How do firms' outward FDI strategies relate to their activity at home? Empirical evidence for the UK

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Abstract: I investigate the structure of firms' outward FDI and their behaviour at home in both manufacturing and business service sectors. UK multinationals that invest in low-wage economies also invest in a large number of high-wage countries. I find that firms with a greater number of overseas operations are more productive, consistent with being able to bear the costs of investing in numerous locations abroad. I find that UK manufacturing plants owned by large scale, low-wage economy outward investors display lower employment growth, in particular in low-skill industries, consistent with low-wage economy labour substituting for low-skill industry labour in the UK.

Keywords: multinational enterprises; skills; globalisation

JEL classification: F2

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1 Introduction

This paper provides evidence on the relationship between the structure of firms' overseas foreign direct investment (FDI) and the performance and organisation of their home-country operations. To do this it combines firm-level data on the geographic location of outward FDI with within-firm, plant-level data on home-country activity. Understanding the adjustment mechanisms of multinational firms is important in the context of the relaxation of barriers to inward investment in low-wage economies, such as China's accession to the WTO in 2001. How multinational firms structure their operations globally, both production activity and service operations, is of interest since they comprise a substantial proportion of employment in OECD economies. Bernard and Jensen (2007) report that US multinationals account for 26% of manufacturing employment in the US; in the UK in 2003 UK multinationals accounted for 16% of manufacturing employment and 9% of employment in the business services sector, with foreign-owned multinationals accounting for a further 26% and 14% in the two sectors respectively.[1] International restructuring can potentially affect large numbers, and particular groups of workers, and is of considerable interest to governments.

The paper contributes to the literature by considering both heterogeneity in firms' outward FDI strategies and heterogeneity in firm behaviour at home, distinguishing between activity in high- and low-skill manufacturing industries. I differentiate between firms that invest abroad in relatively low-wage economies and hence might be engaged in vertical FDI, and those that only invest in high-wage economies. I find that firms that invest in low-wage economies also invest in a large number of high-wage economies, employing complex FDI strategies (Yeaple, 2003a). My findings support the proposition that only the most productive firms become multinationals (Melitz, 2003). For both manufacturing and business services activity I demonstrate that those

[1] See also Griffith et al. (2004) for evidence covering a wider range of sectors.

firms investing in a larger number of countries (including low-wage economies) have higher total factor productivity than firms that only make investments in a smaller number of high-wage economies, consistent with the former being able to overcome large fixed costs of establishing multiple overseas facilities.

Firms' overseas investment strategies may affect activity at home, with potentially differential impacts on high and low-skill activities. Relocating low-skill activity to relatively low-wage economies could enable a firm to reduce costs and expand output, with potential positive impacts on investment, employment and output in complementary (high-skill) activities at home. I find evidence consistent with differential effects of vertical FDI on firms' high and low-skill manufacturing activity in the UK, although do not establish a causal relationship.

By examining employment growth I find some evidence that for firms investing in low-wage economies, labour in relatively low-wage countries may substitute for relatively low-skilled labour in the UK. This is in line with firms locating activity globally according to countries' comparative advantage, and suggests that low-skill workers are those most likely to be adversely affected by their employers investing overseas in low-wage economies. In addition I find that in high-skill manufacturing industries UK multinationals that invest in low-wage economies are larger, more productive, more capital intensive and more intensive in their use of intermediate inputs than other UK multinationals and purely domestic firms. These differences are less pronounced in low-skill manufacturing industries. I find few systematic relationships between the characteristics of firms' outward investments and their UK business services activity.

The paper is structured as follows. The next section outlines some brief theoretical and empirical background. Section 3 describes the data and presents some descriptive statistics on firms' outward FDI strategies. Section 4 presents the main empirical results and section 5 concludes.

2 Outward FDI and firm adjustment

The theoretical literature on multinational enterprises (MNEs) differentiates between horizontal FDI, the replication of home country activity abroad in proximity to customers as a substitute for exporting, and vertical FDI, locating different stages of the production chain, or for multi-product firms locating the production of different goods, geographically according to countries' comparative advantage.[2] In practice MNEs undertake both types of overseas investment simultaneously (Yeaple, 2003a), however horizontal and vertical FDI can have different implications for the skill-intensity of an MNE's home-country operations. A key difference is that while horizontal FDI could imply an increase in the skill-intensity of production at home (either through the manufacture of low skill-intensity products abroad that would otherwise have been produced at home and exported, or through the expansion of headquarter or R&D services at home), this would be expected to occur irrespective of the economic characteristics of the host economy. Whereas if firms engage in vertical FDI effects on home country operations would be expected to be systematically related to the economic characteristics of host economies relative to those of the home country.

Under vertical FDI firms would be expected to locate (low) skill-intensive activities in (low) skill-abundant countries. Hence the relocation of activity to a relatively low skill-abundant, low-wage country would be expected to be associated with an increase in the skill-intensity of firm production at home. If the good is subsequently used as an intermediate input in production in the home country there may also be an increase in the use of imported inputs. Empirical evidence exists in support of this. Head and Ries (2002) using data on outward investment by Japanese firms find that an increase in investment in relatively low per-capita GDP economies

[2] Examples of models of horizontal multinationals are Markusen (1984) and Brainard (1997) and of vertical multinationals, Helpman (1984, 1985); Venables (1999) contains elements of both types of activity.

was associated with an increase in the skill-intensity of firms' employment in Japan, and with increased purchases of imported goods.

Brainard and Riker (1997) and Riker and Brainard (1997) also find evidence consistent with MNEs engaging in vertical FDI. They find that labour in affiliates in high-income countries is a substitute for labour in affiliates in other high-income countries (i.e. countries with similar skill levels) and a complement for labour in low-wage economies. They also find that labour in low-wage economies competes to carry out those activities most sensitive to labour costs. Braconier and Ekholm (2000) find some evidence that home country employment in Swedish multinationals is a substitute for employment in affiliates in high-income host countries.[3]

Firms invest overseas for a reason, to increase profits or even to survive, hence outward investment may lead to higher investment, employment and output compared to if the firm had not chosen to produce abroad. For a firm engaged in vertical FDI locating low-skill activities abroad any increase in activity at home might be expected to occur in complementary high-skill activities – potentially high-skill manufacturing or headquarter or R&D services. Using data on US MNEs in manufacturing and their overseas affiliates Desai et al. (2005) observe that firms whose operations grow overseas also exhibit growth in their domestic (US) activities, and conclude that rather than crowding out domestic activity by the same firms, overseas activity increases domestic activity. Harrison and McMillan (2007) use similar data but distinguish between affiliates located in low-income versus high-income countries. They find that labour in low-income countries substitutes for labour at home, and that labour in high-income countries is a complement to that in the US, suggesting that the finding of Desai et al. (2005) is driven by the latter effect. Barba Navaretti et al. (2007) compare the behaviour of firms that become

[3] Further research includes Hanson et al. (2003) and Konings and Murphy (2001). See also Chapter 9 of Barba Navaretti and Venables (2004) for a summary of research on home-country effects of outward FDI. Yeaple (2003) provides an industry-level analysis which finds a role for comparative advantage in explaining the pattern of U.S. outward FDI. Hanson et al. (2005) analyse within-firm trade and vertical production networks by exploiting variation across affiliates operating in the same industry in different locations owned by the same firm.

multinationals in France and Italy to that of firms that remain purely domestic, and also differentiate between FDI in low-wage versus developed economies. They find no evidence of negative effects and some evidence of positive scale effects on domestic activity. However, these studies do not differentiate between employment effects for workers with different skill-levels[4] or heterogeneous effects of outward investment on different types of activity *within* firms in the home economy.

Finally, it is clear that not all firms engage in FDI. Theory suggests that only the most productive firms will invest overseas due to the high fixed costs of establishing operations abroad, (Melitz, 2003). Criscuolo and Martin (2005) provide recent evidence on the productivity advantage of MNEs for the UK. If, as is likely, fixed costs are increasing the number of overseas affiliates established, then a positive correlation between productivity and the global scale of a firm's operations might be expected, an issue I investigate below and which is also explored in Yeaple (2008).

