinants of industry differences towards the end of this section.

Base Results

Perhaps the most striking feature of the results in columns 1 (manufacturing) and 2 (services) of Table 5 is the similarity in the determinants of the location of FDI. This occurs for both the firm and country controls. In columns 1 and 2 the size of the firm is found to be significantly

correlated with the probability of being a multinational within a given country. Bigger firms are multinationals in more countries. There are some differences between sectors however. At the mean the marginal effect of size is greater in the results for the manufacturing sector, approximately double that for services. The other firm variables, labour productivity and exporting, appear to matter for the location decision of firms in the service sector but not for manufacturing.

The similarity in the effect of the firm variables is also evident when we consider the impact of a change in firm characteristics on the estimated probability of locating a subsidiary in a given country across the two sectors. In both cases we increase firm size and productivity by approximately one-standard deviation and set the export status of all firms to 1 for all firms. When we do this we find that in the manufacturing sector the overall estimated probability across all countries and all firms increases from 0.030 to 0.067 and from 0.025 to 0.047 in services. On average the likelihood that a multinational locates a subsidiary in a given country is quite low, although under the simulated improvement in performance across all firms this probability approximately doubles in both sectors (more than doubles in manufacturing).

A perhaps better comparison is to focus on the effect on the probability of locating in particular countries. From this exercise we find that in rich countries, where the probability of locating a subsidiary there is higher than that in poor more distant countries, the absolute increase in the probability of locating there is greater is greater than for small countries, although the proportional improvement for the later is larger. For example, for a multinational in the service sector the probability of locating a subsidiary in the US or Germany increases by 0.15 and 0.13 to 0.41 and 0.32 respectively. In comparison the change in the probability for China or India is 0.07 and 0.05 to 0.14 and 0.09, although these are double the probability when firm characteristics are set at their initial values. The patterns of change are similar in the manufacturing sector, albeit where the overall probabilities for these chosen countries are somewhat higher.[2]

Our choice of country characteristics is determined by the broader literature that emphasises market size and level of development, as key determinants of establishing affiliates abroad. The first two variables that capture size and wealth are country size, measured by GDP, and the share of wealth per person in the population. Again the similarities between the service and

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[2] For a manufacturing multinational the probability of locating a subsidiary in the US or Germany increases by 0.21 and 0.18 to 0.57 and 0.41 respectively. In comparison the change in the probability for China or India is 0.15 and 0.12 to 0.29 and 0.21. In this case these more than double the probability when firm characteristics are set at their initial values.

manufacturing sectors are striking. Both GDP and GDP per capita can be seen to have a significant positive effect on locating affiliates within a given country in both sectors, and the marginal effect is very similar. Big countries and rich countries attract more manufacturing and services multinationals and in the same way.

To capture the ease of investing in a country we include measures of the distance from the UK, whether they are another European country, whether they also speak English as a first language, whether they share a common border and whether they are a fellow member of the OECD. The results suggest that UK MNEs are likely to locate production in countries that are physically close to the UK (distance) and that share common language or laws and regulations (Europe). We also find that manufacturing firms are less likely to locate in Ireland, while there is no residual impact from being a member of the OECD.

Together these firm and country characteristics generate large differences in the estimated probability of locating production in a given country. In the table below we report the estimated probability of locating a subsidiary in each country for multinationals in the manufacturing and the service sector. The countries are ranked across the columns by the estimated probability of locating a subsidiary in the manufacturing sector. There are an additional 17 countries included in the regression but not in the table for which the probability values are below 0.001. These are all African and Central and South American countries and include Niger, Mali, Kenya and Nicaragua. The probability values reported in the table range from less 0.0009 in Senegal in the service sector up to 0.363 for the US in the manufacturing sector.

Estimated probability by country

Country	Manf	Serv	Country	Manf	Serv	Country	Manf	Serv
Senegal	0.001	0.000	Cyprus	0.005	0.005	Philippines	0.027	0.012
Guinea	0.001	0.000	Cameroon	0.005	0.002	Korea RP	0.028	0.019
Gabon	0.001	0.000	Bahamas	0.006	0.005	Hungary	0.029	0.022
Paraguay	0.001	0.000	Iceland	0.006	0.008	Finland	0.032	0.030
Zambia	0.001	0.000	Mauritius	0.006	0.004	Greece	0.037	0.033
El Salvador	0.001	0.000	Malaysia	0.007	0.004	Singapore	0.039	0.029
Angola	0.001		Indonesia	0.007	0.003	Portugal	0.040	0.035
Fiji	0.001	0.001	Colombia	0.007	0.004	Czech Rplbc.	0.042	0.034
Panama	0.001	0.001	Morocco	0.008	0.004	Sweden	0.049	0.045
Guatemala	0.001	0.001	Bulgaria	0.008	0.005	Norway	0.050	0.050
Ecuador	0.001	0.001	Ghana	0.009	0.003	Austria	0.053	0.050
Guyana	0.001	0.001	Tunisia	0.009	0.006	South Africa	0.055	0.031
Uruguay	0.001	0.001	Egypt	0.009	0.004	Japan	0.061	0.046
Tanzania	0.002	0.000	Thailand	0.010	0.005	Hong Kong	0.062	0.046
Sri Lanka	0.002	0.001	Nigeria	0.011	0.003	Denmark	0.062	0.061

Country			Country			Country		
Costa Rica	0.002	0.001	Trinidad & Tobago	0.011	0.008	Australia	0.065	0.050
Bangladesh	0.003	0.001	UAE	0.012	0.010	Switzerland	0.069	0.066
Dominican Republic	0.003	0.002	Argentina	0.013	0.008	India	0.092	0.039
Jamaica	0.003	0.001	Poland	0.015		Spain	0.110	0.092
Peru	0.003	0.002	Romania	0.016	0.010	Italy	0.129	0.108
Zimbabwe	0.003	0.001	Malta	0.017	0.014	Netherlands	0.136	0.124
Oman	0.004	0.003	Saudi Arabia	0.017	0.012	China	0.144	0.070
Uganda	0.004	0.001	Mexico	0.018	0.010	Canada	0.153	0.120
Qatar	0.004	0.004	Algeria	0.018		Ireland	0.173	0.251
Venezuela	0.005	0.002	Brazil	0.020	0.010	Germany	0.231	0.195
Pakistan	0.005	0.002	Israel	0.021	0.017	France	0.243	0.209
Barbados	0.005	0.004	Turkey	0.023	0.015	USA	0.363	0.264
Chile	0.005	0.003	New Zealand	0.025	0.020			

Human Capital

In columns 3 and 4 (Table 5) we extend the set of control variables to include a measure of human capital. This also has the expected relationship with the decision to invest in a given location. Countries with high levels of human capital are more likely to attract FDI, even controlling for size and wealth. Perhaps unsurprisingly this effect is stronger for services compared to manufacturing. At the mean of the right hand side variables the estimated marginal effect of human capital is around half of that of GDP and GDP per capita in the manufacturing sector at 0.001, but the same size in services. Human capital is a more important factor in determining the location decision in services compared to manufacturing.

