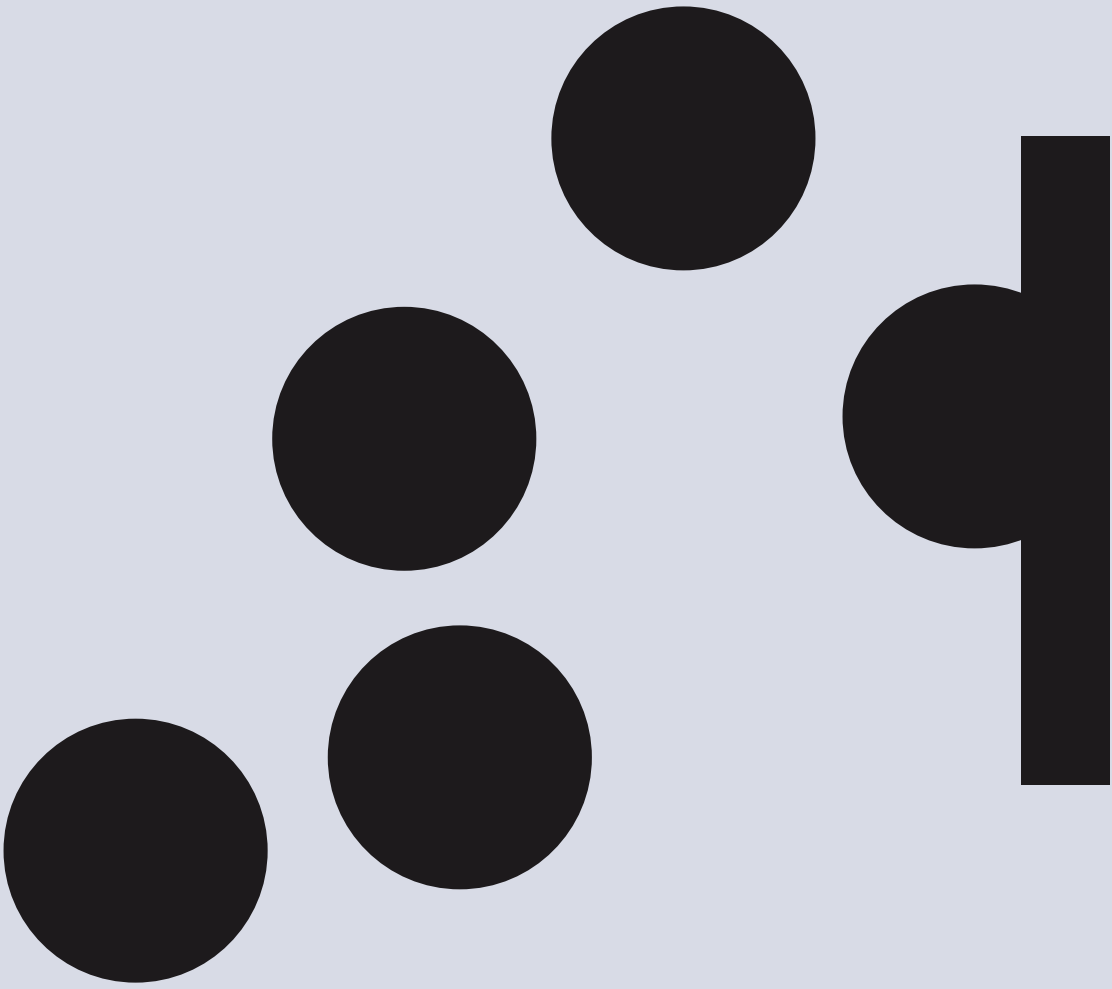
Growing Inward and Indigenous Investment



MANCHESTER INDEPENDENT ECONOMIC REVIEW

The Manchester Independent Economic Review provides a detailed and rigorous assessment of the current state and future potential of Manchester's economy. It contains a rich seam of evidence to inform the actions of public and private sector decision-makers so that Manchester can achieve long-term sustainable economic growth and boost the performance of the national economy.

Completely independent of local and national government, the Review is led by a panel of five prominent economists and business leaders:

Sir Tom McKillop (Chair):
Chairman, Royal Bank of Scotland

Diane Coyle:
Managing Director, Enlightenment Economics

Ed Glaeser:
Professor of Economics, Harvard University

Jonathan Kestenbaum:
Chief Executive, NESTA

Jim O'Neill:
Chief Economist and Head of Global Economic Research, Goldman Sachs

The Review Panel commissioned seven world-class organisations to work on seven strands of analysis which provide a deep and cutting-edge analysis of the economics of the Manchester City Region: the way businesses and people interact in terms of trade and skills, the causes and impact of innovation, how investment comes about and the effect it has, and why, despite all this economic activity and growth, stubborn pockets of deprivation still persist.

An ambitious agenda-setting report pulls together the seven strands of analysis, output from the comprehensive economic baseline study, as well as incorporating the extensive intelligence gathered from a year long consultation across the public, private and voluntary sector, which will be the foundation of an ambitious economy strategy so that the world-class research the Review has produced is used to drive Manchester's aspirations forward.

The Review has been funded by the Manchester Innovation Investment Fund, which is supported by both the Northwest Regional Development Agency and the National Endowment for Science Technology and Arts, separately by the Northwest Regional Development Agency, by the Learning and Skills Council and by the North West Improvement Network. The Review is also funded, supported and underwritten by the Association of Greater Manchester Authorities.

FOREWORD

Investment has long been a target of policy given its importance in driving productivity growth and ultimately living standards. Prior to the work commissioned by the MIER from Aston Business School, we knew very little about the nature and impact of both overseas and domestic investment in the Manchester City Region (MCR).

Using data on individual companies investing in the region, this research has some encouraging conclusions about the impact of recent investment but also contains some important policy lessons.

The evidence indicates that investment by foreign firms in MCR, in contrast to the UK as a whole, does not 'crowd out' or displace investment by UK firms. This type of investment most often occurs where the foreign investor has been attracted by a subsidy. This does not happen in MCR. On the contrary, inward foreign investment in the region is associated with increased investment by domestic firms which supply the inward investor.