One issue is that in order to isolate empirically any effect of outward investment or of a specific outward investment strategy it is necessary to address the endogeneity of the investment decision both with respect to potential reverse causality and unobservable firm characteristics correlated with outward investment behaviour. Rather than try and establish causal effects I look for supportive evidence in line with differential impacts of firms' outward FDI strategies by comparing the behaviour of firms taking different outward investment decisions. As discussed above theory suggests that any effects may also vary with industry or product characteristics, hence I also compare firms' behaviour in high and low-skill industries in order to provide descriptive evidence on potential heterogeneous impacts on different types of workers. The next section describes the data I use to do this.

[4] See Fabbri et al. (2003) for evidence on multinational ownership and the elasticity of labour demand for less-skilled workers, and Hijzen et al. (2005) for industry-level evidence on outsourcing and the skill-structure of labour demand.

3 Data and descriptive statistics

3.1 Overseas investment

I use information on overseas investment from the UK Office for National Statistics (ONS) Annual Inquiry into Foreign Direct Investment (AFDI) to identify UK multinational firms (UK-MNEs) and the structure of their outward FDI. The AFDI register contains annual information on the population of firms undertaking outward investment from the UK, on the country of location of their overseas subsidiaries, associates and branches, and on the 2-digit industry of the outward investment activity.[5] I use the data from 1998 to 2004.

I define a UK-MNE as a firm that makes at least one outward investment from the UK, and which is not itself classified as owned by a foreign multinational, (i.e. I exclude UK-based affiliates of, for example, US multinationals making outward investments to other European countries from the UK). I combine the AFDI data with data on countries' GDP per capita relative to that in the UK to create a firm-level indicator for investment in low-wage economies. I define an investment in a low-wage economy as an overseas operation in a country with per capita GDP of less than 10% of that in the UK in a particular year. However, in doing this I exclude overseas operations in countries designated as tax havens. This is because the register is used for the purpose of collecting FDI data which relate to all financial flows to overseas affiliates, rather than just those relating to investment in fixed capital assets. These, along with the countries with per capita GDP less than 10% of the UK where I observe overseas affiliates, are listed in Table A1 in the Appendix.

[5] No information on the size of the affiliate is provided. A subsidiary is an overseas company where the UK parent holds the majority of the voting rights and can exercise a dominant influence, an overseas associate company is one where the UK parent holds at least 10% of the voting rights and can exercise a significant influence, and a branch is a permanent overseas establishment defined for the purpose of UK tax and double taxation agreements. This is a fixed place of business abroad through which the UK company operates but which is not a subsidiary or associate company. The population of firms in the register increases over the period and then decreases. Part of the increase may be due to the inclusion of outward investors that were previously missing from the register. This may mean I mis-classify some UK-MNEs as domestic firms in 1998.

Table 1 provides information on the number of UK-MNEs engaged in outward investment, and on the average number of countries in which they have affiliates overseas. The table splits UK-MNEs into three types: those that are investing in both low-wage, (based on the definition above), and high-wage economies;[6] those that are only investing in low-wage economies; and those that are only investing in high-wage economies. The vast majority of UK-MNEs are in the final group.

What is distinctive is that those UK-MNEs that do invest in both types of economy, and which might be engaging in both vertical and horizontal FDI simultaneously, typically invest in a much larger number of countries. Overall, the number of low-wage countries and high-wage countries that firms invest in is highly positively correlated (0.80). This is in line with the evidence of Mayer et al. (2007) on the outward investment strategies of French multinational firms. Given this, and if investment abroad is associated with significant fixed costs, we might expect these multinationals to be among the most productive firms. But it also implies that it will be difficult to cleanly distinguish between behaviour associated with investment in low-wage economies versus investment in a large number of countries. In the analysis in section 4 I differentiate between two types of UK-MNEs: those which invest in low-wage economies (columns (2) and (3) of Table 1) and those which only invest in high-wage economies (column (4) of Table 1), in addition to comparing firms according to the number of overseas operations they have.

[6] For ease of exposition I will refer to all countries with per-capita GDP greater than 10% of the UK as high-wage economies, although there is clearly a great deal of heterogeneity among this group of countries.

Table 1. Outward investment: number of countries invested in by firm type and year

Year	All UK-MNEs (1)		Investing in low-wage and high-wage countries (2)			Only investing in low-wage countries (3)		Only investing in high-wage countries (4)	
	Mean no. countries	Number firms	Mean no. low-wage countries	Mean no. high-wage countries	Number firms	Mean no. low-wage countries	Number firms	Mean no. high-wage countries	Number firms
1998	4.11	2,269	3.88	18.38	217	1.27	11	2.19	2,041
1999	3.67	2,817	3.88	17.69	227	1.12	25	2.11	2,565
2000	3.31	3,117	3.61	16.50	235	1.06	81	1.96	2,801
2001	3.31	3,222	3.70	16.09	246	1.06	85	1.97	2,891
2002	3.30	3,021	2.45	15.41	240	1.01	80	1.98	2,701
2003	3.73	2,599	3.72	16.86	238	1.03	86	2.07	2,275
2004	3.88	2,267	3.72	16.97	239	1.00	87	1.94	1,941

Note: figures are averages across firms by firm type.
Source: author's calculations using AFDI data (Source: ONS).

Table 2. Outward investment: manufacturing and business services investments, number of countries invested in by firm type

	Invest in business services?			Invest in business services in low-wage country?	
	Yes	No		Yes	No
Invest in manufacturing?			**Invest in manufacturing in low-wage country?**		
Yes *(obs)*	*(356)*	*(6,091)*	**Yes** *(obs)*	*(24)*	*(733)*
Manufacturing no. low-wage countries	1.68	0.32	Manufacturing no. low-wage countries	8.21	3.18
Manufacturing no. high-wage countries	11.20	3.22	Manufacturing no. high-wage countries	23.83	14.82
Business services no. low-wage countries	0.37	-	Business services no. low-wage countries	4.08	-
Business services no. high-wage countries	4.29	-	Business services no. high-wage countries	15.88	0.65
No *(obs)*	*(4,665)*	*(8,200)*	**No** *(obs)*	*(292)*	*(18,263)*
Manufacturing no. low-wage countries	-	-	Manufacturing no. low-wage countries	-	-
Manufacturing no. high-wage countries	-	-	Manufacturing no. high-wage countries	0.23	0.66
Business services no. low-wage countries	0.17	-	Business services no. low-wage countries	2.77	-
Business services no. high-wage countries	2.48	-	Business services no. high-wage countries	11.76	0.48

Note: figures are averages across firm-year observations by firm type.
Source: author's calculations using AFDI data (Source: ONS).

Table 2 looks at whether firms invest abroad in manufacturing and business service sectors, the extent to which they do so in low-wage countries and the degree to which they make investments in these two sectors simultaneously. The table shows the average number of countries in which firms invest, across firms employing different outward investment strategies and years. The left hand panel of the table shows that firms that make overseas investments in both manufacturing and business service sectors on average invest in a higher number of both low and high-wage countries than firms that only invest abroad in one of these sectors. A large number of firms invest in neither of these sectors, for example those that only invest abroad in agricultural or primary industries. The right hand panel of the table again illustrates that firms making investments in low-wage economies, in this case specifically in manufacturing and business services, typically invest in a larger number of countries, in particular the small minority of firms that invest in low-wage countries in both of these sectors. Firms generally have operations in a larger number of countries in manufacturing than in business services.