In Table 6, motivated by anecdotal evidence, we investigate whether human capital and the English language reinforce each other by including an interaction term between these two variables.[3] A combination of high levels of human capital and spoken English together makes countries attractive locations for offshoring activities than if either one of these factors exists alone. This is exactly what we find, indeed the English language no longer matters directly when we control for its interaction with human capital (it is even negative in the manufacturing sector regression), while human capital does not matter for manufacturing firms. Human capital becomes a more important variable when English is the first language of the country.

To provide some interpretation on the effect of English language were the Chinese to share a common language with the UK the probability a UK multinational locating there would rise from 0.14 to 0.31 in the manufacturing sector and from 0.075 to 0.16 in the service sector. Or

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[3] In order to focus on the role of human capital we do not report the results for the other variables included in the regressions. These control variables are identical to those reported in regressions 3 and 4 in Table 6.12.

for a Central and Eastern European country such as the Czech Republic the probability would now be 0.25 in manufacturing and 0.10 for service sector firms. Similar changes would be observed for developed countries also however. For example were France to start using English as their first language the estimated probability that a UK multinational would have a subsidiary there would be 0.59 in manufacturing and 0.4 in services, while in Germany it would be 0.65 in manufacturing and 0.44 in services. Removing the language barrier between the UK and Continental Europe would mean that it was a more important destination for UK outward FDI than the US.

In regressions 3 and 4 within Table 6 we investigate the importance of human capital further by capturing the importance of scientific and technical knowledge within a country. We measure this as (the log) of a count of the number of scientific and technical journal articles. It is expected that this variable will capture both the depth of scientific and technical knowledge, but also the quality of the tertiary education sector. Unfortunately this data results in a sharp drop in the number of observations (the data exist for 78 countries for which we also have GDP data). Despite this we find that it enters significantly into the regression equation. A greater depth of high end-scientific knowledge is an attraction for UK firms to locate production within a country. At the mean of the right hand side variables the estimated marginal effect reported in the tables is noticeably stronger for manufacturing over services, although it matters in both sectors.

Policy Variables

In Table 7 we extend the set of country characteristics to more fully control for the ease of investing in a given location, in particular to test for the importance of institutional infrastructure and the general policy environment. In columns 1 and 2 of Table 7 we add controls for the quality of the general policy environment using data constructed by the Fraser Institute. Five measures are used here: the size of government within the economy; the protection offered by the legal system and the quality of property rights; macroeconomic stability; the freedom to trade internationally; and the extent of regulation of credit, labour and business. It is expected that countries with market friendly policy environments attract more FDI. Countries are rated on a 1-10 index, where 10 denotes greater economic freedom and protection of the individual enterprise.

For both sectors we find a strong positive correlation from a number of these factors. In particular countries with small government sectors, that offer high levels of protection through

the legal system for property rights and are free from regulation attract higher levels of multinational investment from the UK. In addition the freedom to trade internationally appears to be important within the service sector, where unexpectedly macroeconomic stability has a negative effect.

Quantitatively differences in institutional quality have a large effect on the location decision of UK multinationals. For manufacturing improving policy conditions to those of UK standards would increase the probability of locating production in Brazil to 0.07 (from 0.016) in China to 0.37 (from 0.013), in India to 0.19 (from 0.10) and in South Africa to 0.09 (from 0.04). Using the estimated probabilities from this model would suggest that were this to occur, China would be second only to the US as the host for UK firms. The effects are greatest in China because according to this index they score much lower than the UK for the quality of their regulatory environment, their legal protection of property rights and the size of government. Policy conditions are on average much closer in India to UK levels in comparison to those in China, although were these improvements in policy conditions realised this would suggest that levels of UK FDI in India would be higher than those in Australia, Canada or the Netherlands for example.

For service sector firms the effect of improving policy conditions to those of UK standards for these same four countries is slightly smaller. The probability of locating production in Brazil would increase to 0.02 (from 0.008), in China to 0.37 (from 0.15), in India to 0.19 (from 0.07) and in South Africa to 0.05 (from 0.03). Using the estimated probability from Table 7.5 this would make China the most likely destination for UK FDI, while those in India would be similar to that currently found in Germany, France and Ireland.

In columns 3 and 4 we investigate the insignificance of the variable describing restrictions on international trade and FDI. Within the Fraser Institute data it is possible to break down this measure into a number of sub-categories that include a measure of taxes on international trade (including tariffs), regulatory barriers (including non-tariff barriers) and international capital market controls. This has some interesting effects on the results. It would appear for example that restrictions placed on FDI through international capital markets have a significant effect on the volume of foreign affiliates by UK multinationals located within a country. For services it again appears that regulatory elements are more important.

Finally in columns 5 and 6 of Table 7 we test the relationship between corruption and FDI. The World Bank has recently identified corruption as a serious impediment to development. The

results in column 5 and 6 support this view; countries that are more corrupt (have greater values in the index) attract lower levels of multinational investment from the UK. Interestingly a number of the policy variables are non-robust to the inclusion of the measure of corruption; for example the protection of property rights and the quality of the legal system and freedom from regulation are no longer statistically significant. This reflects the use of policy distortions by corrupt bureaucracies to engender the use of bribes and other corrupt activities. Corrupt countries have high levels of policy distortions.