Moreover, both inward and domestic investment in MCR use skilled labour rather than substituting for labour. Collectively, increased investment by both overseas and UK investors can increase employment. Again, this pattern is not universal and is an encouraging characteristic of MCR.

Less encouragingly, inward investment taken as a whole does not have a positive effect on the productivity of domestic firms operating in the same sector in MCR. However, there is a positive effect on the productivity of firms in downstream sectors, i.e. those which are buying from the overseas investors. This positive spillover is most pronounced in clothing and textiles, computing and precision instruments; it is weaker in transportation, which has seen significant inward investment; it is absent in engineering and life sciences.

However, these effects from inward investment, which are the focus of policy efforts, should be seen in the context of another result from the study, which is that large domestic companies are the most likely to carry out investment.

This finding is good news for MCR. It means that large businesses within the region are its main engine of investment and ultimately productivity. In doing so, they will generate jobs as well, rather than substituting capital equipment for labour.

Inward investment has a positive impact on jobs too, and some positive productivity spillovers, but more investment is domestically-generated. Given the volatility of foreign direct investment flows, particularly in todays economic climate this is to be welcomed.

Less encouragingly, investment by firms within MCR seems to be more reliant on debt finance than investment elsewhere in the UK, which could prove a serious vulnerability during the credit crunch.

What are the policy lessons resulting from these findings?

Two are negative lessons. First, that policy support should not be geared disproportionately either towards overseas investors or towards SMEs, both conventionally considered to be the most important targets for support. Investment by large domestic firms in the region will have the biggest impact on both productivity and employment.

Secondly, attracting overseas investors will have beneficial spillovers on the productivity of some domestic firms, and on employment; but it should not be attracted on the basis of subsidies as the evidence is that this displaces domestic investment.

Turning to the positive implications for policymakers in MCR, one of the key aspects the region needs to attract foreign investors is a large pool of skilled labour. This is a better inducement to potential overseas businesses looking for UK locations than the conventional range of policy options intended to boost inward investment.

It is important to encourage the development of supply chains which link overseas investors with domestic firms. Not only will this encourage positive productivity spillovers, it will also induce additional investment by the local firms.

Finally, there is a serious threat to investment in MCR from the drying up of credit, given that firms in the city region seem unusually reliant on debt finance. An assessment of this threat and possible remedies should be undertaken urgently.

EXECUTIVE SUMMARY

Investment is widely recognised as one of the five drivers of productivity and is vital for long term economic growth.

Investment analysis involves:

- the determinants of investment by domestic (i.e.UK-owned) establishments in MCR;
- the nature of the relationship between domestic and foreign investment, i.e. does foreign investment complement or crowd-out domestic investment?; and
- the effects of foreign direct investment (FDI) on productivity growth among domestic firms in MCR, allowing where possible for sectoral differences.

Investment in physical capital not only raises labour productivity directly, by providing the equipment used by workers, but does so indirectly by helping to introduce new technology and thus implement product and process innovation. It is therefore important for growth in a regional economy.

Inward investment generates employment, and attracting inward investment is often the only way that localities can achieve large-scale employment creation – where growth through indigenous SMEs for example, is slower and more organic. However, where large scale subsidies are used to attract (or retain) internationally mobile capital, the size of the incentive offered is seldom justified by the number of jobs created.

There are wider benefits to a region of attracting inward investment, particularly in the form of international technology transfer and the productivity gains made by indigenous firms. Regions that offer large subsidies to inward investors seem to experience the greatest crowding out effects in terms of domestic investment.

Data

The two main datasets used in this project are AMADEUS, which is a comprehensive and rich pan-European firm-level dataset and ORBIS, which is the global equivalent. The data on these firms is collected from various sources including national official bodies in charge of collecting company accounts data.

AMADEUS data are collected at the level of the enterprise (i.e. firm). This is perfectly suitable for the vast majority of industries, where multi-plant operations do not predominate. For a sector such as retailing however, where the predominance of large national retailers means there are a large number of establishments (individual retail outlets) but relatively few firms, the establishment-level data that are available through the Office for National Statistics (ONS) are used.

Key findings

Large domestic establishments are more likely to carry out capital investment. Importantly, investment by the domestic sector in MCR is generally not labour replacing, suggesting that increased capital investment by local firms can be combined with increased employment (collectively) by these firms within MCR.

The one issue of possible concern here lies in the consistent finding that domestic investment is positively associated with the ratio of long-term debt to total assets, suggesting that there is a high reliance on such debt to fund investment among domestic firms. If debt becomes more difficult to finance, this may adversely affect the capacity of the domestic sector to maintain its position as a driver of investment growth within MCR.

Foreign investment into MCR is driven by relatively large, R&D intensive enterprises. This holds even after allowing for sectoral differences.

As with domestic investment, there is little evidence that FDI into MCR is labour replacing: in other words, foreign investment into MCR appears to be generally complementary to skilled labour.

There is evidence for the UK generally that foreign investment to some extent 'crowds out' or substitutes for domestic investment. This is especially the case where inward investment is attracted through subsidy. There is no evidence of such crowding out for MCR, and indeed there is evidence that foreign investment in upstream industries actually complements investment by domestic firms in downstream sectors.

FDI has virtually no effect on the productivity of domestic firms in the same sector within MCR. However, there are positive effects in downstream sectors, suggesting that domestic firms do benefit from (direct or indirect) supply-chain linkages with foreign investors.

This is most evident in relatively low-technology sectors, where supply-chain linkages may be strongest, and especially where the foreign investor has an export orientation. However, there is no evidence of spillover effects to the domestic sector in the engineering or life sciences sectors.

This is consistent with a range of studies, which have suggested that buyer-supplier partnerships involving foreign firms are a mechanism for productivity spillovers, technology diffusion and more fundamental value chain restructuring.

The nature of the foreign investment affects the nature of the spillover. Export oriented FDI – where the multinational firm's output is principally geared towards external markets – appears to have no productivity spillover effect. In the literature this is often interpreted as a 'market stealing' or competition effect: inward investors compete with domestic firms, forcing them to operate at smaller scale, so that in the short-term productivity declines.

Positive spillover effects are particularly strong in the clothing and textiles, computing, and precision instrument sectors. However, positive spillovers are weaker in transport equipment, where FDI has been strong.