3.2 UK plants and establishments

My second data source is the plant and establishment-level data from the British Annual Respondents Database (ARD).[7] The AFDI information can be linked to the ARD data at the firm level.[8] To analyse employment and employment growth I use data on the *population* of plants in manufacturing and business service sectors over the period 1998 to 2003. This contains very basic information on employment, age, 5-digit industry, ownership (including whether a

[7] See Barnes and Martin (2002) and Griffith (1999) for a full description. It is a legal requirement for firms to respond to the ARD survey. The ARD contains indicators of whether a UK-based plant is owned by a foreign multinational. This information is collected alongside the outward AFDI investment data. The definition of foreign direct investment used for statistical purposes in collecting the inward and outward FDI data is, "*investment that adds to, deducts from or acquires a lasting interest in an enterprise operating in an economy other than that of the investor, the investor's purpose being to have an "effective voice" in the management of the enterprise. (For the purposes of the statistical inquiry, an effective voice is taken as equivalent to a holding of 10% or more in the foreign enterprise.)."* Office for National Statistics (2000).

[8] See Criscuolo and Martin (2005) and Griffith et al. (2004) for analyses using these linked data.

plant is owned by a foreign-multinational) and firm structure, and allows me to incorporate entry and exit into the analysis.

Further characteristics, such as productivity and capital intensity, can only be examined using the ARD establishment-level sample, where an establishment can comprise more than one plant in the same line of business under common ownership. I also use these data over the period 1998 to 2003.[9] I account for the sample stratification by using inverse sampling probabilities as weights in all regressions, however the way the sample is structured means that the probability of being sampled increases with establishment size, and hence the sample may be biased towards growing, surviving plants. For manufacturing industries I use 4-digit industry level deflators to construct real values of output, intermediate inputs etc. Due to a lack of detailed industry-level deflators for business service sectors I use 4-digit industry-year dummies in the regression analysis instead. I provide some descriptive information on these data in section 4.

I also use the plant population data to construct further firm characteristics. I construct three indicators of multi-plant firms: whether a plant is part of a firm with other plants in the same 5-digit industry; for the analysis of manufacturing, whether the plant is part of a firm with plants in other 5-digit manufacturing industries; and for the analysis of business services, whether the plant is part of a firm with plants in other 5-digit business services industries. All refer only to activity in the UK. I construct similar variables using the establishment population data for use in conjunction with the establishment-level sample.

3.3 Industry characteristics

For the period I consider the ARD data do not contain a plant or establishment-level indicator of skill intensity, instead I construct an industry-level measure from the UK Labour Force Survey (LFS). I use a measure of the proportion of employees in an industry who report having no

[9] See Martin (2002) for more information on the construction of the capital stock data.

qualifications. I create a time-invariant average at the 4-digit industry level using data from 1995 to 2003.[10] The average share of employees with no qualifications is shown for 2-digit manufacturing industries and 3-digit business services industries in Table A2 in the Appendix. The sectors with the lowest skill-intensities in manufacturing include clothing, leather, textiles and rubber and plastics. I restrict the set of business services sectors to those activities that are likely to be geographically mobile or tradeable using information on trade in services from ONS (2007). This excludes business services such as real estate services**,** rental activities and industrial cleaning. The tradeable business services sectors, such as R&D, consultancy and IT services, are typically very high-skill sectors.

4 Evidence on the behaviour of outward investors at home

In this section I analyse the UK activities of UK-MNEs in a number of dimensions. In doing so I make comparisons across two types of UK-MNE, those that invest in low-wage economies (*UK-MNE_L*) which might be expected to be engaged in vertical FDI and those that only invest in high-wage economies (*UK-MNE_H*), and also make comparisons with plants owned by foreign-MNEs and with purely domestic firms. I also differentiate between outward investment strategies using data on the scale of firms' overseas operations as described in Tables 1 and 2. I distinguish between firm behaviour in high-skill versus low-skill manufacturing industries in the UK where vertical FDI might have differential effects, and between manufacturing and business service sectors. I begin by looking at a wide range of establishment characteristics including the relationship between total factor productivity and the scale of firms' outward investment. I then use the plant-level data to examine entry, exit and employment growth.

[10] I average over the LFS spring quarters for these years to increase the sample sizes on which the measure is based.

4.1 Establishment characteristics and productivity

I use the establishment-level sample described in section 3.2 to examine differences in characteristics for establishments owned by four types of firm (*UK-MNE_L*, *UK_MNE_H*, foreign multinationals and domestic firms). I examine differences in establishment size, labour productivity and input intensity. I run the following regression for each characteristic:

$$\log(characteristic)_{it} = \alpha + \beta_1 UK-MNE\_L_{it} + \beta_2 UK-MNE\_H_{it} + \beta_3 FOR_{it} + \chi'_{it}\gamma + t_t + ind_j + \varepsilon_{it} \quad (1)$$

where *UK-MNE_L*, *UK-MNE_H* and *FOR* are dummy variables indicating that the establishment is owned by a UK-MNE investing in a low-wage economy, a UK-MNE that only invests in high-wage economies, and a foreign-owned MNE respectively, (hence the omitted category is purely domestic establishments), χ is a vector of establishment characteristics which includes: age; a dummy variable to indicate that the establishment is part of a firm with other establishments in the same 5-digit industry; and a dummy variable to indicate that the establishment is part of a firm with other establishments in the manufacturing or business services sector respectively. *t* is a set of time dummies, and ind_j a set of 4-digit industry dummies. In the business services specifications I replace these final two sets of dummies with a single set of 4-digit industry-year dummies due to a lack of deflators for the characteristics variables at the level of narrowly defined industries. I cluster the standard errors at the firm level and all regressions are weighted using inverse sampling probabilities.

I use data over six years 1998-2003 and run separate regressions for establishments in manufacturing and business services, and within manufacturing for establishments in high-skill and low-skill industries. To do this I rank 4-digit manufacturing industries using the industry-level skill intensity measure (see section 3.3) and split them into thirds. I report results for the high-skill third (the third of industries with the lowest shares of employees with no qualifications, which includes industries in office machinery and computers and precision

instruments), and the low-skill third (those with the highest shares of employees with no qualifications, which includes industries in textiles and clothing and rubber and plastics). For ease of exposition Table 3 reports the estimated coefficients for each characteristic as percentage differences from the omitted category (domestic establishments), calculated as $\exp(\beta_i)-1$ for each of β_1, β_2 and β_3, along with indicators of statistical significance, and indicators of whether the β coefficients are significantly different from each other.

The table shows that in both manufacturing and business services establishments owned by multinationals are much larger in terms of output and employment than purely domestic establishments, that they exhibit higher labour productivity, are more capital intensive and use more intermediate inputs per employee. This pattern is well established (for UK evidence see Criscuolo and Martin, 2005 and Griffith et al., 2004). In terms of comparisons across the three different types of multinationals, affiliates of foreign MNEs typically exhibit the highest values of each of these characteristics in both manufacturing and business services. For manufacturing, establishments owned by UK-MNEs investing in low-wage economies generally have higher values of these characteristics than other UK-MNEs, and differences between these two types of firm are more pronounced in high-skill manufacturing activities compared to low. For business services the differences between the two types of UK-MNEs are less systematic.

Hence the findings for manufacturing point towards UK-MNEs investing in low-wage economies as having a lead over other UK-MNEs in terms of productivity and scale in relatively high-skill industries. This pattern, of advantages being clustered in high-skill sectors, is consistent with vertical FDI leading to benefits in industries where the home country may have a comparative advantage. But the results are not definitive as to whether these differences in performance are a result of overseas investment, or whether they can be explained by other firm-specific assets. In addition, as discussed above, investment in low-wage economies is very

highly correlated with the overall scale of a firm's outward investment (in terms of the number of countries in which a firm invests), making it difficult to distinguish empirically between these different types of outward investment strategy (overall scale, versus investment in low-wage economies). I explore this further below.