Information Technology

The final exercise we undertake with respect to the country level determinants is to evaluate the importance of ICT in attracting UK multinationals to locate commercial activity abroad. Anecdotal evidence suggests that the quality of the ICT framework can be an important factor in choosing where to locate subsidiaries abroad. Unfortunately high quality data on ICT on a cross-country basis is difficult to come by, or at least that which covers a reasonably high proportion of the wide range of countries are available within our sample.

To generate sufficient country coverage we use a measure of the extent of computer and communication and other services as a ratio to total commercial service exports taken from the World Bank Development Indicators for the year 2000 and covers 108 countries. We also have an equivalent measure for imports. This compares for example with a measure of ICT investment (as a ratio to GDP) which covers 61 countries (this variable is insignificant – though only at the 10 per cent level). We use both the exports and imports measure, where it is expected that both are positively correlated with the size and quality of the ICT sector. In addition to these measures we use (the log) of the number of internet used per thousand people within the population, to proxy for the depth of ICT penetration within a country.

It would appear from Table 8 that while ICT exports are significant, in regression 1 the import variable does a better job of explaining the ICT-attractiveness of a country. The share of ICT imports in total commercial service imports is strongly positively correlated with outward FDI from the UK. The depth of internet penetration also appears to matter as expected. In countries in which internet penetration is widespread the population is more likely to be ICT literate and therefore more attractive to overseas investors. Interestingly, despite anecdotal evidence of the importance of ICT to the investment decisions of firms in the service sector, the estimated marginal effect is identical to that for manufacturing sector firms.

Industry Determinants

The recent literature on offshoring due to Grossman and Helpman (2004), Antras (2003) and Antras and Helpman (2004) and reviewed by Helpman (2006), has emphasised both country and industry characteristics as important in determining the complex patterns of production by multinational firms. A particular feature of this literature has been the analysis of the boundaries of the firm together with the decision where to locate production. The distinction between outsourcing or integration and onshoring versus offshoring has potentially interesting implications for the location decision of foreign subsidiaries modelled in this paper. In this section of the paper we focus on two predictions of this class of models.

We consider first the relationship between capital intensity and contract completeness. Following Antras (2003) we expect that the extent of vertical integration is greater in industries that employ capital intensive inputs. However this relationship is complicated by Grossman and Helpman (2005), amongst others, who have argued that the outsourcing decision of firms is dependent upon the degree of contact completeness. An improvement in the legal environment improves the degree of contract completeness and therefore the extent of outsourcing to that country.

Empirically we model these industry differences using a measure of the (log) capital labour ration of the (3-digit) industry as well as a measure of the extent of the use of internationally offshored intermediate inputs in an industry. The latter is constructed using the methodology found in Geishecker (2006) and is described more fully in the Appendix. To capture the importance of the policy environment to the outsourcing decision we interact the industry variables with the policy variables measuring the quality of the legal system and the extent of business regulation. Here we expect that while higher values of the index of the quality of the legal system and lack of regulation have been shown to be associated with a higher probability of attracting inward FDI, this effect is likely to be weaker in capital and input intensive industries because they encourage firms to outsource rather than integrate production.

The results for the capital-labour ratio suggest that in both the manufacturing and the service sector more capital intensive industries lead to higher levels of offshored activity (regressions. The results are similar when we add the extent of international outsourcing in the industry for manufacturing firms but not for services, where the relationship is reversed. More input intensive industries have higher levels of offshoring. Table 9 suggests that these effects differ across industries however, although there are some differences in the results for the

manufacturing and service sectors. Columns 1 and 2 suggest that the effect of capital intensity on the extent of offshoring in the services sector is declining with the quality of the legal environment and business regulation. In the manufacturing sector we find the same relationships but using the intensity of internationally sourced intermediate inputs. For a given level of outsourcing in an industry international offshoring is less likely the higher the quality of the legal environment or lower business regulation (Tables 10 and 11). This occurs despite controlling for the direct effect of these policy variables, where higher values suggest a greater probability of locating subsidiary in that country. In both cases we make a similar interpretation; in capital intensive or input intensive industries the ability to offshore elements of the production process is greater, but in environments where contract enforceability is greater, because of the quality of the legal environment or lower business regulations, it is more likely that this production will be outsourced rather than integrated within the firm.[4]

The second prediction we take from the recent literature on offshoring follows from the model of Antras and Helpman (2004). This model combines variation in contractual input intensity across industries with variation in productivity across firms within the same industry to generate a rich pattern of predictions regarding insourcing or outsourcing in the domestic country, or insourcing or outsourcing abroad. Domestic and foreign in the model is simplified to a high cost North versus a low cost South. The differences in fixed and variable costs associated with these alternatives modes of production, combined with firm heterogeneity allows firms within the same industry to make different organisational choices. One interesting set of predictions that follows from the model occurs in headquarter intensive industries summarised in Figure 3. This figure shows the organisational choice against the productivity of firms within the industry. There is a clear ranking in the choices made. As is common in these models the lowest productivity firms are expected to exit the industry. The firms with slightly higher productivity find it optimal to organise production in the North, with those choosing integration having higher productivity than those choosing outsourcing. The most productive in the industry firms take advantage of the lower production costs available in the South, with the same ordering between outsourcing versus integration. Of the firms offshoring to the South the most productive choose integration and the lesser productive firms offshoring.

Figure 3 suggests a complicated relationship exists between firm productivity, the ownership structure of the firm and the location of any subsidiaries. According to the Antras and Helpman (2004) model the relationship between productivity and the likelihood of locating a subsidiary

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[4] The results for the legal system and property rights and regulation do not hold for other policy variables such as the size of government. For this variable the interaction term is insignificant at conventional levels.

in given country will depend whether the host country is high-cost or low cost. For low cost Southern countries we are likely to observe and increased likelihood of subsidiaries as the productivity of the firm rises, whereas in Northern countries we are likely to observe a decreased likelihood of subsidiaries as productivity rises. This of course occurs only in headquarter intensive industries.

Empirically we simplify this argument and develop it in stages. In columns 1 and 2 of Table 12 we begin by considering whether industries that are more headquarter intensive have a higher probability of offshored production. We measure headquarter intensity using information on the ratio of intangible assets to employment in the (3-digit) industry. Intangible assets in the FAME dataset include the firm's R&D investments and their advertising. We find a difference between the manufacturing and service sectors here, with the strongest evidence found for the service sector. In the service sector industries with higher levels of intangible assets are associated with higher probabilities of subsidiaries for each location, whereas in the manufacturing sector they are not.

