

The Impact Of Inward Investment On The UK Economy

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I. Introduction

There is considerable interest in government and academic circles in the extent to which international transfers of technology and knowledge by multinational companies may affect the performance of host economies. Foreign investments by multinational companies can provide a channel through which new ideas, working practices and technologies can arrive in host economies, as well as a means by which indigenous companies are exposed to greater competitive pressures. The location of economic activity could thus be an important endogenous influence on the size of host economies, implying that living standards are determined in part by acquired characteristics rather than just by endowed characteristics (Fujita *et al.*, 1999). The Competitiveness White Paper issued by the UK government in 1998 argued that foreign direct investment is one of the main transmission mechanisms behind the diffusion of knowledge, both codified and tacit, across national borders (DTI, 1998). This is supported by empirical evidence that international openness raises economic growth in the UK and other European economies (Proudman and Redding, 1998; Barrell and Pain, 1997 and 1999b).

The desire to attract inward investment is one of the few industrial policies pursued consistently by successive UK governments over the past twenty five years. Despite this, comparatively little is known about the net benefits of inward investment for the British economy or the appropriate national policies and institutions that will maximise the potential size of those benefits. There is not even a comprehensive official data source on the activities of foreign-owned firms throughout the economy as a whole.

In order to understand the growing impact of foreign-owned firms and the importance attached to inward investment by the policy community it is useful to briefly review the factors behind the global growth of inward investment and the particular characteristics of inward investors in the UK. This serves to highlight some of the most important channels through which inward investors might influence the performance of indigenous companies. We then discuss the evidence regarding the existence of spillovers from inward investment and outline some of the policies available to affect location choice.

2. The Growth of Inward Investment

The rapid growth of foreign direct investment over the last twenty five years has made an important contribution to the ongoing globalisation of economic activities. At first sight indicators such as the ratio of total trade and capital flows to income suggest that many industrialised economies are in fact no more open at present than they were a hundred years ago. But technological changes

mean that the feasible geographical span of managerial control and the implications of, and the motivations for, dispersed production are quite different now. New business advances are increasingly knowledge-based, arising from specific ideas and organisational innovations, both tacit and codified. The potentially infinite expansibility of knowledge means that many of these assets can be utilised simultaneously across multiple establishments under common ownership, generating economies of scale for the firm as a whole (Dunning, 1988; Markusen, 1995).

The literature on the determinants of foreign direct investment confirms that the accumulation of firm-level knowledge-based assets affects the decision to invest. Empirical evidence for countries such as the United States, the UK and Germany suggests that outward investment is more likely to occur in industries with a high level of R&D expenditure in the home country (Barrell and Pain, 1999b; Pain, 1997; Hubert and Pain, 2000d), suggesting that new ideas and technologies are being utilised by inward investors in host economies.

Capital market integration in Europe and elsewhere has been associated with high levels of gross flows between the industrialised economies. Business strategies have changed, with many multinational firms choosing to reorganise their activities on a regional or global basis. Many leading brand names now have global recognition. Investments in non-manufacturing sectors such as financial services and public utilities have expanded rapidly, helped by widespread use of privatisation policies by many governments and the need for a local presence in foreign markets in activities which rely heavily on personal contacts as well as price competitiveness.

The UK has been relatively successful in attracting inward direct investment over the past forty years, particularly in the latter half of the 1980s, as can be seen from Chart 1.¹ Although the proportion of total investment located in the UK has fallen since 1990, the UK share of the global stock of inward investment in 1998 was still 8%, approximately 2½ times the share of UK output in global GDP measured on a purchasing power parity basis.

The long-term trends in the stock of inward foreign direct investment in the UK economy as a whole and in the manufacturing sector are shown in Chart 2, expressed as a proportion of GDP and gross value-added in manufacturing respectively. By the end of 1999 the whole economy stock was equivalent to 27% of GDP, compared to approximately 6½% of GDP in 1960. This is considerably larger than the share of inward FDI in most other large industrialised economies, although comparable to that seen in a number of small, open European economies. There are two periods in which the UK inward stock has risen especially rapidly in real terms, the latter half of the 1980s and more recently, since 1997. Total FDI inflows averaged 2¼% of GDP per annum over 1985-89

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1 Data for the global FDI stock and the stock in developed countries (in effect the OECD) are taken from Dunning (1988) and UNCTAD (1999).

and just under 3½% per annum over 1995-99, compared to a long-run average of 1.6% per annum since 1960.