Table 3. Percentage differences in characteristics relative to domestic establishments, manufacturing and business services

	Manufacturing			Business services
	All industries	High-skill industries	Low-skill industries	All industries
Size				
Gross output				
UK-MNE_L	142% *** [a b]	183% *** [a b]	113% *** [b]	248% *** [b]
UK-MNE_H	94% *** [c]	97% *** [c]	83% *** [c]	334% *** [c]
Foreign-MNE	239% ***	264% ***	196% ***	560% ***
Employment				
UK-MNE_L	92% *** [b]	111% ***	76% ***	159% *** [b]
UK-MNE_H	71% *** [c]	71% *** [c]	63% *** [c]	248% ***
Foreign-MNE	130% ***	137% ***	113% ***	294% ***
Labour productivity and input intensity				
Gross output per employee				
UK-MNE_L	26% *** [a b]	34% *** [a b]	21% *** [b]	34% *** [b]
UK-MNE_H	13% *** [c]	16% *** [c]	12% *** [c]	25% *** [c]
Foreign-MNE	47% ***	54% ***	39% ***	68% ***
Capital stock per employee				
UK-MNE_L	34% *** [a b]	38% *** [a b]	33% *** [b]	53% *** [b]
UK-MNE_H	16% *** [c]	17% *** [c]	17% *** [c]	47% *** [c]
Foreign-MNE	60% ***	59% ***	52% ***	99% ***
Intermediate inputs per employee				
UK-MNE_L	31% *** [a b]	41% *** [a b]	28% *** [b]	65% *** [b]
UK-MNE_H	18% *** [c]	20% *** [c]	16% *** [c]	59% *** [c]
Foreign-MNE	68% ***	77% ***	56% ***	131% ***
Observations	39,396	13,538	13,678	15,633

Note: Figures reported are $\exp(\beta_i) - 1$ from equation (1). Establishment characteristics included in each regression: age; firm owns multi establishments in 5-digit industry dummy; firm owns multi establishments in manufacturing / business services dummy. Manufacturing regressions include 4-digit industry dummies and time dummies. Business services regressions include 4-digit industry-year dummies. Standard errors in parentheses clustered at the firm level. ***, **, * significant at 1%, 5%, 10% level. [a] β_1 significantly different to β_2 at 5% level, [b] β_1 significantly different to β_3 at 5% level, [a] β_2 significantly different to β_3 at 5% level.

Source: author's calculations using AFDI and ARD data (Source: ONS) and LFS data.

In addition to making labour productivity comparisons across the four groups of establishments I estimate production functions to investigate differences in total factor productivity (TFP). First I include the same three dummy variables for the three MNE ownership types in the regressions, as well as establishment characteristics, 4-digit industry dummies and time dummies (interacted for business services). Table 4 shows the results of this exercise.

Table 4. Total factor productivity: manufacturing and business services

Dep. var.: Ln(gross output)$_{it}$	**Manufacturing**			**Business services**
	All industries	**High-skill industries**	**Low-skill industries**	**All industries**
Ln(employment) $_{it}$	0.245***	0.252***	0.257***	0.438***
	(0.006)	(0.012)	(0.009)	(0.007)
Ln(intermediates) $_{it}$	0.597***	0.585***	0.596***	0.284***
	(0.007)	(0.013)	(0.013)	(0.011)
Ln(capital stock) $_{it}$	0.133***	0.142***	0.124***	0.234***
	(0.005)	(0.010)	(0.009)	(0.0011)
UK-MNE_L $_{it}$	0.049*** [a]	0.061*** [a]	0.020*	0.094**
	(0.010)	(0.016)	(0.012)	(0.043)
UK-MNE_H $_{it}$	0.022***	0.026**	0.018**	0.054* [c]
	(0.007)	(0.011)	(0.009)	(0.029)
Foreign-MNE $_{it}$	0.036***	0.045***	0.028***	0.179***
	(0.005)	(0.010)	(0.009)	(0.020)
Age $_{it}$	-0.0004**	-0.001***	-0.00005	0.008***
	(0.0002)	(0.0003)	(0.0003)	(0.003)
Multi manuf / bus. serv. dummy $_{it}$	0.010**	0.0004	0.013*	0.063***
	(0.005)	(0.008)	(0.008)	(0.020)
Multi industry dummy $_{it}$	0.020**	0.024**	0.015*	0.019
	(0.005)	(0.010)	(0.008)	(0.024)
4-digit industry dummies	Yes	Yes	Yes	No
Time dummies	Yes	Yes	Yes	No
4-digit industry-year dummies	No	No	No	Yes
R^2	0.98	0.98	0.98	0.95
Observations	39,396	13,538	13,678	15,633

Note: standard errors clustered at the firm-level in parentheses. ***, **, * significant at 1%, 5%, 10% level. [a] *UK-MNE_L* coefficient significantly different to *UK-MNE_H* coefficient at 5% level, [b] *UK-MNE_L* significantly different to *Foreign-MNE* at 5% level, [c] *UK-MNE_H* significantly different to *Foreign-MNE* at 5% level.
Source: author's calculations using AFDI and ARD data (Source: ONS) and LFS data.

For manufacturing the results indicate that overall UK-MNEs investing in low-wage economies have significantly higher TFP than establishments owned by other UK-MNEs (around 5% and 2% higher than domestic establishments respectively). Moreover, this advantage over UK-

MNEs that only invest in high-wage economies looks to result from significantly higher TFP in high-skill industries. Indeed the results point towards this group of establishments as having even higher TFP than foreign-owned establishments although the estimated coefficients are not statistically significantly different from each other. The results for business services imply that foreign-owned establishments have the highest TFP overall, and suggest that UK-MNEs that invest in low-wage economies have higher TFP than those that do not, although the differences are less clear than for manufacturing.

As shown in Table 1 those firms that invest in low-wage economies tend to invest in a large number of countries overall. Table 5 replaces the dummy variables for the two types of UK-MNEs with a single UK-MNE dummy variable and a count of the number of countries in which the firm is investing. The results for manufacturing indicate that firms that invest in a larger number of countries tend to have higher TFP, (in particular in relatively high-skill sectors). The coefficient on the number of investments is positive for business services, but estimated with less precision.

Table 5. Total factor productivity and the scale of outward investment: manufacturing and business services

	Manufacturing			**Business services**
Dep. var.: Ln(gross output) $_{it}$	**All industries**	**High-skill industries**	**Low-skill industries**	**All industries**
Total no. countries invested in $_{it}$	0.001**	0.001**	-0.0001	0.0017*
	(0.0004)	(0.0004)	(0.0005)	(0.0009)
UK-MNE $_{it}$	0.020***	0.024**	0.020**	0.046
	(0.007)	(0.011)	(0.009)	(0.028)
Foreign-MNE $_{it}$	0.036***	0.045***	0.028***	0.179***
	(0.006)	(0.010)	(0.009)	(0.020)
Other variables as Table 4	Yes	Yes	Yes	Yes
R^2	0.98	0.98	0.98	0.95
Observations	39,396	13,538	13,678	15,633

Note: Control variables as in Table 4. Standard errors clustered at the firm-level in parentheses. ***, **, * significant at 1%, 5%, 10% level.
Source: author's calculations using AFDI and ARD data (Source: ONS), and LFS data.

These results indicate that firms' TFP is positively related to the scale of their overseas investment activity, which is line with only the very most productive firms being able to overcome the high fixed costs of investing in a large number of geographic locations abroad. That this relationship is more pervasive in high-skill sectors (high-skill manufacturing and business services) is also of interest. For example, it may be the case that these large-scale outward investors, which are typically investing in low-wage economies, are reducing the extent to which they produce low-skill intensive goods in the UK, instead carrying out these activities abroad. In addition any beneficial effects of off-shoring that occur in the UK might be expected to be observed in complementary (high-skill) activities. In the next section I examine whether there is evidence that firms investing in low-wage economies are reducing the scale of their low-skill activities in the UK.

4.2 Employment and employment growth

To examine employment and employment growth among different types of firm I use the plant-level population data described in section 3.2. Table 6 shows how employment in manufacturing plants in 1998 and 2003 was split between plants owned by different types of firm, and how it was split between plants that were either survivors (present in the population in 1998 and 2003), exitors (present in the population in 1998 but not in 2003) and entrants (present in the population in 2003 but not 1998). Overall the table shows a decrease in manufacturing employment of around 700,000 employees, with the majority of this decrease being driven by net exit, rather than substantial reductions in employment by surviving plants.