As a second stage we simplify the Antras and Helpman (2004) argument by simply considering whether the relationship between firm productivity and the probability of locating production in a given country differs for Northern versus Southern countries, which we define for these purposes as whether the country is a member of the OECD or not, controlling for the headquarter intensity of the industry. That is, the productivity variable included directly in the regression tests for the relationship for firm productivity for non-OECD countries, while the interaction with the country indicator of OECD membership tests whether this relationship differs for OECD countries. To allow for greater complexity in the relationship we consider both linear and squared productivity terms.

The results for this regression are listed as columns 3 and 4 in the table. Again we find some difference in the behaviour of service and manufacturing sector multinationals. For the manufacturing sector we find no difference according to whether the country being considered is a member of the OECD or not. As before firm productivity is not associated with a higher probability of locating in a given country. In the service sector it would appear that the positive relationship found for productivity is explained by the relationship for OECD countries. Firm productivity has a stronger positive relationship with the location of subsidiaries in the OECD than that found for non-OECD countries, the interaction term is significant for the level of productivity although not for its squared term. Indeed the direct effect of productivity is insignificant in this regression, suggesting that the findings reported in

5 may have been driven completely by the relationship for OECD countries.

As a final stage we test whether the effect of firm productivity on the probability of location differs between headquarter intensive industries and Northern and Southern countries.[5] Here we interact the firm productivity variables with the headquarter intensity measure and then allow this to differ between OECD and non-OECD countries. Now the headquarter intensity firm productivity interaction captures the relationship for non-OECD countries while the interaction with the OECD indicator tests whether this effect differs between these groups of countries. The results are reported in regressions 5 and 6 in Table 12.[6]

A number of these interaction terms are significant, and perhaps more strikingly display some similarity across the manufacturing and service sector. In non-OECD countries we find that the interaction between firm productivity and industry headquarter intensity is significant and positive. As headquarter intensity and productivity rise so does the probability of offshoring production. This occurs in the manufacturing sector regressions despite the fact that the firm productivity variable did not enter the regression significantly (regression 1 of Table 12). The relationship of this interaction variable is also found to differ between OECD countries and non-OECD countries. In both regressions 5 and 6 the headquarter intensity –firm productivity interaction is less strong in OECD compared to non-OECD countries, whereas the squared effect is stronger. This result for high income countries would appear consistent with Figure 3. In headquarter intensive industries the significant squared term suggests that the most productive firms are more likely to have subsidiaries in other OECD countries. For non-OECD countries we find results that are consistent although perhaps less strongly so with Figure 3.

Section 4   Conclusions

To be written

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[5] We have also tested whether there is evidence of an interaction between headquarter intensity and productivity that does not depend on the split between OECD and non-OECD countries. For both the service and manufacturing sectors we find that it does not. In such as regression the firm productivity (its square), headquarter intensity and the interaction of productivity (and its square) with headquarter intensity are all insignificant.
[6] The findings in this table are in general robust to the inclusion of a complete set of headquarter, productivity and OECD interaction effects. We choose to exclude those relationships for which statistical significance cannot be established.

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Figure 1a: The number of manufacturing sector multinationals with n subsidiaries
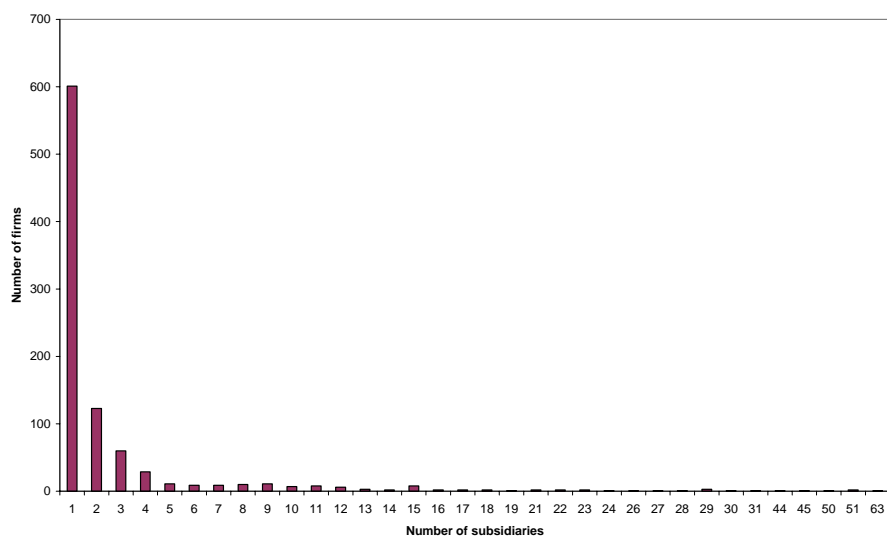
Figure 1b: The number of service sector multinationals with n subsidiaries
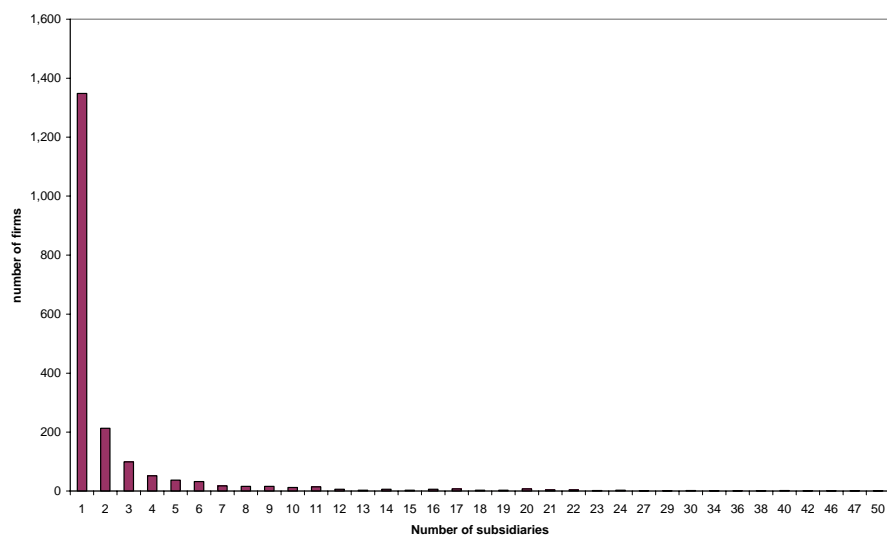
Table 1: Number of firms with subsidiaries and the percentage of multinationals in each location