Chart 1: The UK Share of the Global Inward Investment Stock (%)

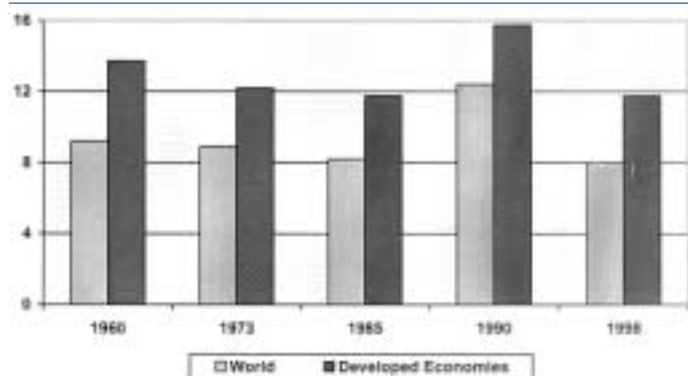
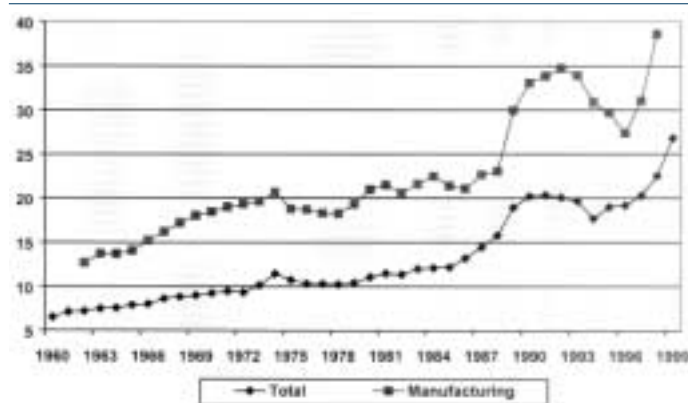


Chart 2: The Inward FDI Stock (% of value-added output)



The composition of the inward FDI stock is summarised in Table 1. Thirty years ago inward investments were concentrated in the manufacturing sector. Although there has since been a marked decline in the relative importance of this sector, the share does appear to have stabilised in recent years at about one-third, and as Chart 2 shows the stock-output ratio tends to fluctuate in line with that for the economy as a whole. Inward investors still remain relatively concentrated in manufacturing activities, since the manufacturing sector now accounts for about only one-fifth of UK GDP. The importance of inward investment in the energy sector is also clear, with significant investments having taken place in the North Sea and, in recent years, in the privatised public utilities. Nonetheless the relative level of investment in this sector has also begun to decline, coinciding with the decline in the relative share of oil production in total UK GDP. In recent years there has been strong growth in investments in non-manufacturing activities such as financial and business services.

The ownership data highlight the long-standing importance of inward investment from the United States. Despite the popular attention given to inward investment from Japan, Korea and other Asian economies, it continues to represent a small minority of total inward investment. It is clear that the rapid growth in inward investment in the 1980s was driven by the growth of inward investment from Western Europe and Asian investors. In contrast investment from US-owned companies has been the most important force behind the upturn in the late 1990s. As we highlight below, the empirical evidence from a variety of studies suggests that it is US investors who have brought the largest benefits with them.

Table 1: The Composition Of The UK Inward FDI Stock (per cent)

		1968	1978	1988	1998
SECTOR	Manufacturing	58.6	46.3	32.8	31.8
	Energy	29.7	29.4	27.2	15.6
	Financial Services	4.8	8.0	17.2	26.5
	Other Non-Manufacturing	6.9	16.3	22.8	26.1
SOURCE	United States	66.8	59.5	39.4	49.2
	Western Europe	21.8	29.7	39.8	35.7
	Asia	0.1	1.2	5.5	5.1
	Rest of the World	11.3	9.6	15.3	10.0

Source: Pain (2000, Table 1.2)

Inward investment in knowledge-intensive sectors in the UK has grown more rapidly than in other activities over the past decade. From the available data it is possible to identify four separate sectors that contain many knowledge-intensive activities – chemicals, transport equipment, electronics and business and financial services. In 1987 these sectors accounted for approximately one-third of the total inward investment stock. By 1998 their share had risen to just over 43½% of the stock. Between 1987 and 1998 the combined stock of inward direct investment in knowledge-based activities rose by an average 13.5% per annum compared to growth of 9.1% per annum in other industries.

Foreign direct investment is just one means of financing the activities of inward investors. Once foreign investors have established a presence in the host country, tacit and codified firm-specific knowledge can be transferred continually from parent companies independently of other financial transactions. Equally, productive facilities can be established and expanded using capital raised outside the home country of the parent firm. Such capital will not be included in the direct investment statistics. Thus there is a strong argument for focusing on the activities undertaken by foreign-owned firms, as well as the level of inward direct investment, in assessing the impact of inward investors on the UK economy.

However there are no official data on the activities of foreign-owned firms throughout the UK economy as a whole. Given the importance attached to inward investment by successive governments collection of such data would be helpful. Detailed statistics are available on the output, employment and fixed capital formation of foreign firms in the manufacturing sector. But outside the manufacturing sector comprehensive data can be obtained only from commercial databases of company accounts.

The long-term trends in the share of foreign-owned firms in the UK manufacturing sector are summarised in Table 2 and Chart 3. It can be seen that their share of total output, employment and investment has risen over time. As with the foreign direct investment data, the dominance of US controlled affiliates is clear. They continue to account for over half of the value-added output produced in foreign-owned firms, even though their relative importance has declined over time as the share of Western European and, to a lesser extent, Japanese firms has risen.