Looking across the different ownership categories the table shows that in 1998 UK-MNEs investing in low-wage economies accounted for around 12% of manufacturing employment (9% + 3%) and UK-MNEs only investing in high-wage economies around 13%. Affiliates of foreign-owned multinationals located in the UK accounted for a further 17%. By 2003, the respective proportions were 6%, 10% and 26% respectively. Part of the substantial increase in employment

in surviving foreign-owned establishments appears to have been driven by changes in ownership.

Table 6. Change in employment 1998 to 2003 by firm-ownership type manufacturing industries

	Employment 1998 (1)		Employment 2003 (2)		Plants 1998 (3)	Plants 2003 (4)
Continuers	**2.77m**	**68%**	**2.68m**	**80%**	**100,700**	**100,700**
UK-MNE_L	0.38m	9%	0.16m	5%	1,500	1,100
UK-MNE_H	0.38m	9%	0.30m	9%	2,800	2,100
Foreign-MNE	0.49m	12%	0.74m	22%	2,200	5,000
Domestic	1.53m	38%	1.48m	44%	94,100	92,500
Exitors	**1.29m**	**32%**			**81,800**	
UK-MNE_L	0.14m	3%			1,400	
UK-MNE_H	0.15m	4%			2,200	
Foreign-MNE	0.19m	5%			1,800	
Domestic	0.81m	20%			76,400	
Entrants			**0.66m**	**20%**		**68,500**
UK-MNE_L			0.03m	1%		400
UK-MNE_H			0.05m	1%		1,100
Foreign-MNE			0.14m	4%		2,300
Domestic			0.44m	13%		64,700
All	**4.07m**	**100%**	**3.35m**	**100%**	**182,500**	**169,200**

Note: figures may not sum due to rounding.
Source: author's calculations using AFDI and ARD data (Source: ONS).

To examine where within the manufacturing sector the different types of firm concentrate their activities over time, in Table 7 I distinguish between high-skill and low-skill manufacturing industries. Employment in low-skill manufacturing industries fell by more than employment in high-skill manufacturing industries. In 1998, in a pattern consistent vertical FDI behaviour UK-MNEs investing in low-wage economies accounted for a much higher share of total employment in high-skill industries (19%, 280,000 employees) compared to low-skill industries (8%, 110,000 employees). This pattern of orientation of employment towards high-skill industries is also observed among plants owned by foreign-MNEs, whereas UK-MNEs that only invest in high-wage countries accounted for a higher share of employment in low-skill industries (15%, 210,000 employees in low-skill, 12%, 170,000 employees in high-skill industries). By 2003 UK-MNEs investing in low-wage economies had reduced their share of employment in high-

skill industries to 10%, and to only 2% in low-skill industries, whereas there was much less of a change in the shares of UK-MNEs only investing in high-wage economies (they still accounted for 11% of employment in low-skill industries and 12% of employment in high-skill industries).

Table 7. Change in employment 1998 to 2003 by firm-ownership type, high-skill and low-skill manufacturing industries

	Employment 1998		Employment 2003		Plants 1998	Plants 2003
High-skill industries		**(1)**		**(2)**	**(3)**	**(4)**
Continuers	**1.01m**	**70%**	**0.98m**	**79%**	**36,600**	**36,800**
UK-MNE_L	0.22m	15%	0.10m	8%	800	700
UK-MNE_H	0.13m	9%	0.13m	10%	1,300	1,000
Foreign-MNE	0.18m	13%	0.29m	23%	1,000	2,400
Domestic	0.48m	33%	0.46m	37%	33,400	32,700
Exitors	**0.42m**	**29%**			**28,500**	
UK-MNE_L	0.06m	4%			700	
UK-MNE_H	0.04m	3%			900	
Foreign-MNE	0.08m	6%			900	
Domestic	0.24m	17%			26,000	
Entrants			**0.26m**	**21%**		**26,700**
UK-MNE_L			0.02m	2%		300
UK-MNE_H			0.03m	2%		500
Foreign-MNE			0.07m	6%		1,200
Domestic			0.15m	12%		24,700
All	**1.44m**	**100%**	**1.24m**	**100%**	**65,100**	**63,500**
Low-skill industries						
Continuers	**0.87m**	**64%**	**0.85m**	**81%**	**27,000**	**27,400**
UK-MNE_L	0.07m	5%	0.02m	2%	300	200
UK-MNE_H	0.14m	10%	0.09m	9%	800	500
Foreign-MNE	0.10m	7%	0.19m	18%	500	1,200
Domestic	0.56m	41%	0.55m	52%	25,300	25,400
Exitors	**0.49m**	**36%**			**24,300**	
UK-MNE_L	0.04m	3%			400	
UK-MNE_H	0.07m	5%			700	
Foreign-MNE	0.04m	3%			400	
Domestic	0.34m	25%			22,900	
Entrants			**0.20m**	**19%**		**17,100**
UK-MNE_L			0.003m	0.3%		50
UK-MNE_H			0.02m	2%		300
Foreign-MNE			0.04m	4%		500
Domestic			0.14m	13%		16,200
All	**1.36m**	**100%**	**1.05m**	**100%**	**51,300**	**44,400**

Note: figures may not sum due to rounding. The total number of continuing plants can differ between 1998 and 2003 as plants can change industries.
Source: author's calculations using AFDI and ARD data (Source: ONS) and LFS data.

Table 8 shows the same information for the set of tradeable business service sectors. The sector saw employment growth of around 640,000 thousand employees over the period. UK-MNEs of

both types accounted for a similar share of employment in 2003 as in 1998, but foreign-MNEs increased their share considerably.

Table 8. Change in employment 1998 to 2003 by firm-ownership type tradeable business services industries

	Employment 1998 (1)		Employment 2003 (2)		Plants 1998 (3)	Plants 2003 (4)
Continuers	**0.87m**	**60%**	**1.06m**	**55%**	**143,400**	**143,400**
UK-MNE_L	0.04m	3%	0.04m	2%	500	400
UK-MNE_H	0.05m	3%	0.05m	3%	900	1,000
Foreign-MNE	0.06m	4%	0.12m	6%	600	2,200
Domestic	0.73m	50%	0.85m	44%	141,500	139,700
Exitors	**0.58m**	**40%**			**143,300**	
UK-MNE_L	0.03m	2%			1000	
UK-MNE_H	0.03m	2%			1,800	
Foreign-MNE	0.04m	3%			700	
Domestic	0.48m	33%			139,800	
Entrants			**0.87m**	**45%**		**199,500**
UK-MNE_L			0.03m	2%		400
UK-MNE_H			0.05m	2%		1,100
Foreign-MNE			0.16m	8%		3,200
Domestic			0.63m	33%		194,800
All	**1.45m**	**100%**	**1.93m**	**100%**	**286,700**	**342,900**

Note: figures may not sum due to rounding.
Source: author's calculations using AFDI and ARD data (Source: ONS).

Tables 6 to 8 also provide information on the propensities of different types of plant to enter and exit over the period. I measure exit propensity as the proportion of plants of each type present in 1998 to have exited by 2003, and entry propensity as the proportion of plants of each type present in 2003 that entered between 1999 and 2003. Panel A of Table 9 shows these exit and entry propensities for plants owned by the four different types of firm. The figures show that among manufacturing plants the highest exit rates and the lowest entry rates are among plants in low-skill industries owned by UK-MNEs investing in low-wage economies, which is consistent with this type of firm re-locating relatively low-skill activities from the UK abroad. This does not appear to be a 'firm-level' characteristic, since this pattern of high net exit is not present for plants in high-skill industries owned by low-wage country investors. For business services

plants owned by the two types of UK-MNEs display very similar entry and exit rates, although exit rates are higher and entry rates lower than for plants owned by the two other types of firm.