		Manufacturing	**Services**
Non-MNEs		12,040	41,109
MNEs		925	1,928
Of which %	*US*	*36.2*	*24.4*
have subsidiaries	*Western Europe*	*74.6*	*78.1*
located in	*Australia, Canada, Japan, NZ and South Africa*	*19.0*	*15.6*
	Central and Eastern Europe	*8.3*	*5.8*
	South East Asia, China and India	*12.3*	*9.0*
	Other locations	17.3	12.2

Figure 2a: Percentage of manufacturing multinationals by location (top 25 locations)

Figure 2b: Percentage of service sector multinationals by location (top 25 locations)

Table 2: Percentage of Firms that are Multinationals and Non-multinational by Firm Size and the Percentage Number of Subsidiary Locations
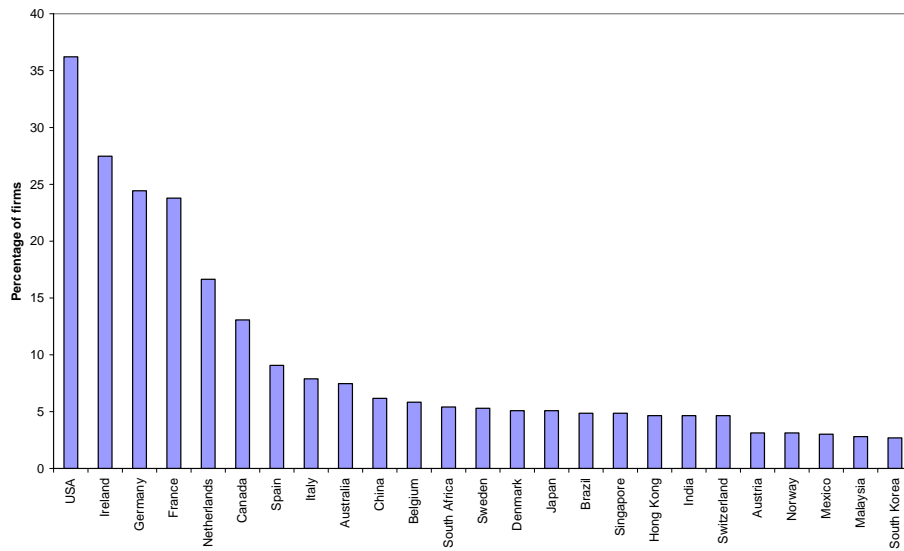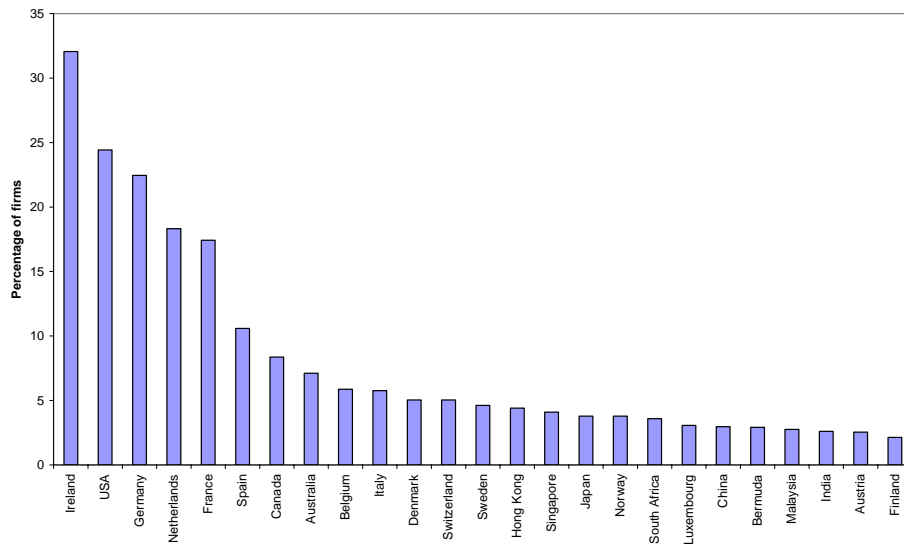
	% of firms that are Non-Multinational	**% that are Multinational**	*% of MNEs with 1 Subsidiary*	*2*	*3*	*4+*
Number of Employees	*Manufacturing*					
<25	97.0	3.0	*88.9*	*7.4*	*1.9*	*1.9*
25-50	96.3	3.7	*91.8*	*6.8*	*0.0*	*1.4*
50-100	95.7	4.3	*82.6*	*12.4*	*4.1*	*0.8*
100-250	93.4	6.6	*75.9*	*16.3*	*4.4*	*3.4*
>250	79.9	20.1	*48.9*	*13.9*	*9.5*	*27.6*
Number of Employees	*Services*					
<25	97.7	2.3	*77.9*	*9.9*	*3.1*	*9.1*
25-50	96.4	3.6	*85.0*	*8.6*	*3.0*	*3.4*
50-100	96.4	3.6	*76.2*	*10.7*	*5.3*	*7.8*
100-250	94.4	5.6	*75.6*	*10.5*	*6.8*	*7.1*
>250	87.8	12.2	*56.7*	*12.7*	*5.9*	*24.7*

Table 3: Probit Model of Multinationality

	1 **Manufacturing**	**2** **Services**	**3** **Manufacturing**	**4** **Services**
Employment	0.023	0.012		
	(22.06)**	(29.09)**		
Labour productivity	0.004	0.006		
	(2.02)*	(8.99)**		
Output for Dom. Mkt			0.019	0.010
			(18.80)**	(25.85)**
Capital/ Labour			0.007	0.005
			(5.25)**	(12.44)**
Export dummy	0.000	0.014	-0.003	0.013
	(0.14)	(7.03)**	(0.70)	(6.06)**
Export Share	0.043	0.037	0.091	0.061
	(7.49)**	(12.28)**	(13.97)**	(16.75)**
Observations	11649	35977	11343	33799