The figures in Table 2 highlight some of the key stylised facts about foreign firms:

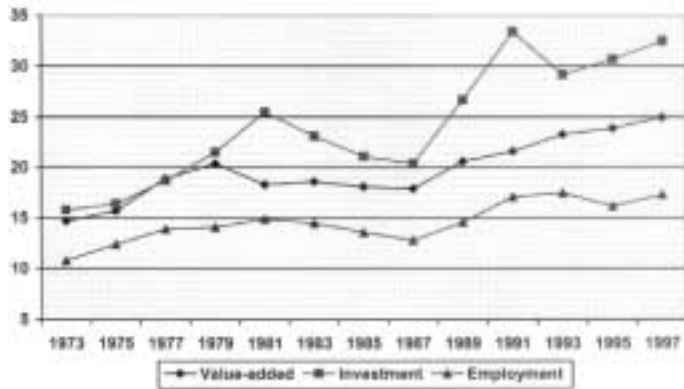
- Labour productivity, measured in terms of value added output per employee, has been continuously around 40% higher on average than in UK-owned firms.
- Foreign firms are more capital intensive, accounting for a larger share of investment than output. This difference has risen over time.
- Foreign firms employ a higher proportion of skilled labour than domestic firms.

Table 2: Foreign-Owned Firms In UK Manufacturing (Annual Averages)

	1973-79	1981-89	1990-97
Share of Foreign-Owned Firms (%)			
Gross value added	17.4	18.5	23.9
Net capital expenditure	18.1	22.2	30.9
Total employment	12.8	13.8	17.4
Employment of operatives	12.0	12.8	16.0
Employment of non-operatives	15.2	16.4	19.9
Nationality of investor (%)			
United States	72.9	65.2	53.1
Western Europe	18.7	20.3	29.8
Japan	0.1	1.0	6.6
Rest	8.3	13.5	10.5

Source: Pain (2000, Table 1.3).

Chart 3: Foreign Firm Share of UK Manufacturing (%)



These differences appear to stem from more than just differences in the scale of operations or a concentration of foreign firms in capital-intensive sectors with high value added. Using a sample of establishments drawn from the longitudinal database of the Annual Census of Production, Oulton (2000) finds that controlling for industrial structure, labour productivity in establishments owned by US companies in 1993 was 32% higher than in UK-owned establishments. Other foreign owned establishments had a productivity advantage of 15%. Differences in the mix of inputs could account for 61% of the higher labour productivity of US-owned establishments and 97% of that of other foreign-owned ones. Girma *et al* (2000) use a sample of firms from the OneSource database and find that, after accounting for scale and industrial structure, the labour productivity of foreign-owned companies between 1991-96 was 10% higher than UK-owned ones, and the level of total factor productivity was 5¼% higher. A similar picture is shown by Oulton (2000) for the non-manufacturing sector, using OneSource data for 1995. The labour productivity advantage of foreign firms is estimated to be 49% and 46% respectively for US and other foreign-owned companies. Differences in capital intensity and labour quality can account for only two-thirds of these differentials.

Thus it seems clear that foreign firms have some important firm-specific advantages that allow them to achieve higher levels of productivity than their UK counterparts. These may reflect factors such as better organisational efficiency, greater exposure to international competition and the quality of knowledge-based assets. If foreign firms did not possess such firm-specific

advantages, it would be difficult to explain why they are able to take advantage of profitable opportunities in the UK whilst UK-owned firms are not. There are sometimes said to be significant asymmetries in the provision of public financial incentives for inward investors and indigenous firms, but there is little hard evidence of significant discrimination between comparable projects proposed by foreign and domestic firms (House of Commons 1998, 1999). An alternative explanation might be that domestic firms suffer from capital market constraints that do not impinge on foreign firms, although this has yet to be demonstrated.

Indeed it should be noted that the UK is far from unique in having a steadily growing population of comparatively high productivity foreign-owned firms in the manufacturing sector. Table 3 provides some comparable statistics for France, and shows that the degree of foreign penetration in the manufacturing sector is larger than in the UK. On average foreign firms also have a higher level of productivity and are more investment intensive than indigenous firms in France, but the gap between them is smaller than in the UK.

Table 3: Foreign Firms Share of Manufacturing, UK and France

		1973/74	1987	1997
Output	UK	14.7	17.9	25.0
	France	22.2	25.2	34.4
Employment	UK	10.8	12.8	17.3
	France	17.5	21.6	29.2
Investment	UK	15.8	20.4	32.5
	France	21.8	25.6	35.3

Sources: Annual Census of Production (ONS) and *L'implantation étrangère dans l'industrie* (Ministère de l'Economie, des Finances et de l'Industrie, Paris).