Table 9. Un-conditional, 5-year exit and entry propensities, by firm ownership type and industry skill intensity

	UK-MNE_L	UK-MNE_H	Foreign-MNE	Domestic	All
Panel A: 5 year exit and entry propensities					
Manufacturing					
All industries					
Exit propensity	0.48	0.44	0.45	0.45	0.45
Entry propensity	0.27	0.34	0.32	0.41	0.40
High-skill industries					
Exit propensity	0.47	0.41	0.47	0.44	0.44
Entry propensity	0.43	0.30	0.50	0.43	0.42
Low-skill industries					
Exit propensity	0.57	0.47	0.44	0.48	0.47
Entry propensity	0.20	0.38	0.29	0.39	0.39
Business services					
Exit propensity	0.68	0.66	0.56	0.50	0.50
Entry propensity	0.52	0.51	0.59	0.58	0.58
Panel B: 2-year employment growth indices, mean (s.d)					
Manufacturing					
All industries					
Empgrow surv	-0.043 *(0.454)*	-0.019 *(0.352)*	-0.032 *(0.381)*	0.022 *(0.323)*	0.019 *(0.329)*
Empgrow surv, ex, en	-0.289 *(1.148)*	-0.175 *(1.158)*	-0.113 *(1.246)*	-0.022 *(1.263)*	-0.032 *(1.259)*
High-skill industries					
Empgrow surv	-0.033 *(0.499)*	-0.021 *(0.363)*	-0.029 *(0.393)*	0.022 *(0.317)*	0.017 *(0.329)*
Empgrow surv, ex, en	-0.243 *(1.158)*	-0.123 *(1.180)*	-0.127 *(1.269)*	0.011 *(1.269)*	-0.005 *(1.265)*
Low-skill industries					
Empgrow surv	-0.068 *(0.377)*	-0.022 *(0.349)*	-0.037 *(0.354)*	0.015 *(0.332)*	0.011 *(0.334)*
Empgrow surv, ex, en	-0.408 *(1.159)*	-0.210 *(1.127)*	-0.107 *(1.203)*	-0.083 *(1.277)*	-0.091 *(1.271)*
Business services					
Empgrow surv	0.025 *(0.473)*	0.018 *(0.418)*	0.001 *(0.510)*	0.027 *(0.327)*	0.027 *(0.330)*
Empgrow surv, ex, en	-0.061 *(1.454)*	-0.043 *(1.393)*	0.115 *(1.477)*	0.149 *(1.379)*	0.147 *(1.380)*

Source: author's calculations using AFDI and ARD data (Source: ONS) and LFS data.

To examine differences in employment growth across plants in more detail I run the following regression,

$$Empgrow_{it,t-2} = \alpha + \beta_1 UK-MNE\_L_{it-2} + \beta_2 UK-MNE\_H_{it-2} + \beta_3 FOR_{it-2} + \chi'_{it-2}\gamma + t_t + ind_j + \varepsilon_{it} \quad (2)$$

Where employment growth is measured between *t-2* and *t* and is defined as,

$$Empgrow_{it,t-2} = \frac{E_{it} - E_{it-2}}{(E_{it} + E_{it-2})/2} \quad (3)$$

following Biscourp and Kramarz (2007) and Davis and Haltiwanger (1999), where E_{it} is employment in plant *i* at time *t*. This measure varies between -2 (for exitors) and 2 (for entrants). *UK-MNE_L*, *UK-MNE_H* and *FOR* are dummy variables indicating that the plant is owned by a UK-MNE investing in a low-wage economy, a UK-MNE that only invests in high-wage economies, and a foreign-MNE respectively, (hence the omitted category is purely domestic owned plants). In further specifications I replace the *UK-MNE_L*, *UK-MNE_H* dummies with alternative indicators of the characteristics of UK-MNEs. χ is a vector of plant characteristics. For manufacturing plants these include age, an indicator for a small or medium-sized plant (less than 250 employees), a dummy variable to indicate that the plant is part of a firm with other plants in the same 5-digit industry, and a dummy variable to indicate that the plant is part of a firm with other plants in the manufacturing sector. For plants in business services I do not have data on age and I replace the final dummy variable with one to indicate that the plant is part of a firm with other plants within the business services sector.[11] Dunne et al. (1988, 1999) and Bernard and Jensen (2007) show that these characteristics are related to exit propensities, for example younger, smaller plants and plants that are part of multi-plant firms are more likely to exit. *t* are time-dummies and ind_j are 4-digit industry dummies. I estimate this specification using data on employment growth over two, three-year periods 1998-2000 and 2001-2003.

Panel B of Table 9 shows some descriptive statistics on the dependent variable for plants owned by the four different types of firm. The first row of each subsection shows the mean and standard deviation of the employment growth index among surviving plants and the second row also includes exitors and entrants. For manufacturing the figures point towards plants owned by UK-MNEs investing in low-wage economies exhibiting the lowest employment growth, in

[11] For entrants the characteristics variables are dated *t* rather than *t-2*.

particular when entrants and exitors are included, and in particular in low-skill industries. In business services there is again some indication that plants owned by this group of firms show lower employment growth when entry and exit are taken into consideration, but surviving plants owned by this group show relatively high employment growth.

Table 10 shows the results of the regression exercise for plants in manufacturing. The table has three horizontal panels and in each panel I use a different set of indicators of the characteristics of UK-MNEs. The first three columns present results for surviving plants only, whereas the final three columns present results for the full set of plants (surivors, exitors and entrants). The table only reports the estimated coefficients on the firm ownership dummies and outward investment characteristics variables, and in panel A also reports the results of tests of whether the estimated coefficients on the three ownership dummies are statistically significantly different from each other.

In panel A looking at surviving plants only I find some evidence that plants owned by UK-MNEs investing in low wage economies and plants owned by foreign-multinationals exhibit lower employment growth than purely domestic plants, but no significant differences in employment growth across plants owned by the three types of MNE. Once exitors and entrants are included I find that plants owned by UK-MNEs investing in low-wage economies typically exhibit lower employment growth than those owned by the other three types of firms, and that this appears to be primarily driven by lower employment growth in low-skill industries. There is also some evidence that plants owned by foreign-owned MNEs and by UK-MNEs that only invest in high-wage economies have higher employment growth than purely domestic plants. Hence UK-MNEs investing in low-wage economies display a different pattern of employment growth compared to other types of firms in manufacturing, with net exit an important driving factor.

In panels B and C of the table I experiment with alternative indicators of UK-MNEs outward investment strategies. In panel B I use a single dummy variable to indicate a plant owned by a UK-MNE and a count measure of the total number of countries in which the UK-MNE has investments. The results show that UK plants owned by larger scale outward investors typically have lower employment growth, and that the relationship between the scale of outward investment and employment growth is greater in low-skill industries once entrants and exitors are included in the analysis.

Since it is difficult to distinguish empirically between investment in a large number of countries, and investment in low-wage countries in panel C I replace the count of the total number of countries with a count of the total number of low-wage countries in which the firm has investments. The pattern of results lends some support to the hypothesis that it is investment in low-wage economies that is most strongly associated with lower employment growth in low-skill manufacturing industries, and also that the relatively high exit rates and low entry rates in Table 9 are an important factor driving this relationship. In conclusion then it appears that plants in the UK owned by UK-MNEs investing in low-wage economies show lower employment growth in particular in low-skill industries, a finding consistent with labour in low-wage economies being a substitute for labour in low-skill industries in the UK, which ties in with the findings of Harrison and McMillan (2007) for the US.

Table 11 shows results for business services for surviving plants in columns (1)-(4) and for survivors, exitors and entrants in columns (5)-(8). I estimate four alternative specifications, where in each case domestic plants are the excluded category. In the first column I use ownership dummies for the three types of MNE. In the second I use a single UK-MNE dummy and a count of the total number of country investments. In the third column I use counts of the number of investments the firm has manufacturing industries and in business services industries in low-wage economies. Activity in manufacturing industries in low-wage economies may

potentially be complementary to business service activities such as R&D and headquarter functions at home. Investment in business services activity in low-wage economies may be complementary to firms' business services activity at home, but may also act as a substitute, for example off-shoring data processing functions. In the final specification in each case I use indicators of the number of high-wage country investments in manufacturing and business services respectively.