*Notes: The estimated model is a Probit model. The dependent variable is a 0/1 indicator of whether the firm is a multinational or not. The sample excludes all foreign owned firms. The reported coefficients are the marginal effects calculated at the mean of the right hand side variables. ** denotes significance at the five per cent level. Z-statistics from the test that the estimated coefficient is equal to zero are reported in parenthesis*

Table 4: Number of MNEs with Subsidiaries by Locations and Firm Size

Number of Employees	Number Located					
	US	*Western Europe*	*Australia, Canada, Japan, NZ and South Africa*	*Central and Eastern Europe*	*South East Asia, China & India*	*Other countries*
Manufacturing						
<25	8	43	5	2	0	5
25-50	17	47	6	1	1	6
50-100	43	78	6	5	3	6
100-250	55	151	12	11	9	11
>250	212	371	147	58	101	132
Total	*335*	*690*	*176*	*77*	*114*	*160*
Services						
<25	72	258	42	21	16	37
25-50	41	174	28	6	9	16
50-100	57	184	24	5	19	22
100-250	81	275	35	14	14	23
>250	220	614	171	66	116	138
Total	*471*	*1505*	*300*	*112*	*174*	*236*

Table5: The location decision of UK multinationals

	1 **Manufacturing**	2 **Services**	3 **Manufacturing**	4 **Services**
Employment	0.002	0.001	0.002	0.002
	(17.07)**	(12.74)**	(17.06)**	(12.51)**
Labour productivity	0.000	0.000	0.000	0.001
	(0.41)	(3.41)**	(0.57)	(3.51)**
Export dummy	-0.000	0.001	-0.000	0.001
	(0.64)	(2.39)*	(0.80)	(2.31)*
GDP	0.002	0.002	0.002	0.002
	(39.43)**	(42.27)**	(39.54)**	(42.29)**
GDP per capita	0.002	0.003	0.002	0.003
	(9.27)**	(16.57)**	(6.17)**	(9.19)**
Distance	-0.002	-0.002	-0.003	-0.003
	(17.75)**	(19.72)**	(17.54)**	(19.39)**
R. Ireland Dummy	-0.001	0.000	-0.002	0.001
	(4.63)**	(0.56)	(4.12)**	(1.39)
English Language	0.009	0.008	0.011	0.009
	(21.60)**	(19.73)**	(19.83)**	(18.13)**
European dummy	0.001	0.001	0.001	0.002
	(3.70)**	(4.55)**	(4.45)**	(5.65)**
OECD dummy	-0.000	0.000	-0.000	0.000
	(0.58)	(1.24)	(1.58)	(0.15)
Human capital			0.001	0.002
			(2.26)*	(3.95)**
Observations	76528	147456	63387	122880

*Notes: The estimated model is a Probit model. The dependent variable is a 0/1 indicator of whether the firm is located in a given country. The sample includes only multinationals. The reported coefficients are the marginal effects calculated at the mean of the right hand side variables. ** denotes significance at the five per cent level*

Table 6: The location decision of UK multinationals – the role of human capital

	1 Manufacturing	2 Services	3 Manufacturing	4 Services
Human capital	0.001	0.002	0.001	0.004
	(1.65)	(3.14)**	(0.70)	(2.52)*
*HC*English*	0.006	0.004	0.014	0.009
	(5.73)**	(3.86)**	(5.95)**	(3.66)**
Log (journal articles)			0.014	0.001
			(8.17)**	(2.19)*
Observations	63387	122880	44062	86016

*Notes: The estimated model is a Probit model. The dependent variable is a 0/1 indicator of whether the firm is located in a given country. The sample includes only multinationals. The reported coefficients are the marginal effects calculated at the mean of the right hand side variables. ** denotes significance at the five per cent level. The model includes all of the firm and country control variables reported in reported in regressions 3 and 4 in Table 5, along with dummy variables for each 3-digit industry.*

Table 7: The location decision of UK multinationals – The role of policy

	1 Manufacturing	2 Services	3 Manufacturing	4 Services	5 Manufacturing	6 Services
Size of Govt.	0.000	0.000	0.000	0.000	0.001	0.000
	(2.32)*	(1.69)+	(2.08)*	(2.88)**	(2.54)*	(1.46)
Legal system & prop right	0.000	0.001	0.001	0.001	0.000	0.000
	(4.00)**	(5.45)**	(4.28)**	(5.39)**	(0.83)	(1.38)
Macro Stability	-0.000	-0.000	-0.000	-0.000	-0.000	-0.001
	(1.45)	(2.99)**	(2.18)*	(1.10)	(0.98)	(2.79)**
International Trade	0.000	0.001			-0.000	0.001
	(0.13)	(4.67)**			(0.31)	(4.43)**
Regulation	0.001	0.000	0.001	0.000	0.001	0.000
	(4.07)**	(2.04)*	(2.83)**	(1.98)*	(1.80)	(0.19)
Taxes on Int. Trade			-0.000	0.000		
			(0.29)	(0.48)		
Int. Capital Mkt. Control			0.000	0.000		
			(2.08)*	(0.78)		
Regulatory Trade barrier			-0.000	0.001		
			(0.21)	(4.00)**		
Corruption					-0.001	-0.001
					(2.91)**	(3.55)**
Observations	62614	121344	60295	116736	51019	99840

*Notes: The estimated model is a Probit model. The dependent variable is a 0/1 indicator of whether the firm is located in a given country. The sample includes only multinationals. The reported coefficients are the marginal effects calculated at the mean of the right hand side variables. ** denotes significance at the five per cent level. The model includes all of the firm and country control variables reported in reported in regressions 1 and 2 Table 6, along with dummy variables for each 3-digit industry.*

Table 8: The location decision of UK multinationals – The role of ICT

	1 **Manuf.**	2 **Services**	3 **Manuf.**	4 **Services**
ICT exports	0.000 (1.96)*	-0.000 (0.08)		
ICT imports			0.000 (2.82)**	0.000 (5.59)**
Internet penetration	0.003 (6.53)**	0.003 (8.10)**	0.002 (5.26)**	0.002 (5.34)**
Observations	57976	113664	57976	113664