3. Productivity Spillovers From Inward Investors

Given that foreign firms in the UK possess firm-specific advantages, it is natural to ask whether these spillover and become available to domestic companies. If that was the case, then inward investment would be associated with significant positive externalities for the economy as a whole, providing a justification for government intervention in the form of investment incentives and promotional activities designed to attract potential foreign investors. There are two broad categories of spillovers that can be distinguished:

- direct spillovers – domestic firms can acquire knowledge of new technologies and working practices from foreign firms; labour mobility from foreign to domestic firms.
- indirect spillovers – examples include the impact of greater competition in product markets, the impact on national innovation and R&D, and the impact on export performance. We discuss R&D below, the others are discussed in Pain (2000).

All of these are potentially important sources of productivity growth. Blomström *et al* (2000) provide a comprehensive overview of the literature on spillovers in from inward investment in developed economies.

3.1 Direct Spillovers

It is important to be clear about how direct spillovers from inward investors are best evaluated. All too often the focus of investment promotion activities is on the number of jobs that investors promise to create or safeguard. Yet there is little evidence that the long-run level of unemployment in the UK and other industrialised countries is affected by the industrial structure of the economy. Instead

emphasis is placed on supply-side factors and labour market institutions (Layard *et al*, 1991). A more appropriate means of judging the benefits from inward investors is to look at the overall level of national income. Even if inward investment does not affect the long-run level of employment, it might still affect the productivity of those employed, their wage levels and the organisational efficiency of their companies.

There is some indication from qualitative survey evidence that new technologies and standards have been adopted by UK producers as a result of inward investment. In a study of the impact of technology transfer by US multinational companies Mansfield and Romeo (1980) found that over half of the UK firms in their survey had introduced new products or processes more quickly because of a transfer of a new product or process by a US-based firm to its overseas subsidiary, with around two-thirds of the UK firms indicating that their technological capabilities had been raised by such transfers. Inward investment in the UK has also helped to bring about a significant improvement in the product quality of suppliers (PACEC, 1995). The quantitative importance of such findings is not clear. Recent empirical research has begun to fill this gap by providing a comprehensive overview of the relative performance of foreign-owned firms in the UK and the extent to which their presence has had a sustained impact on the performance of UK-owned firms over time.

The extent of direct spillovers from foreign-owned firms in the manufacturing sector has been investigated by Hubert and Pain (2000a and 2001), using an econometric approach first applied by Barrell and Pain (1997). This allows for endogenous technical progress within labour demand relationships derived consistently from an underlying production function.² Suppose output (Q) is produced using labour (L) and capital (K) consistent with a CES production function of the form:

$$Q = \gamma \left[s(K)^{-\rho} + (1-s) \left(L e^{\lambda t} \right)^{-\rho} \right]^{-\frac{1}{\rho}} \quad [1]$$

Here ν denotes returns to scale, γ and s are production function scale parameters, and the elasticity of substitution (σ) is given by $1/(1+\rho)$. Technical progress is assumed to be labour-augmenting at rate λ . The first-order condition that the marginal product of each input should equal its real price can be used to derive a log-linear 'desired' labour demand function:

$$\ln(L^*) = \frac{1+\sigma(\nu-1)}{\nu} \ln(Q) - \sigma \ln(w/p) - (1-\sigma)\lambda t + k \quad [2]$$

where k denotes a constant. The coefficient on the real producer wage (w/p) provides a direct point estimate of the elasticity of substitution, allowing the technical progress parameter(s) and returns to scale to be identified. Technical progress can be endogenised by allowing the level within any given industry to be dependent on various factors, including indicators of the scale of the activities of foreign-owned firms (F), imports (M), the R&D stock (R) as well as an exogenous deterministic time trend (T):

$$\lambda t = \lambda_T T + \lambda_F \ln(F) + \lambda_M \ln(M) + \lambda_R \ln(R) \quad [3]$$

This specification implies that technical progress will grow at a constant rate if the key driving factors also grow at a constant rate.

The parameters of the technical progress function can be estimated jointly with those of the labour demand schedule by substituting [3] into [2]. Allowance can also be made for the costs of adjusting labour by estimating a dynamic model for employment in which the factor demand expression implied by the combination of the marginal productivity condition [2] and the technical progress function [3] is embedded as the long-run steady-state solution. Failure to allow for any cyclical effects would imply the strong assumption that companies always use the minimum inputs necessary to produce a given level of output.

Hubert and Pain (2001) examine the impact of inward investment on the pace of technical change in UK-owned firms in 15 manufacturing sectors between 1983 and 1992.³ This encompasses two factors, new advances which serve to push out the production possibility frontier and demonstration effects which serve to eliminate technical inefficiencies. Their indicator of the activities of foreign firms (F in [3]) is based on value-added at constant prices.