There are productivity spillovers from foreign to domestic firms within retailing, and that this effect is concentrated within MCR. Thus spillovers occur largely within MCR rather than firms within the city region appropriating spillovers from inward investment elsewhere. In addition, spillovers occurring within MCR's retail sector do not 'leak out' to regions outside.

In terms of pointers to growing indigenous and foreign investment within MCR, the analysis suggests a number of key issues, summarised below.

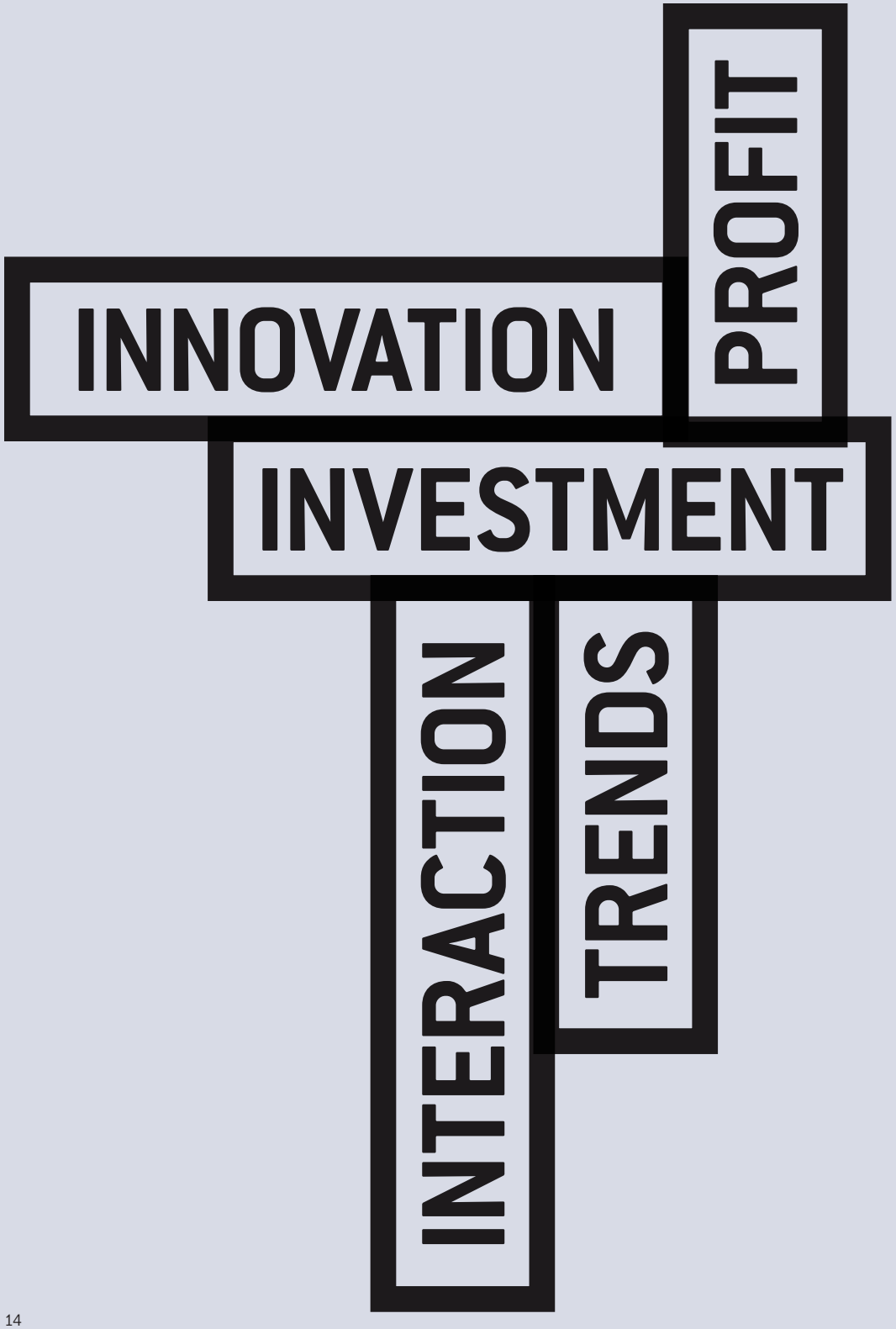
Size matters for investment by domestic firms within MCR. Therefore, the tendency for policy support to be geared towards SMEs has to be tempered with a recognition that relatively large domestic firms appear to be the main engine of domestic investment growth in MCR.

Attracting foreign firms into MCR has been beneficial both in terms of physical investment and in terms of labour market effects. It seems likely that continuing to be able to do so – and without recourse to widespread subsidy and other inducements – is likely to continue to be a major strength of MCR. This also suggests that having a pool of complementary skilled labour will continue to be an important pull for foreign investment.

Building supply-chain links between domestic and foreign firms is important. This has two beneficial effects: productivity spillovers occur via these linkages, and they also allow complementary physical investment by local firms.

Beneficial spillover effects are more likely in low-tech than hi-tech sectors, suggesting that foreign investment and local linkages in sectors such as clothing and textiles still have an important role to play within MCR.

1.0 INTRODUCTION



The purpose of this project is to evaluate the trends and determinants of investment within the Manchester City Region.

It therefore attempts to do two things. Firstly to examine the trends and determinants of both indigenous and inward foreign investment in MCR. Secondly, to examine the effects of inward foreign direct investment (FDI) on MCR from two aspects: the impact of productivity at the local level; and the interaction between inward investors and domestic firms – put simply whether inward FDI stimulates investment by the indigenous sector or stifles it.

The rationale for focusing on these two questions is clear. Over the last decade, there has been a rise in studies linking development to growth in total factor productivity.

Productivity growth is seen as the driver of development, and in terms of income at both a local and national level. Its importance far outweighs other determinants of growth such as government spending, human capital accumulation or R&D / innovation (though of course both of these are expected to generate productivity growth subsequently).

Further, standard "endogenous growth" models of development highlight the role that investment (and in turn inward FDI) can have in further stimulating growth. The literature on the benefits of FDI is then linked to ideas surrounding international technology and FDI.