*Notes: The estimated model is a Probit model. The dependent variable is a 0/1 indicator of whether the firm is located in a given country. The sample includes only multinationals. The reported coefficients are the marginal effects calculated at the mean of the right hand side variables. ** denotes significance at the five per cent level. The model includes all of the firm and country control variables reported in regressions 1 and 2 of Table 7, along with dummy variables for each 3-digit industry.*

Table 9: The location decision of UK multinationals – industry differences

	1 **Manuf.**	2 **Services**	3 **Manuf.**	4 **Services**
Industry Capital-labour ratio	0.001 (2.85)**	0.001 (2.52)*		
Total International Outsourcing			0.002 (12.32)**	-0.002 (1.73)+
Observations		113664	57976	107078

*Notes: The estimated model is a Probit model. The dependent variable is a 0/1 indicator of whether the firm is located in a given country. The sample includes only multinationals. The reported coefficients are the marginal effects calculated at the mean of the right hand side variables. ** denotes significance at the five per cent level. The model includes all of the firm and country control variables reported in reported in regressions 3 and 4 in Table 8, along with dummy variables for each 3-digit industry.*
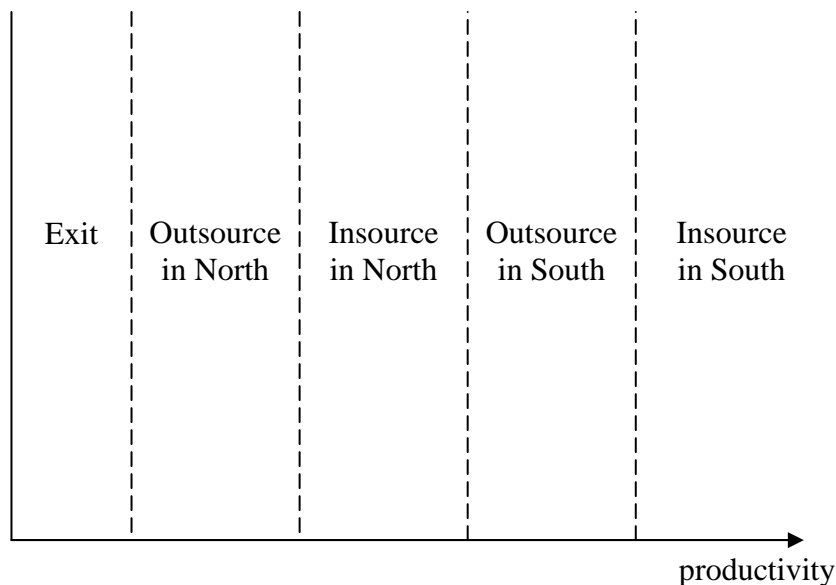
Table 10: The location decision of UK manufacturing multinationals – industry and policy differences

	1 **Manufacturing** *Industry KL ratio*	2 **Manufacturing** *Industry KL ratio*	3 **Manufacturing** *Total Internat Outsourcing*	4 **Manufacturing** *Total Internat Outsourcing*
X				
Industry KL ratio	0.001 (1.57)	0.002 (2.25)*		
Total Internt Outsourcing			0.006 (5.39)**	0.006 (5.10)**
*X * Lgl sytm & prop right*	-0.000 (0.53)		-0.000 (1.99)*	
*X * Regulation*		-0.000 (1.53)		-0.000 (1.98)*
Observations			57976	57976

Table 11: The location decision of UK service sector multinationals – industry and policy differences

	1 **Services** *Industry KL ratio*	2 **Services** *Industry KL ratio*	3 **Services** *Total Internat Outsourcing*	4 **Services** *Total Internat Outsourcing*
X				
Industry KL ratio	0.002 (3.70)**	0.003 (3.91)**		
Total Internt Outsourcing			-0.004 (2.17)*	-0.003 (1.70)+
*X * Lgl sytm & prop right*	-0.000 (2.76)**		0.000 (1.28)	
*X * Regulation*		-0.000 (3.16)**		0.000 (0.70)
Observations	113664	113664	107078	107078

Figure 3: Sorting Pattern in Headquarter Intensive Industries

| Exit | Outsource in North | Insource in North | Outsource in South | Insource in South |

productivity

Source: copied from Helpman (2006), p617.

Table 12: The location decision of UK multinationals –differences in the effect of productivity between OECD and non-OECD countries in headquarter intensive industries

	1 Manuf.	2 Services	3 Manuf.	4 Services	5 Manuf.	6 Services
Labour productivity	0.000 (0.72)	0.001 (3.53)**	0.002 (0.82)	-0.000 (0.38)		
Headquarter intensity	0.000 (0.44)	0.001 (2.20)*	0.000 (0.34)	0.001 (2.23)*	-0.000 (0.90)	-0.000 (0.27)
Lab prod^2			-0.000 (0.99)	0.000 (0.53)		
*Lab prod *OECD*			-0.002 (0.76)	0.002 (1.66)+		
*Lab prod^2 *OECD*			0.000 (1.46)	-0.000 (0.97)		
*Lab prod * HQ*					0.000 (1.66)+	0.000 (1.84)+
*Lab prod^2 *HQ*					-0.000 (1.46)	-0.000 (1.60)
*Lab prod *HQ*OECD*					-0.000 (3.25)**	-0.000 (2.85)**
*Lab prod^2 *HQ*OECD*					0.000 (3.49)**	0.000 (3.24)**
Observations	56701	113146	56701	113146	56701	113146

*Notes: The estimated model is a Probit model. The dependent variable is a 0/1 indicator of whether the firm is located in a given country. The sample includes only multinationals. The reported coefficients are the marginal effects calculated at the mean of the right hand side variables. ** denotes significance at the five per cent level. The model includes all of the firm and country control variables reported in reported in regressions 1 and 2 Table 6, along with dummy variables for each 3-digit industry.*

Table 2: SIC Codes Used

SIC Code	Industry
15	Manufacture of food products & beverages
16	Manufacture of tobacco products
17	Manufacture of medical, precision & optical instruments, watches & clocks
18	Manufacture of radio, television & communication equipment
19	Manufacture of machinery & equipment
20	Manufacture of electrical machinery
21	Manufacture of textiles
22	Manufacture of chemicals & chemical products