Amongst the key findings are:

- Intra-industry and inter-industry effects from foreign firms value-added are both significant and of a similar magnitude. A 1% rise in foreign firms output (1990 prices) in all sectors is estimated to raise the level of labour-augmenting technical progress in UK-owned firms by 0.5-0.6%. Policies to improve dissemination of new ideas and working practices across industries may thus be of equal benefit to policies targeting selected industries.
- The results are robust to the inclusion of R&D and imports. Intra-industry import volumes are found to be significant, but not inter-industry imports. A 1% rise in imports raises technical progress by 0.3%. One interpretation of this is that imports bring new technologies (and competition) that are industry-specific; inward investment also brings ideas that can be applied across industries.
- Hubert and Pain (2000a) examine whether spillovers from foreign firms vary according to the nationality of the firm. They find that US firms have a larger effect and EU firms a statistically smaller effect than other inward investors.

In a separate exercise using aggregate data for the manufacturing sector, public services and three market service sectors – distribution, business services and transport and communications, over 1972-96, Hubert and Pain (2000a) also examine the impact of inward investment on technical progress using the (constant price) sector-specific stock of FDI as an indicator of the influence of foreign-owned firms in sector-wide labour demand equations. Their results reflect both compositional and behavioural effects from inward investors.

- For the three market services sectors a 10% rise in the stock of inward investment is estimated to raise technical progress by 1.35%. Technical progress also has an exogenous trend component worth 1.9% per annum. Both effects are statistically significant. In the individual industries the impact of inward investment was found to be greatest in business services.
- The equivalent figures for manufacturing were 3.2% and 2.9% respectively, and were statistically different from those for services.

Thus the direct benefits from inward investment appear to be larger in the manufacturing sector than in non-manufacturing ones,

2 Girma *et al* (2000), Girma and Wakelin (2000) and Driffield (2000, 2001) also explore this issue, but use different methodologies. All report evidence of spillovers in at least some industries and regions.

3 Attempts to utilise a longer data set are hampered by significant changes in the UK Standard Industrial Classification in both 1980 and 1992.

although much more research is required in this area. One explanation might be that some inward investments in non-manufacturing are asset-augmenting ones, with foreign firms seeking to benefit from agglomeration economies. One obvious example is provided by the rapid growth in financial services investment in the City of London. The impact of inward investment in the manufacturing sector also appears to have strengthened over time. The benefits from foreign firms in the sample from 1983-92 are larger than the benefits found in the longer data set stretching back to the early 1970s.

The wider economic impact of productivity spillovers from inward investment on host economies is also considered for the UK economy by Pain and Young (2000), who use the National Institute macroeconomic model of the UK (NiDEM) and for the Scottish economy by Gillespie *et al* (2000), who use a computable general equilibrium model. Both studies show that a permanent rise in the level of inward investment generates a permanently higher level of GDP and national income than would otherwise have been enjoyed.

3.2 The Distribution of Spillovers

Even if there are positive spillovers from inward investment, there is no necessary reason why the gains should be felt equally in all parts of the country, or by all factors of production. The issue of regional spillovers from inward investment has recently been studied by Driffield (2000) and Girma and Wakelin (2000). Both studies indicate that the presence of foreign firms has a positive effect on the productivity of UK firms, but find that the spillovers tend to be confined to the region in which the investment takes place.⁴

Equally, if there are important complementarities between fixed capital and skilled labour the factor-bias of the new technologies introduced by foreign firms might also help to raise the relative demand for skilled labour in host economies, and potentially widen wage inequality. Little empirical work has been undertaken on this question to date, especially in the UK. One means of assessing whether there may be an important factor bias from inward investment is to undertake an accounting decomposition of the skilled labour share of employment or the wage bill (see, for instance, Berman *et al*, 1994). One possible decomposition of the aggregate change in the proportion of skilled labour over a given time period is:

$$\Delta P = \sum_i \Delta S_{Di} \bar{P}_{Di} + \sum_i \Delta S_{Fi} \bar{P}_{Fi} + \sum_i \Delta P_{Di} \bar{S}_{Di} + \sum_i \Delta P_{Fi} \bar{S}_{Fi} \quad [4]$$

where: P_i = share of skilled labour in employment or wage bill of industry i

S_i = share of industry i in total sector employment or wage bill.

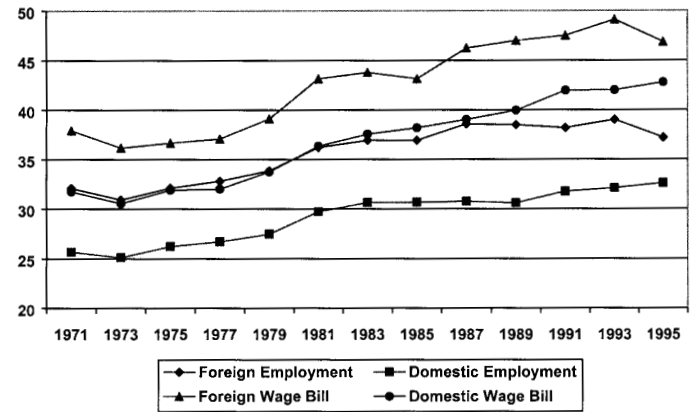
D, F = domestic and foreign firms respectively

The first two terms capture 'between' effects arising from shifts in the composition of demand between industries, and the second pair of terms capture 'within' effects arising from skill upgrading within industries. If foreign and domestic firms raise their skill proportions by equal amounts then the 'within' contribution from domestic firms should be $(1-\alpha)$ times the 'within' contribution of foreign firms, where α is the share of total output produced by foreign firms.