While technology is seen as a driver of productivity, it is also clear that a very high proportion of the worlds' R&D is carried out by a very limited number of firms in a limited number of locations. As such, inward investment agencies have seen the attraction of inward investment as being a way of linking regions into the global innovation system.

These issues have perhaps become even more important in the context of the economic downturn. While it is difficult to speculate on what the outcome of this may be, one can draw several parallels with previous experience. There is however, one big distinction between the recession of 2008 and previous ones. That it started in the service sector, not the manufacturing sector.

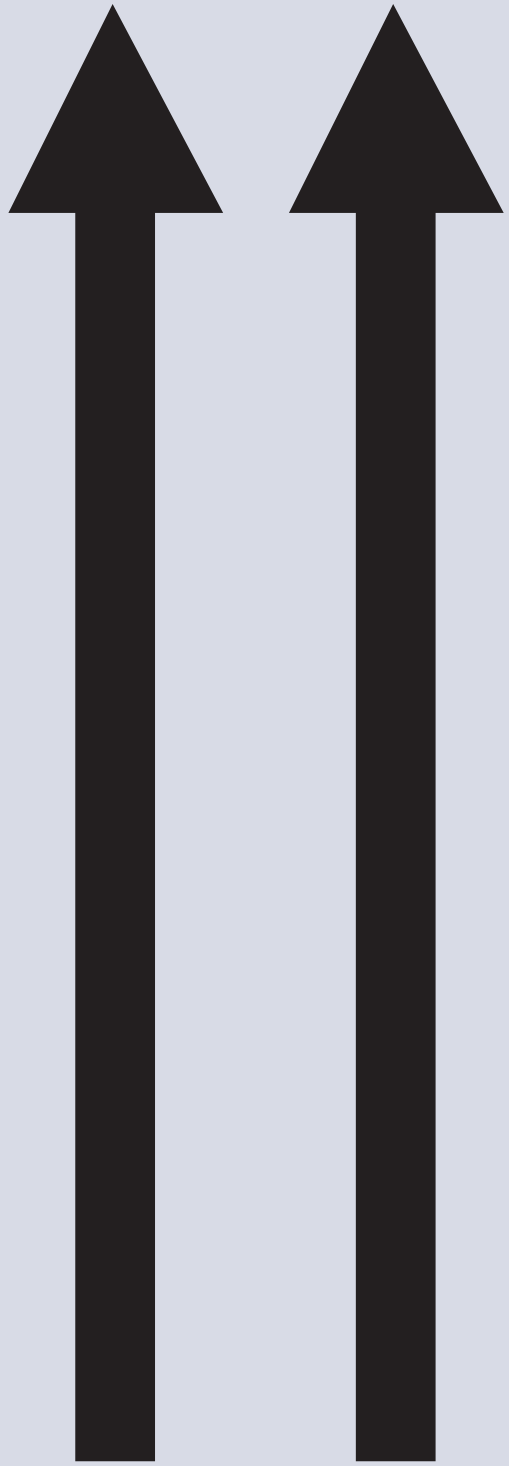
It is possible therefore that manufacturing firms who have managed to navigate a good deal of economic turbulence since 1979 may have the skills, customer base and flexibility to survive again. However, with the reduction in the availability of debt, service sector and retail firms are likely to be hard hit, as are manufacturing firms exposed to the downturn in customer debt. The automotive sector is a good example of this.

In terms of global FDI flows, a few comments are pertinent. Firstly, that a growing proportion of FDI between developed countries has been funded by debt. This is often masked in official figures, because if for example a US firm seeks to invest in the UK, and does this by raising debt in London, then it will not show up as inward FDI in the FDI flows data.

However, it is clear from the firm level data that more and more international investment is funded by debt, and as high profile examples have shown, servicing and refinancing this debt is becoming problematic. Equally, signs are already emerging that firms are looking to retrench into their home markets. With currency fluctuations and interest rate uncertainties making international investment more risky, US firms in particular appear to be forgoing the potential benefits of FDI, and seeking to focus on production at home. This also becomes politically expedient when seeking large scale support from government, as US car manufacturers did in November and December of 2008.

In this context we therefore seek to examine the determinants of capital investment and the extent to which these vary across sectors, and between inward investment and locally owned firms. Secondly, the extent to which inward investment generates spillovers that are seen to boost the productivity of domestic firms.

However, it is also important to put this work in context. We seek to do this in two ways. Firstly, by providing some detailed background on the local, national and international investment climate, and discussing the trends in international capital investment flows. Secondly, by discussing in detail the voluminous literature in this area that has informed our study.



PRODUCTIVITY

The remainder of this report is set out as follows:

We begin with some discussion of recent trends, and some background analysis of the international, national and local conditions that MCR sits within. The second section then presents a review of the academic literature on which our analysis is based, and discusses the importance of investment, attracting FDI and the significance of inward investment spillovers within the context of a region or regional policy. Chapter three then presents some outline analysis of local and national data in this context. Chapter four then discusses our data in some detail, while Chapter five discusses our findings in summary. Finally, we offer some conclusions.

The reader's attention is also drawn to the five appendices, including a detailed bibliography, that form a component part of this report and are available to download at:

www.manchester-review.org.uk

These are comprised of four technical papers that present the literature, analysis and findings in detail. The fifth one offers some more detailed commentary on the changes in the patterns of global FDI flows over the past 25 years.

1.1
Recent trends in global FDI

FDI flows tend to be highly volatile, and reflect the underlying economic conditions of the countries concerned. Global FDI[1] flows peaked in 2000 at $1.4 trillion, and then fell sharply until 2004, when they began to rise sharply once more. By 2006, global FDI inflows had reached $1.3 trillion. Provisional figures from United Nations Conference on Trade and Development (UNCTAD) suggest another increase in 2007 to $1.5 trillion.

While both developed and developing countries have seen substantial rises in inflows in the last three years, as is usual in a time of FDI upswings, the share of global FDI accounted for by developed economies is rising: in 2006 approximately two-thirds of all FDI inflows were to developed economies, flowing mainly from other developed economies (Figure 1.1).