The results show very little evidence of any clear pattern between firms' outward investment strategies and employment growth in the UK. The results in column (5) suggest that plants owned by UK-MNEs making investments in low-wage economies have lower employment growth compared to domestic plants and plants owned by foreign-MNEs once entrants and exitors are included in the estimation sample, but it is difficult to relate this to any specific outward investment behaviour. The coefficients on the count measures of outward investments are generally imprecisely estimated, although they point towards a positive association between employment growth in business services in the UK and manufacturing investments in low-wage countries, but a negative association with business services investments in low-wage countries.

Table 10. Employment growth regressions: manufacturing plant population

Dep. var.: *Empgrow* $_{it, it-2}$	**Survivors only**			**Survivors, exitors and entrants**		
	All industries	**High-skill industries**	**Low-skill industries**	**All industries**	**High-skill industries**	**Low-skill industries**
Panel A	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
UK-MNE_L $_{it-2}$	-0.034*	-0.043	-0.034*	-0.087** [a b]	-0.077	-0.164** [a b]
	(0.019)	*(0.029)*	*(0.018)*	*(0.041)*	*(0.059)*	*(0.068)*
UK-MNE_H $_{it-2}$	-0.004	-0.019*	0.007	0.044*	0.051	0.032
	(0.008)	*(0.011)*	*(0.016)*	*(0.024)*	*(0.039)*	*(0.040)*
Foreign-MNE $_{it-2}$	-0.010*	-0.015*	-0.005	0.055**	0.023	0.049
	(0.005)	*(0.009)*	*(0.009)*	*(0.023)*	*(0.037)*	*(0.036)*
R^2	0.02	0.02	0.02	0.05	0.05	0.05
Panel B						
No. country investments $_{it-2}$	-0.001***	-0.0005	-0.001**	-0.002**	-0.001	-0.005***
	(0.0003)	*(0.0004)*	*(0.0005)*	*(0.001)*	*(0.001)*	*(0.001)*
UK-MNE $_{it-2}$	-0.004	-0.020*	0.009	0.030	0.017	0.038
	(0.007)	*(0.012)*	*(0.014)*	*(0.025)*	*(0.040)*	*(0.040)*
Foreign-MNE $_{it-2}$	-0.010*	-0.015*	-0.005	0.056**	0.025	0.049
	(0.005)	*(0.009)*	*(0.009)*	*(0.022)*	*(0.036)*	*(0.036)*
R^2	0.02	0.02	0.02	0.05	0.05	0.05
Panel C						
No. low-wage investments $_{it-2}$	0.001	0.004	-0.005*	-0.007	-0.004	-0.029***
	(0.003)	*(0.004)*	*(0.003)*	*(0.006)*	*(0.008)*	*(0.011)*
UK-MNE $_{it-2}$	-0.015*	-0.033**	0.001	0.010	0.010	0.004
	(0.008)	*(0.014)*	*(0.015)*	*(0.023)*	*(0.038)*	*(0.038)*
Foreign-MNE $_{it-2}$	-0.009*	-0.014	-0.005	0.056**	0.025	0.049
	(0.005)	*(0.009)*	*(0.009)*	*(0.022)*	*(0.036)*	*(0.036)*
R^2	0.02	0.02	0.02	0.05	0.05	0.05
Plant characteristics	Yes	Yes	Yes	Yes	Yes	Yes
4-digit industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	268,789	98,537	71,368	433,330	159,795	116,751

Note: plant characteristics included are: age, sme dummy, firm owns multi plants in 5-digit industry dummy; firm owns multi plants in manufacturing dummy. Standard errors clustered at the firm-level in parentheses. ***, **, * significant at 1%, 5%, 10% level. [a] *UK-MNE_L* coefficient significantly different to *UK-MNE_H* coefficient at 5% level, [b] *UK-MNE_L* significantly different to *Foreign-MNE* at 5% level, [c] *UK-MNE_H* significantly different to *Foreign-MNE* at 5% level.
Source: author's calculations using AFDI and ARD data (Source: ONS) and LFS data.

Table 11. Employment growth regressions: business services plant population

Dep. var.: *Empgrow* $_{it, it-2}$	**Survivors only**				**Survivors, exitors and entrants**			
	All industries (1)	**All industries (2)**	**All industries (3)**	**All industries (4)**	**All industries (5)**	**All industries (6)**	**All industries (7)**	**All industries (8)**
UK-MNE_L $_{it-2}$	-0.005				-0.134* [b]			
	(0.019)				*(0.074)*			
UK-MNE_H $_{it-2}$	-0.003				-0.038 [c]			
	(0.011)				*(0.036)*			
Foreign-MNE $_{it-2}$	-0.016	-0.016	-0.016	-0.016	0.118**	0.118**	0.118**	0.117**
	(0.011)	*(0.011)*	*(0.011)*	*(0.011)*	*(0.050)*	*(0.050)*	*(0.050)*	*(0.050)*
No. country investments $_{it-2}$		0.0002				-0.001		
		(0.0003)				*(0.002)*		
UK-MNE $_{it-2}$		-0.006	-0.002	-0.002		-0.053	-0.063*	-0.023
		(0.010)	*(0.010)*	*(0.010)*		*(0.035)*	*(0.033)*	*(0.038)*
No. manufacturing low-wage investments $_{it-2}$			0.001				0.007	
			(0.003)				*(0.007)*	
No. business services low-wage investments $_{it-2}$			-0.003*				-0.009	
			(0.002)				*(0.016)*	
No. manufacturing high-wage investments $_{it-2}$				0.001				-0.001
				(0.001)				*(0.003)*
No. business services high-wage investments $_{it-2}$				-0.001				-0.009
				(0.001)				*(0.007)*
R^2	0.00	0.00	0.00	0.00	0.09	0.09	0.09	0.09
Plant characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4-digit industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	448,647	448,647	448,647	448,647	841,558	841,558	841,558	841,558

Note: plant characteristics included are: sme dummy; firm owns multi plants in 5-digit industry dummy; firm owns multi plants in business services dummy. Standard errors clustered at the firm-level in parentheses. ***, **, * significant at 1%, 5%, 10% level. [a] *UK-MNE_L* coefficient significantly different to *UK-MNE_H* coefficient at 5% level, [b] *UK-MNE_L* significantly different to *Foreign-MNE* at 5% level, [c] *UK-MNE_H* significantly different to *Foreign-MNE* at 5% level.
Source: author's calculations using AFDI and ARD data (Source: ONS) and LFS data.

5 Conclusions

This paper has investigated the outward investment strategies of UK multinationals and how these relate to their behaviour at home by making comparisons across plants owned by different types of firms and undertaking different geographic outward investments. I find some evidence that multinationals which invest in low-wage economies display behaviour in line with the theory of vertical FDI. Within manufacturing, employment in these firms is orientated towards high-skill industries. They also show slower (more negative) employment growth, a greater propensity to close down plants, and a lower propensity to open new ones in low-skill manufacturing industries compared to other types of firms. This pattern is consistent with labour in low-wage countries being a substitute for labour in low-skill manufacturing industries in the UK.

This type of outward investment may however bring benefits to home-country activities. My results suggest that within high-skill manufacturing industries UK multinationals that invest in low-wage economies display productivity and scale advantages over other UK multinationals and purely domestic firms. While this is in line with outward investment in low-wage economies potentially leading to higher output and improved efficiency in complementary high-skill industries at home, it may also be due to other firm-specific characteristics or assets. Indeed for both business service and manufacturing sectors I find a positive relationship between firms' total factor productivity and the geographic scale of their overseas investment activity, suggesting that the most productive firms are those able to incur substantial fixed costs of investing in a number of different countries.

References

Barba Navaretti, G., Castellani, D. and Disdier, A-C., 2007. How does investing in cheap labour countries affect performance at home? France and Italy, mimeo University of Urbino.

Barba Navaretti, G. and Venables, A.J., 2004. Multinational firms in the World Economy, Princeton University Press.

Barnes, M. and Martin, R., 2002. Business data linking: an introduction. Economic Trends, 581, April, 34-41.