It is common for skilled and unskilled labour to be measured using data on non-operatives and operatives, in part because of the frequent lack of any more suitable proxies. The long-term trends in

the employment and wage-bill shares of non-operatives in the total population of foreign and domestic firms in the UK manufacturing sector are shown in Chart 4. In both cases foreign-owned firms are, on average, more skill-intensive than domestic ones, although both groups show a comparatively similar amount of skill upgrading over time.

Chart 4: Share of Non-Operatives in UK Manufacturing (%)



Using two digit industry data for the UK manufacturing sector between 1981 and 1992 Hubert and Pain (2000b) obtain the results reported in Table 5. Foreign firms can 'account' for approximately two-thirds of the aggregate rise in the share of skilled labour in total employment, and approximately three-fifths of the rise in the wage bill share of skilled labour.⁵ Much of this can be attributed to a shift in the composition of demand towards more skill-intensive foreign firms from less skill-intensive domestic firms, but the weighted 'within' industry contribution of foreign firms is also a little larger than might have been expected from their share in output. Aggregating across foreign and domestic firms indicates the familiar result that most skill upgrading can be accounted for by within industry shifts rather than between industry ones.

Table 5. Accounting For Skill-Upgrading in UK Manufacturing 1981-92

	Annual Growth (%)	'Between' industry contribution		'Within' industry contribution	
		Foreign	Domestic	Foreign	Domestic
Wage Bill	1.36%	0.55%	-0.38%	0.23%	0.96%
Employment	0.77%	0.39%	-0.30%	0.13%	0.55%

The within industry changes for domestic and foreign firms are positively and significantly correlated suggesting that common technological developments have occurred in foreign and domestic firms. Cross-sectional regressions of the (weighted) changes in domestic firms on the changes in foreign firms yield (t-statistics in parentheses):

$$\text{Employment: Domestic} = 0.0004 + 2.7728 * \text{Foreign} \quad R^2 = 0.52$$

(1.1) (4.1)

$$\text{Wage Bill: Domestic} = 0.0012 + 2.0988 * \text{Foreign} \quad R^2 = 0.62$$

(2.9) (5.2)

4 There are some important differences between the methodology used by Hubert and Pain (2000a and 2001) and that used by Girma *et al* (2000) and Girma and Wakelin (2000). Hubert and Pain use the level of foreign firms' output as they model the factors driving the level of technical progress. Girma *et al* use foreign firms' share of total employment. This provides a good indicator of the degree of competition faced by domestic firms, but over a long time horizon it is less likely that the *share* of foreign firms can be an important determinant of the *level* of productivity in domestic firms, as the latter would be expected to rise, on average, irrespective of any changes in the former.

5 The results may be sensitive to the level of disaggregation of the data and the time period considered.

Since Table 5 indicates that the domestic industry contributions are approximately 4 times the size of the foreign ones (allowing for weighting by industry shares), the lower coefficient obtained in the regression analysis indicates a wide dispersion in the different effects from foreign and domestic firms across industries.

3.3 Inward Investment And R&D

Foreign firms have come to play an increasingly important role in both the financing and performance of research and development in the UK. Table 6 summarises the trends over the last decade for business enterprise R&D. The share of business enterprise R&D expenditure performed by foreign-owned firms doubled between 1989 and 1999. Of the total level of R&D expenditure by foreign firms in 1998 and 1999, some 47.4% was undertaken by US-owned affiliates, and 27.1% by EU-owned affiliates. Japanese affiliates accounted for just 7.8%.

Table 6. Business Enterprise R&D Expenditure

	1989	1993	1994	1995	1996	1997	1998	1999
Total R&D (£m)	7650	9069	9204	9254	9431	9680	10261	11302
UK-Owned	6394	6729	6630	6555	6588	6547	7179	7779
Foreign-Owned	1256	2340	2574	2690	2843	3133	3082	3523
Total R&D (£m, 1995)	9684	9457	9469	9245	9139	9124	9396	10092
UK-Owned	8094	7017	6821	6555	6384	6171	6574	6946
Foreign-Owned	1590	2440	2648	2690	2755	2953	2822	3146
Foreign-Owned Share (%)	16.4	25.8	28.0	29.1	30.1	32.4	30.0	31.2
<i>Memorandum</i>								
GDP Deflator	79.0	95.9	97.2	100.0	103.2	106.1	109.2	112.0

Source: Research and Development in UK Business, *Business Monitor MA14* various issues.