The rapid rise in FDI flows since 2004 largely reflects the significant economic growth in many major economies, coupled with a weakening dollar. In particular, high corporate profits and stock prices led to a sustained increase in cross-border mergers and acquisitions (M&A), which accounted for over 80% of total FDI inflows in developed economies in 2006.

The total stock of global outward FDI has been rising steadily since the early 1980s, and by 2006 had reached $12.4 trillion, double the value of 2000 (in nominal terms).

Over 85% of both the outward and inward stock of FDI is accounted for by developed economies, principally the USA and Europe. The European Union alone now accounts for almost half of the stock of inward FDI and over half of the outward stock. The UK had an inward FDI stock of over $1 trillion and an outward stock of $1.5 trillion in 2006, accounting for 12% of outward and 9% of inward FDI stocks.

UNCTAD (2005, 2006) ascribe these changes to changes in patterns of FDI. In particular, transition economies and eastern Europe experienced a significant increase in FDI, which more than offset the decline in FDI both within the EU15 and between the EU15 and America. Equally, the rise in service sector FDI more than offset the decline in manufacturing. More recently, UNCTAD (2007) has highlighted the resurgence in what had been thought of as a 1960s / 1970s phenomenon, of FDI in extractive mining industries in developing countries.

A key change in the industrial pattern of FDI over the past 20 years has been the shift towards services, accompanied by a decline in the share of FDI in primary industries and manufacturing[2].

While FDI has increased significantly in absolute terms in primary industries, manufacturing and services, the shares of these sectors in total flows have declined, as the service and financial sectors have increased in importance.

In 2006, manufacturing accounted for around 30% of FDI stock, compared with over 40% in 1990. Services represented over 60% of the global FDI stock in 2006, up from half in 1990. While the primary sector still represents less than 10% of FDI stock, there has been a rapid rise in FDI in the extractive industries during 2005 and 2006.

1 Foreign direct investment (FDI) is defined as an investment involving a long-term relationship and reflecting a lasting interest in and control by a resident entity in one economy (foreign direct investor or parent enterprise) of an enterprise resident in a different economy (FDI enterprise or affiliate enterprise or foreign affiliate).

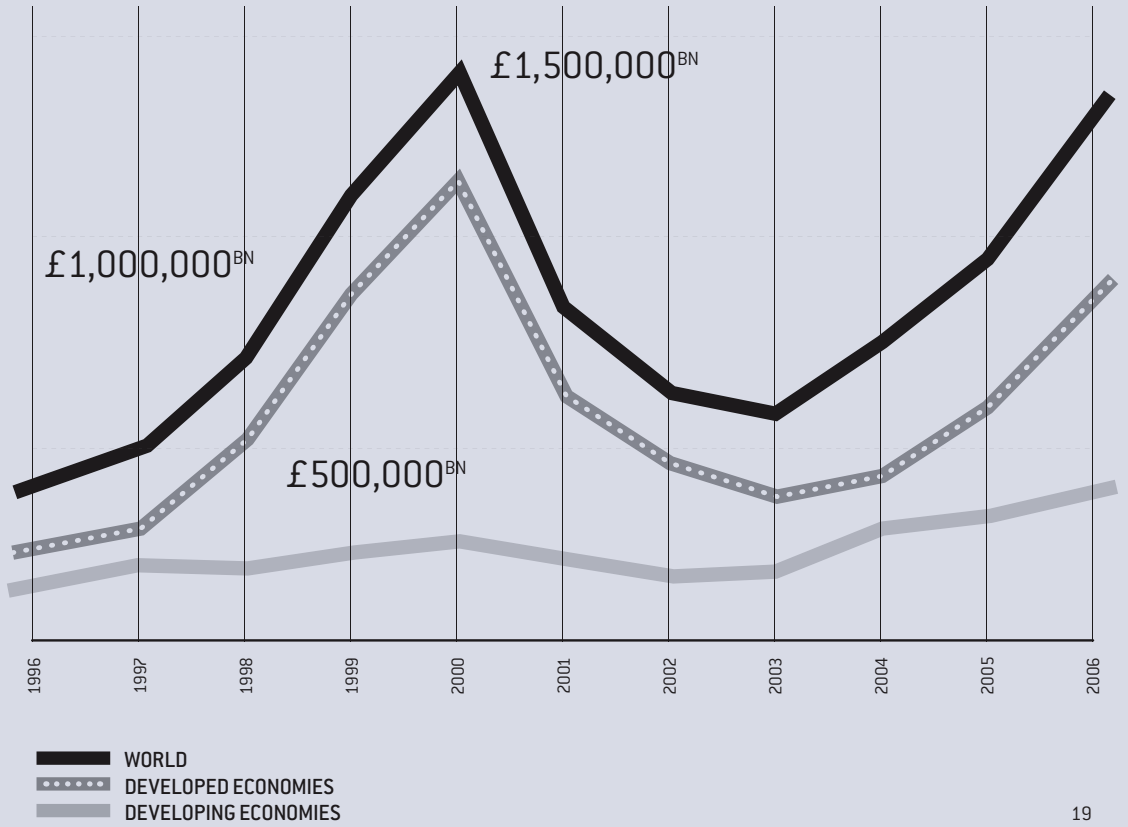
Such investment involves both the initial transaction between the two entities and all subsequent transactions between them and among foreign affiliates.

A direct investment enterprise is defined as an incorporated or unincorporated enterprise in which the direct investor, resident in another economy, owns 10 percent or more of the ordinary shares of voting power (or the equivalent). However, this criterion is not strictly observed by all countries reporting. (UNCTAD).

2 More figures illustrating changes in global FDI flows are presented in a short appendix E to this paper.

Figure 1.1
FDI Inflows 1996-2006 by economy (billions of dollars)

Source: UNCTAD



1.2
The UK's inward investment profile

Between 2001 and 2004, the average annual flow of FDI into the UK was just under £27bn. The stock of FDI in the UK according to the 2007 World Investment Report (UNCTAD 2007) was US$1,135 billion at the end of 2004, second behind the US, and some five times the value of China's.[3]

The review of the academic literature highlights in detail the importance of inward investment to the host economy, but to summarise:

- Some 17% of all FDI into the UK is in the form of retained profits by foreign firms already in the UK.
- Between 1997 and 2003 inward investors in the UK spent some $160 billion on R&D. This is some 10% more than the comparable figure for the US.
- The estimated stock of foreign investment in the UK at the end of 2005 was 47% of the UK's GDP.
- Foreign firms in the UK are more capital intensive than UK firms.
- Foreign firms are larger, thus better placed to achieve scale economies.
- Foreign firms in the UK are more productive than UK firms (approximately 24% on average).
- Foreign firms in the UK pay higher salaries than UK firms (approximately 14% on average).