23	Manufacture of other transport equipment
24	Manufacture of rubber & plastic products
25	Manufacture of wearing apparel
26	Manufacture of basic metals
27	Manufacture of motor vehicles, trailers & semi-trailers
28	Manufacture of office machinery
29	Manufacture of fabricated metal products (except machinery)
30	Manufacture of furniture & other manufacturing
31	Manufacture of pulp, paper & paper products
32	Manufacture of other non-metallic mineral products
33	Manufacture of leather & leather products
34	Manufacture of wood & wood products
35	Processing of nuclear fuel
36 45	Publishing printing & reproduction of recorded media
50	Construction
	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel
51	Wholesale trade and commission trade
52	Retail trade; repair of personal and household goods
55	Hotels and restaurants
60	Land transport
61	Water transport
62	Air transport
63	Supporting and auxiliary transport activities; activities of travel agencies
64	Post and telecommunications
65	Financial intermediation, except insurance and pension funding
66	Insurance and pension funding, except compulsory social security
67	Activities auxiliary to financial intermediation
70	Real estate activities
71	Renting of machinery and equipment
72	Computer and related activities
73	Research and development
74	Other business activities

GDP,

GDP per capita are measured in US$ at PPP exchange rates. These data are from the IMF and for 2005 and are available for 123 countries.

Fraser Institute index are from the year 2004 and are available for 106 countries. These data include the following

Index Measuring	*Includes information on*

Legal Structure and Property Rights	• Judicial independence: the judiciary is independent and not
	
	  subject to interference by the government or parties in disputes
	• Impartial courts: A trusted legal framework exists for private
	
	  businesses to challenge the legality of government actions or

Macroeconomic Stability	• • Military interference in rule of law and the political process
	• Integrity of the legal system
	Standard inflation variability in the last five years.
Credit Market Regulation •	
	• Ownership of banks: percentage of deposits held in privately owned banks.
	• Competition: domestic banks face competition from foreign banks
	• Extension of credit: percentage of credit extended to private sector.
	• Avoidance of interest rate controls and regulations that lead to negative real interest rates.
	• Interest rate controls: interest rate controls on bank deposits and/or loans are freely determined by the market
Business Regulations •	Price controls: extent to which businesses are free to set their own prices.
	• Administrative conditions and new businesses: administrative procedures are an important obstacle to starting a new business
	▪ Time with government bureaucracy: senior management spends a substantial amount of time dealing with government bureaucracy
	▪ Starting a new business: starting a new business is generally easy
	• Irregular payments: irregular, additional payments connected with import and export permits, business licenses, exchange controls, tax assessments, police protection, or loan applications are very rare
Labour Market Regulations •	Impact of minimum wage: the minimum wage, set by law, has little impact on wages because it is too low or not obeyed
	• Hiring and firing practices: hiring and firing practices of companies are determined by private contract
	• Share of labor force whose wages are set by centralized collective bargaining
	• Unemployment Benefits: the unemployment benefits system preserves the incentive to work
	Use of conscripts to obtain military personnel
International Capital • **Market Controls**	• Access of citizens to foreign capital markets and foreign access to domestic capital markets.
	Restrictions on the freedom of citizens to engage in capital
	• market exchange with foreigners—index of capital controls among 13 IMF categories.

Human capital measured as the mean years of schooling of the population aged over 25. This data is taken from the update of Barro and Lee (2000) and is available for 92 countries.

Corruption measured using the Transparency International corruption perception index. These data are for 2003 and are for 86 countries.

Distance, measured as by the great arc circle distance, dummies indicating common language, common borders (Republic of Ireland Dummy), membership of the EU and OECD all taken from Andrew Rose website . These data are available for a total of 107 countries. The countries included as using English as their primary language are Australia, Bahamas, Barbados, Cameroon, Canada, Fiji, Ghana, Guyana, Hong Kong, India, Ireland, Jamaica, Malawi, Malta, Mauritius, New.Zealand, Nigeria, Philippines, Singapore, Solomon Islands, South Africa, Tanzania, Trinidad and Tobago, USA, Uganda, Zambia, Zimbabwe. Summary information on the variables used in the regressions are available in Table ~.

	Observations	Mean	Standard deviation	Min	Max
Log(GDP)	123	11.37	1.87	6.86	18.29
Log(GDP per capita)	123	9.02	1.15	6.56	11.30
Log(Distance)	103	8.47	0.92	5.77	9.84
R. Ireland	107	0.01	0.10	0.00	1.00
English Language	107	0.25	0.44	0.00	1.00
Regional	107	0.08	0.28	0.00	1.00
OECD Dummy	107	0.19	0.39	0.00	1.00
Log(Human capital)	92	1.79	0.55	-0.27	2.51
Size of Govt.	106	6.02	1.43	2.54	9.18
Legal system & property rights	106	5.49	2.02	1.08	9.17
Macro stability	106	8.11	1.64	0.00	9.80
International Trade	106	6.93	1.15	1.88	9.48
Regulation	106	6.09	0.98	3.63	8.51
Taxes on Int. Trade	99	7.53	1.54	2.83	10.00
Int. Capital Mkt. Control	99	5.57	2.36	0.00	9.31
Regulatory Trade barrier	95	6.46	1.50	0.61	9.47
Corruption	86	5.36	2.45	0.30	8.70

Industry Offshoring

This definition is taken from Geishecker (2006). Offshoring is measured as the value of an industry's imported intermediate inputs from industries abroad as a share of the domestic

industries output. In order to allocate imports according to their use as inputs across industries we employ input-output tables for the UK. This enables us to observe the share of imports from an industry abroad that is used by the domestic industry in a given period (denoted k in the equation below).

Formally, offshoring in domestic industry j in year t is defined as

$$OFFjt = | (IMPjt * kjt) / Yjt$$

Where *IMP* are imports, k is the proportion of imports used by the domestic industry, and *Y* is industry output. By differentiating imports by the origin while assuming k to be constant across countries one can construct offshoring measures for different geographic regions.

Data come from OECD trade statistics, UK Input output tables and the EU KLEMS database (available at http://www.euklems.org/).