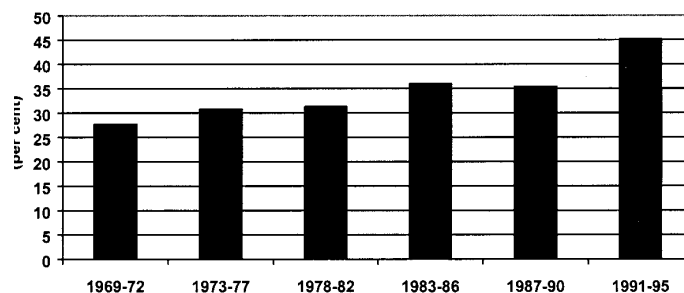
The importance of foreign firms in total R&D becomes even more apparent if expenditure is converted into constant prices using the GDP deflator from the UK national accounts. In 1995 prices total expenditure on R&D declined for three successive years in the mid-1990s, and even after a recovery in 1999 was still only 4.2% higher than in 1989. Expenditure by foreign firms at constant prices almost doubled between 1989 and 1999, whereas expenditure by UK-owned firms declined by 14.2% during this period.

One distinctive feature of the UK is that it is the only major country in which the share of foreign firms in manufacturing R&D is greater than their share in production (OECD, 1998). Put differently, their average R&D intensity is higher than that of domestic firms. Canada is the sole G7 economy in which the foreign contribution to R&D is similar to that in the UK. But there is an important difference between the UK experience and that of Canada. The R&D expenditure of domestic firms in the UK has fallen in real terms, whereas it has risen rapidly in Canada.

A further dimension of the contribution of foreign-owned firms is provided by their research output in the form of patentable products and processes. Cantwell *et al* (2000) show that foreign-owned firms received 45% of the patents granted by the United States Patent and Trademark Office (USPTO) to large firms resident in the UK between 1991-95, compared to just over one-third of the patents granted in the 1980s. There has been a steady upward trend in the foreign firm share since the 1960s, as Chart 5 illustrates. The research activities of foreign firms in the UK also have a comparatively narrow regional dispersion, with some 60% of the patents granted by the USPTO to large foreign firms resident in the UK between 1969-95, granted to firms located in the South East. The corresponding proportion for domestic firms was 40%. To this

extent inward investors may be reinforcing existing regional disparities.

Chart 5. Foreign Firm Share of US Patents Granted to UK-Resident Firms



Source: Cantwell, Iammarino and Noonan (2000)

Of course the proportion of R&D funded and undertaken by foreign-controlled entities does not in itself matter, although it probably raises the direct influence of foreign economic conditions on domestic expenditure. Indeed part of the explanation for the increase in the foreign share may just be the take-over of R&D intensive indigenous companies by foreign companies. In this sense it might be said that the attributes of the British science and engineering base have helped to attract inward investment. Mergers and acquisitions of this kind may help to strengthen further the technological position of the acquired companies.

Whilst the additional foreign funding of R&D in the UK is welcome, there are many areas where further research is needed before the implications for the UK economy are well understood. If it was the case that the magnitude of spillovers from foreign firms was dependent upon domestic firms undertaking additional R&D to facilitate technology adoption, then the decline in the volume of R&D expenditure by UK firms over the past decade is somewhat worrying.

A further possibility is that UK-owned firms have simply chosen to undertake their R&D elsewhere. Other locations may be more attractive because they offer location-specific capabilities that allow multinationals to augment technologies developed at home. The data in Table 7 on the level of R&D undertaken by UK-owned firms in the United States, which is the single most important location for outward investment from the UK⁶, provide some support for this hypothesis.

Table 7. R&D Expenditure by UK-owned Firms in the United States

	1989	1993	1994	1995	1996	1997	1998
Total R&D (\$m)	1645	2211	2499	2428	2684	3132	3836
Total R&D (£m)	1005	1473	1632	1539	1720	1914	2317
R&D in US as % of R&D in UK	15.7	21.9	24.6	23.5	26.1	29.2	32.3
Total R&D (£m, 1996)	1975	2352	2603	2475	2684	3074	3717
<i>Memorandum</i>							
U.S. GDP Deflator	83.3	94.0	96.0	98.1	100.0	101.9	103.2

Sources: *Science & Engineering Indicators 2000*, National Science Foundation, and *Operations of US Affiliates of Foreign Companies: Preliminary Estimates 1997 and 1998*, Bureau of Economic Analysis.

The level of R&D undertaken by UK-owned firms in the US has risen consistently over the past decade in both nominal and volume terms. By 1998 the level of expenditure was equivalent to just under one-third of the total expenditure in the UK by UK-owned firms. At

6 At the end of 1999 some 43.8% of the total book value of outward foreign direct investment from the UK was located in the United States.

constant prices the volume of expenditure in the US rose by an average 7¼% per annum between 1989 and 1998. Further research is required in order to test formally whether UK-owned firms have in fact chosen to switch expenditures away from the UK to the US, or indeed the other foreign locations where they raised R&D expenditure during the 1990s (OECD, 1998, Annex Tables 19 and 20).