While many academic papers have then set out to disaggregate these figures, in order to determine for example whether productivity differences hold when comparing like for like (comparing UK and foreign owned firms of a similar size for example, or comparing inward investors with domestically owned exporters), the fact remains that inward investors represent a particularly productive part of the economy.

3 Official UK FDI data lag behind company level data. The latest data available for the UK for the drafting of this report is 2003 to 2004 in most cases, while company data are available for a further two years.

1.3
FDI flows into the UK over time

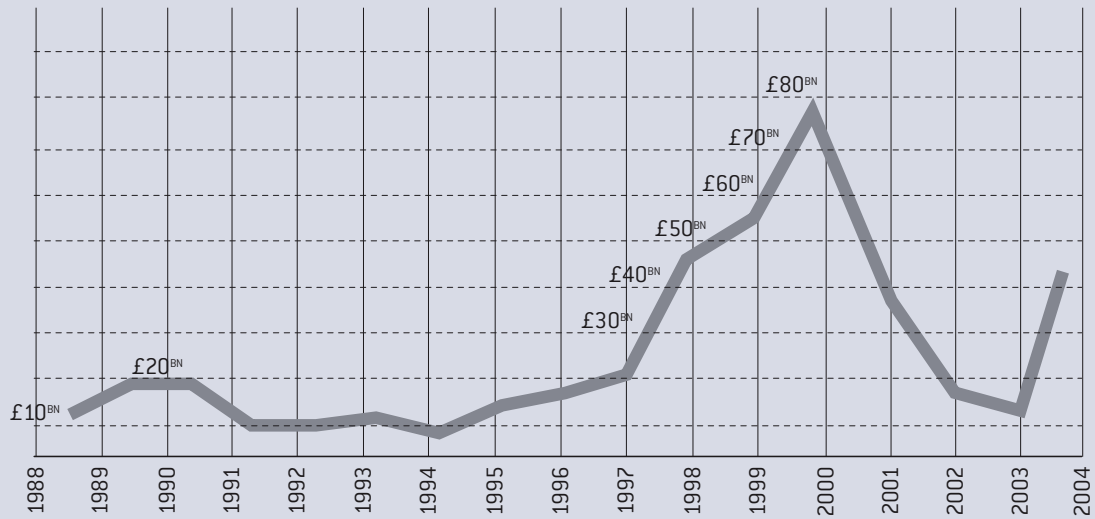
Figure 1.2 below highlights the massive increase in FDI that occurred through the mid 1990s, tailing off (coinciding with the Currency crisis in SE Asia), and then picking up again since.

This data mirrors the global trend, of a four fold increase through the 1990s, with a subsequent decline and a sharp increase from 2003. This again reflects global patterns and a large increase in international M&A activity. To some extent however, this increase also reflects the increase in FDI from emerging and transition economies, such as Brazil, Russia, India and China.

In the current economic climate however, the pattern becomes more interesting when one investigates the source of finance, explored in the next section.

Figure 1.2
FDI flows into the UK (billions)

Source: UNCTAD



The first thing that one should point out with respect to Figure 1.3 is that for reasons mentioned previously, official data based on macro FDI flows will always overstate the importance of equity and retained earnings in funding FDI. This is because, typically, equity is raised in the home country, while debt is often generated in the host country, and therefore while the firm would appear as a foreign firm and therefore an "inward investor" in the source country, the investment may not appear in the national FDI flows data[4].

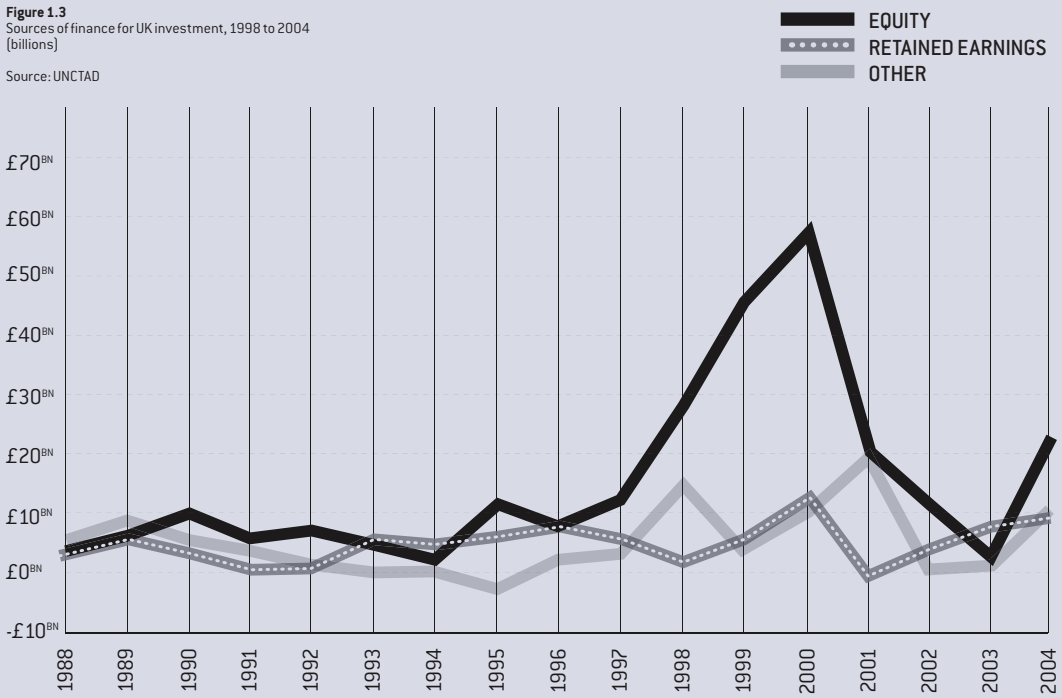
As such, a doubling over the period of FDI funded by debt has become significant. In the present climate, one can expect this to be curtailed significantly. This is particularly important as transatlantic investment (in both directions) and FDI within the EU15 is typically funded at least in part by debt.