Bernard A.B. and Jensen, J.B., 2007. Firm structure, multinationals and manufacturing plant deaths. Review of Economics and Statistics, 89(2), 193-204.

Biscourp, P. and Kramarz, F., 2007. Employment, skill structure and international trade, Journal of International Economics, 72, May, 22-51.

Brainard, S.L., 1997. An empirical assessment of the proximity-concentration tradeoff between multinational sales and trade. American Economic Review, 87, 520-544.

Brainard S.L. and Riker, D.A., 1997. Are US multinationals exporting US jobs?. NBER working paper 5858.

Braconier, H. and Ekholm, K., 2000. Swedish multinationals and competition from high- and low-wage locations. Review of International Economics, 8(3), 448-461.

Criscuolo, C. and Martin, R., 2005. Multinationals and US productivity leadership: evidence from Britain. CEP discussion paper DP0672.

Davis S.J. and Haltiwanger, J. 1999. Gross Job Flows. In Handbook of labour economics, vol. 3b , O. Ashenfelter and D. Card eds. Elsevier: Amsterdam.

Desai, M. Foley, C.F. and Hines, J. 2005. “Foreign direct investment and domestic activity” NBER Working Paper 11717.

Dunne, T., Roberts, M. and Samuelson, L., 1988. Patterns of firm entry and exit in US manufacturing industries. Rand Journal of Economics, 19(4), 495-515.

Dunne, T., Roberts, M. and Samuelson, L., 1989. The growth and failure of US manufacturing plants. Quarterly Journal of Economics, 104(4), 671-698.

Fabbri, F., Haskel J. and Slaughter M., 2003. Does the nationality of ownership matter for labour demands?. Journal of the European Economic Association, April-May 2003 1(2-3), 698-707.

Griffith, R., 1999. Using the ARD establishment level data to look at foreign ownership and productivity in the United Kingdom. Economic Journal, 109, F416-442.

Griffith, R., Redding, S.J. and Simpson, H., 2004. Foreign ownership and productivity: new evidence from the service sector and the R&D lab. Oxford Review of Economic Policy, 20(3), 440-456.

Hanson, G., Mataloni, R. and Slaughter, M., 2003. Expansion abroad and the domestic operations of US multinational firms. Tuck School of Business, Dartmouth working paper.

Hanson, G., Mataloni, R. and Slaughter, M., 2005. Vertical production networks in multinational firms. Review of Economics and Statistics, 87(4), 664-678.

Harrison, A. and M. McMillan 2007. Offshoring jobs? Multinationals and U.S. manufacturing employment, University of California Berkeley and Tufts University Working Paper.

Head, K. and Ries, J., 2002. Offshore production and skill upgrading by Japanese manufacturing firms. Journal of International Economics, 58, 81-105.

Helpman, E., 1984. A simple theory of trade with multinational corporations. Journal of Political Economy, 92, 451-71.

Helpman, E., 1985. Multinational corporations and trade structure. Review of Economic Studies, 52, 443-57.

Hijzen, A., Görg, H. and Hine, R.C. 2005. International Outsourcing and the skill structure of labour demand in the United Kingdom. Economic Journal, 115 (506), 860-878.

Konings, J. and Murphy, A., 2001. Do multinational enterprises substitute parent jobs for foreign ones? Evidence from European firm-level panel data, CEPR discussion paper 2972.

Markusen, J., 1984. Multinationals, multi-plant economies, and the gains from trade. Journal of International Economics, 16, 205-226.

Martin, R., 2002. Building the capital stock. CERIBA mimeo, http://87.230.13.240/pub/CERIBA/BuildCapStock/Martin2002.pdf

Mayer, T., Mejean I. and Nefussi, B. 2007. "The location of domestic and foreign production affiliates by French multinational firms" CEPII working paper 2007-07.

Melitz, M.J. 2003. The impact of trade on intra-industry reallocations and aggregate industry productivity, Econometrica, 71(6), 1695–1725.

OECD, 2006. Trends and recent developments in foreign direct investment. Chapter 1 in: International Investment Perspectives: 2006 Edition. OECD Publishing.

ONS, 2000. Foreign Direct Investment (Business Monitor MA4). National Statistics, London.

ONS, 2007. United Kingdom Balance of Payments: The Pink Book, National Statistics, London.

Riker, D.A. and Brainard, S.L., 1997. US multinationals and competition from low wage countries. NBER working paper 5959.

Venables, A.J., 1999. Fragmentation and multinational production. European Economic Review, 43, 935-945.

Yeaple, S.R., 2003a. The complex integration strategies of multinationals and cross country dependencies in the structure of foreign direct investment. Journal of International Economics, 60, 293-314.

Yeaple, S.R., 2003b. The role of skill endowments in the structure of U.S. outward foreign direct investment. Review of Economics and Statistics, 85(3), 726-734.

Yeaple, S.R., 2008. Firm heterogeneity and the structure of US multinational activity: an empirical analysis. NBER working paper 14072.

Appendix

Table A1. Low wage countries and tax havens

Low-wage economies			
Albania	Ecuador	Jordan	Rwanda
Algeria	Egypt	Kenya	Senegal
Angola	El Salvador	Laos	Sierra Leone
Bangladesh	Equatorial Guinea	Madagascar	Sri Lanka
Benin	Ethiopia	Malawi	Sudan
Bolivia	Ghana	Mali	Suriname
Bulgaria	Guatemala	Morocco	Syria
Burkina Faso	Guinea	Mozambique	Tanzania
Cameroon	Guyana	Nicaragua	Togo
Cape Verde	Haiti	Niger	Tonga
Central African Republic	India	Nigeria	Vietnam
Chad	Indonesia	Pakistan	Zaire
China	Israel	Papua New Guinea	Zambia
Congo	Iran	Paraguay	Zimbabwe
Djibouti	Ivory Coast	Philippines	
Dominican Republic	Jamaica	Romania	
Tax havens			
Antigua	Bermuda	Isle of Man	St Kitts and Nevis
Bahamas	Channel Islands	Liechtenstein	St Lucia
Bahrain	Cyprus	Luxembourg	St Vincent
Barbados	Gibraltar	Macao	Turks and Caicos Islands
Belize	Grenada	Netherlands Antilles	

Table A2. Industry skill intensity: share of employees with no qualifications

2-digit manufacturing industry	**Mean share no qual.s**
15 Food and beverages	0.17
16 Tobacco	0.15
17 Textiles	0.30
18 Clothing	0.41
19 Leather	0.33
20 Wood and wood products	0.20
21 Pulp, paper and paper products	0.19
22 Publishing and printing	0.10
23 Coke, refined petroleum products	0.05
24 Chemicals	0.11
25 Rubber and plastics	0.23
26 Other non-metallic mineral products	0.21
27 Basic metals	0.15
28 Fabricated metal products	0.18
29 Machinery and equipment	0.12
30 Office machinery and computers	0.07
31 Electrical Machinery	0.17
32 Radio, TV and communication equipment	0.13
33 Medical, precision and optical instruments	0.11
34 Motor vehicles	0.16
35 Other transport equipment	0.12
36 Furniture, manufacturing not elsewhere classified	0.21
37 Re-cycling	0.21
Total	*0.18*
3-digit business services industry	
721 Hardware consultancy	0.02
722 Software consultancy and supply	0.01
723 Data processing	0.09
724 Data base activities	0.03
725 Maintenance and repair of office, accounting and computing machinery	0.06
726 Other computer related activities	0.03
731 Research and experimental development on natural sciences and engineering	0.02
732 Research and experimental development on social sciences and humanities	0.03
741 Legal, accounting, book-keeping and auditing activities; tax consultancy; market research and public opinion polling; business and management consultancy; holdings	0.04
742 Architectural and engineering activities and related technical consultancy	0.02
743 Technical testing and analysis	0.05
744 Advertising	0.06
Total	*0.03*

Note: manufacturing: average across 4-digit industries within 2-digit industry. Business services: average across 4-digit industries within 3-digit industry.
Source: author's calculations using LFS spring quarters 1995 to 2003.