4. Policies To Attract Inward Investment

If inward investment does affect the growth prospects of host economies then it becomes important to understand the policies available to affect location choice. Countries increasingly compete for investments in 'location tournaments' by offering investment incentives. The factors affecting the location decisions of US, Japanese and German companies are studied in detail in Barrell and Pain (1997, 1998, 1999a,b) and Hubert and Pain (2000c). Their results highlight a number of key factors:

- membership of the EU/EEA and participation in the Single Market Programme.
- unit labour costs relative to other European locations.
- government fixed investment as a share of GDP and the effective corporate tax rate, relative to other locations.
- agglomeration economies from large markets and the indigenous research base.

The UK has gained inward investment, particularly in manufacturing, by primarily attracting investments as a result of labour market flexibility, and measures to reduce the effective corporate tax rate. Other countries, notably Germany have attracted investments which aim to tap into the agglomeration economies available from the large domestic research base. It is of interest to note that in the manufacturing sector, US multinational affiliates produce a greater volume of output and undertake more R&D expenditures in Germany than they do in the UK, although employment is higher in British affiliates. The average labour productivity of US affiliates in the UK is over 15 per cent lower than in all US affiliates in the European Union and 25 per cent lower than in affiliates in Germany (Barrell and Pain, 1999b).

The existence of agglomeration economies has important implications for the structure of pro-active inward investment policies. Although the direct impact of fiscal incentives is often found to be small compared to other determinants of location choice, temporary policy initiatives could have permanent effects on inward investment, and hence growth prospects, if they helped agglomerations (or clusters) to become established. Equally, even if the direct benefits from fiscal incentives are limited because all competitors also have them, the losses from unilateral abolition of them could be large and difficult to reverse.

There is some potential for tension between the policies suitable for stimulating regional development and those that maximise national income. Given the importance of agglomeration forces, the optimal strategy for an individual regional development agency is to seek to attract as much inward investment as possible. Losing out on one project raises the chances of losing out on related future investments. However for the country as a whole, the optimal strategy is to use public funds to seek to ensure that inward investment is located so as to maximise the potential spillovers and agglomeration economies from that investment. Policies that seek to disperse foreign firms to regions with high unemployment may forego some of the important spillovers that they could generate

and forego some of the agglomeration economies that might serve to attract additional investments. In principle at least, the losses that could result from excessive local competition might outweigh the benefits to the individual regions.⁷

Investments also have to fit in with the capabilities of the host location and the state of development. Carefully formulated, proactive industrial policies targeted at particular sectors can be highly successful, as the experience of Ireland indicates (Ruane and Görg, 1999). Complementary public policies designed to improve the contestability of national markets and strengthen the local science base and the adaptability of the local workforce may help to raise the magnitude and speed with which new ideas and technologies spillover to local firms.

5 Summary

Over the years there have been a number of reviews of the impact of inward investment on the British economy. Summarising developments up to the early 1980s Young et al (1988) concluded that the foreign sector had 'made a positive and welcome contribution to the economic well being of the country' but that linkages between multinational companies and indigenous firms were weak and spillovers were limited.

The body of evidence surveyed in this paper allows a more optimistic conclusion to be drawn. Foreign-owned firms have helped to raise the level of national income and have had beneficial supply-side effects on the performance of some UK-owned companies. However the externalities available from inward investment do not always appear to have been distributed equally amongst industries or regions, and there appears to be little evidence that the average productivity gap between foreign and UK firms has been closed over time. Whilst some gap might reasonably be expected to persist, since the average foreign-owned company operates at a larger scale than the average British company, the apparent failure to narrow the gap does suggest that there may be policies or institutional reforms which could help to raise the magnitude of spillovers and the dissemination of best-practice techniques still further.

Areas into which further research might usefully be undertaken include:

- Whether spillovers are generic to all inward investors, or whether there are particular types of investor or particular sectors which are more important than others.
- Whether there are significant inter-industry spillovers from inward investment, as suggested by the econometric results of Hubert and Pain (2001), and if so, what they are and how they are diffused.
- The impact of the mode of entry on the transmission of knowledge and technologies to host country firms. Does the re-organisation of existing companies have the same impact as the establishment of 'greenfield' sites or joint ventures and strategic alliances?
- The role of labour mobility in the transmission of knowledge (Møen, 2000). There is little empirical evidence on the magnitude of spillovers resulting from the movement of managers and other skilled employees from foreign-owned firms to domestic ones.
- The importance of the skills and capabilities of the workforce in assimilating new ideas and technologies from inward investors.

7 For instance it is an open question whether the regional benefits of separate hi-tech clusters of firms in 'Silicon Glen', Silicon Fen' and the Thames Valley outweigh the agglomeration economies that might be generated if they were all concentrated in a single location.

- Whether the presence of a single inward investor can matter as much as the presence of a number of firms. Greater competition from foreign firms might reasonably be expected to affect the speed with which domestic firms seek to adopt new practices, but a single, high profile investor could be all that is required to indicate whether new techniques and business methods are viable in the host economy.

All of these issues have yet to be studied in any great detail, either in the UK or in most other industrialised economies. The growing importance of inward investment in these economies and the level of interest displayed by policymakers make these omissions somewhat surprising and suggests that there remains plenty of scope for useful further research.

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