More detailed analysis of global FDI flows are presented in the appendices to this paper, and our analysis now turns to the patterns of investment locally and nationally.

4 A high profile example of this is the acquisition of Liverpool football club by Hicks and Gillette. Largely they raised the debt to buy Liverpool from UK banks. They then carried out a domestic transaction within the UK. The parent company of Liverpool is then owned by Americans, so would appear in company level data as a firm with ultimately US owners. However, the actual investment of purchasing the football club would not register in the international trade and investment statistics that calculate international capital flows.

Figure 1.3
Sources of finance for UK investment, 1998 to 2004 (billions)

Source: UNCTAD



2.0 BACKGROUND

A lengthy literature review is provided as appendix A to this report. It sets out in detail not only the rationale for seeking to attract inward investment, but also the evidence concerning the impacts of inward investment on host regions or countries. This highlights a series of considerations that we briefly explain here.

2.1 Summary of key findings from the background literature

The literature on the impacts of FDI has eight key findings:

- Inward investment generates employment, and attracting inward investment is often the only way that localities can achieve large scale employment creation – where growth through indigenous SMEs for example is slower and more organic.
- However, where large scale subsidies are used to attract (or retain) internationally mobile capital, the size of the incentive offered is seldom justified by the number of jobs created.
- That there are wider benefits to a region of attracting inward investment, particularly in the form of international technology transfer and the productivity gains made by indigenous firms.
- The theoretical and conceptual literature is very definite about the technology transfer that may be facilitated by multinationals, and bases this on the concept of firm specific knowledge, and the way this is transferred, either directly or indirectly from inward investors to indigenous firms.
- Central to this process is the concept of linkages, between firms and between sectors. Most results, in terms of productivity spillovers or impacts on earnings, find that the spillovers from FDI between sectors (notably back up the supply chain) are greater than the effects within industries.

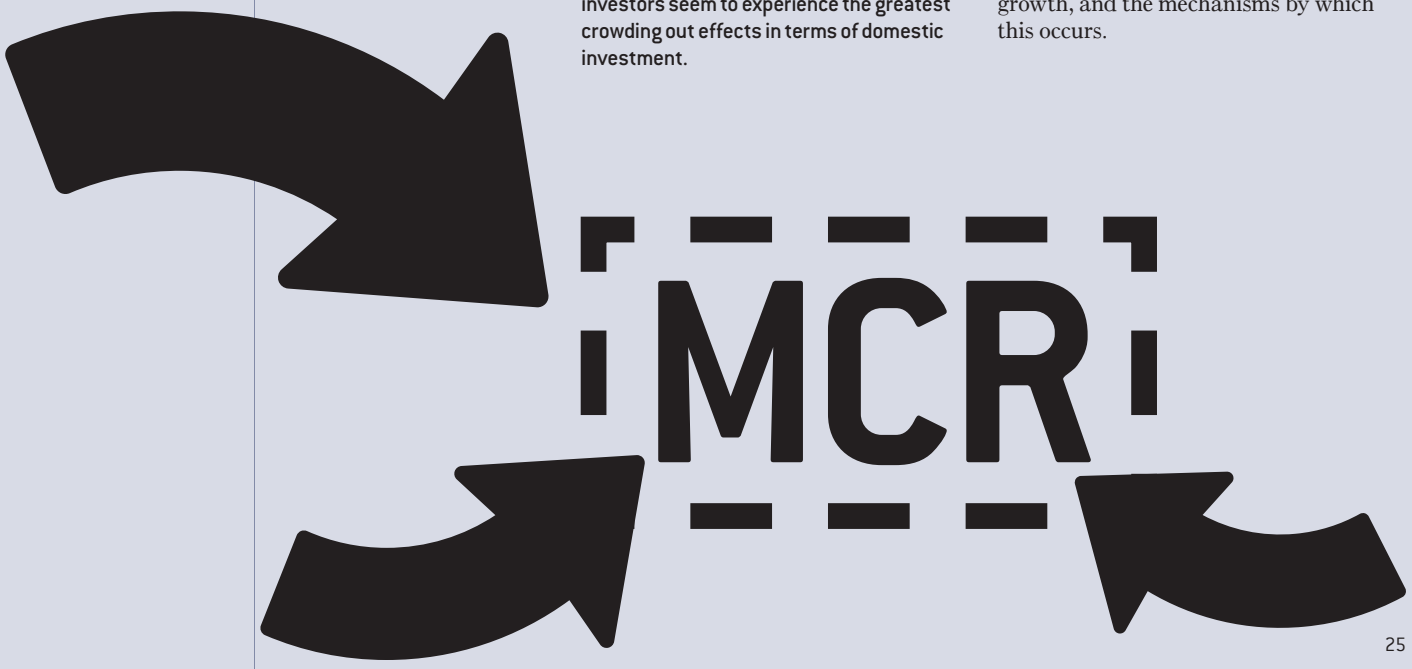
- That much of the early work in this area, based on sectoral level data, is rather optimistic in the scale and scope of spillovers from FDI. The subsequent work using firm level data highlights one reason for this, which is that in general the better performing sectors attract more and higher performing inward investors. As a result, much of the apparent productivity or growth effect from FDI may be due to a sample selection effect – i.e. better sectors attracting better FDI.
- Despite this, most studies using firm level data do find productivity spillovers from FDI, but highlight the importance of linkage effects, and also differences between sectors. One further advantage is that with firm level data, one can generate a more precise measure of productivity, which is less likely to bias subsequent results.
- Finally, there is a smaller amount of literature that seeks to identify the impact of inward investment on domestic investment. Due to data constraints this has often been carried out indirectly, looking at firm entry, or growth of domestic firms.
- There is however, some evidence that in general inward investment stimulates domestic investment at the local level, but that this varies between sectors, and notably between locations. In particular, regions that offer large subsidies to inward investors seem to experience the greatest crowding out effects in terms of domestic investment.

2.2 The motivation for attracting inward investment

Firstly, the most obvious reason for seeking to attract inward investment is that it generates employment. A particular challenge for policy makers charged with attracting investment to a region, is that while certain inward investment projects have received a rather bad press, if one is seeking to generate employment on a large scale, there is in general not the capacity for generating that employment from within the indigenous sector.

This is in line with the way economic theory relating to growth views FDI, it is seen as an exogenous increase in investment, that does not change capital market conditions locally (the capital being assumed to have been raised abroad) but stimulating demand for labour and other intermediate goods locally.

However, the concern then remains as to whether the size of subsidies sometimes offered can be justified purely in terms of direct employment creation, and so the wider benefits of inward investment have attracted a good deal of attention. Of particular interest is the link between inward investment and productivity growth, and the mechanisms by which this occurs.



2.3 FDI and productivity

The most obvious link between inward investment and sectoral productivity growth is quite simply that new entrants, irrespective of nationality, would be expected to have above average productivity. As such, average productivity increases post entry. Further, that entry by more modern, more competitive firms often induces exit by the least productive firms, further increasing sectoral productivity.

This "batting average" effect is probably the greatest single benefit of inward investment in a host region, after the direct employment effect. Quite simply, inward investment acts to reallocate resources to more productive units, thus increasing the long-term competitiveness of the economy. It should of course be noted that this may also accompany a "crowding out" of employment in domestic firms, and this is discussed in more detail in section 2.5.

Perhaps the most controversial, and from a policy perspective the most important issue in terms of the beneficial effects of inward investment, concerns the spillover, or indirect technological benefits of FDI. Policy makers have focused on technology transfer or spillovers from FDI, as typically they are assumed to follow from most traditional theories of FDI activity.

Dunning's (1979) eclectic paradigm, and particularly on the concept of ownership advantages, suggests that FDI is motivated by firm specific advantages, and so, the argument goes, these firm specific advantages will, over time flow from inward investors to domestic firms. Such firm specific advantages are often characterised as technology based, relating to economies of scale, capital intensity and R&D.

Indeed, Blomstrom and Kokko (1996) provide several reasons why such technology is expected to transfer from Multinational Enterprises (MNEs) to domestic firms. This can occur directly, through the licensing of a particular technology, through supplier networks or subcontracting arrangements, or indirectly as knowledge becomes public and spillovers are assimilated by the domestic sector.

Using data from the UK Census of Production, together with information from UK input-output tables, Driffield, Munday and Roberts (2004) demonstrate the importance of the scale of linkages between foreign and domestic manufacturers for productivity growth in the domestic sector.

2.4 Productivity spillovers from FDI

Recent work has suggested that earlier, more positive findings on spillovers from FDI may have rather overstated the case. The majority of the research in this area does find a positive effect, but rather lower than might have been expected (see for example, Haskel et al. (2007); Girma et al. (1999, 2001), and Harris and Robinson (2002a, 2002b)). Indeed, Aitken and Harrison (1999) show that FDI exerts both positive and negative effects on domestic producers.

Research has also focused on the wider dynamics of the spillover process into defined parts of the UK domestic sector. The issue therefore is the extent to which productivity externalities are greater where foreign firms are backwardly linked to domestic manufacturers (buying from) or where they are forwardly linked to domestic manufacturers (selling to). This is an important issue, as significant resources are being targeted towards "embedding" (encouraging local buyer-supplier linkages) multinational firms into host economies across the globe.

2.5 Labour market effects of FDI

There are a number of studies that identify substantial differences in factor demand between foreign and domestic firms. The inference here is that foreign multinationals demonstrate higher levels of labour productivity, and in turn greater demand for high quality labour. Entry by such firms therefore is expected to impact on domestic labour markets via two mechanisms.

Firstly, inward investment generates a straightforward labour demand effect, stemming from an exogenous increase in output. Barrell and Pain (1997), show that the technology accompanying FDI is compatible with more skilled labour. As such, this investment reduces the demand for unskilled labour, and reduces the relative wages of unskilled workers.

A conceptual piece by Driffield (2007) for the DTI illustrates that a wide range of literature generates two consistent results. Firstly, that inward investment, along with most manifests of globalisation, benefits skilled workers disproportionately.

Secondly, that inward investment tends to be linked, not necessarily to low wages, but to labour market flexibility. Thus, inward investment tends to be attracted to regions where wages adjust faster than employment. This helps to explain why the UK has been seen to be a more attractive location than the rest of the EU, by inward investors from the US, Japan or other parts of Asia.

2.6 Links between domestic and foreign investment

Driffield and Hughes (2003) show that in general, inward investment stimulates domestic investment, confirming one of the hypotheses of Markusen and Venables (1999), and others, that complementarity and agglomeration economies are generated as a result of FDI.

However, there is also evidence of competitive or displacement effects, particularly in regions that have used large subsidies to attract inward investment. In cases where host regions or industries exhibit only low levels of physical and human capital intensity, then such firms may not be able to assimilate any technology needed to foster domestic investment or generate linkages.

Where firms are attracted to a region because of low wages, or simply because of a capital or employment subsidy, then the activities undertaken by the foreign firm may be low skill, low value added activities. In such cases, technology spillovers will again be limited, and the displacement effect will dominate.

While these findings do suggest that the overall benefits from FDI may not be as large as suggested elsewhere, this is not to say that the results presented here provide evidence that these regions are worse off as a result of FDI. It is clear that inward foreign direct investment generates employment that may not have occurred in the absence of inward investment.

These results do however suggest that regional development agencies and other policy making bodies should engage in more sophisticated targeting in their use of subsidies as part of their regional economic strategies, focusing on certain industries rather than offering more generic subsidies.

This is important for MCR, as it has several neighbours that are able to offer large subsidies to attract internationally mobile capital. These results suggest that firms who find MCR attractive are unlikely to be drawn away to locations such as South Yorkshire or Merseyside, and as such firms that do locate in MCR are likely to generate significant benefits for the local economy, as explained later.

Having discussed what we can learn from the literature, we now turn to our analysis, beginning with an overview of the investment climate both locally and nationally, and moving on to our more detailed analysis.

3.0 THE PATTERN OF DOMESTIC AND INWARD INVESTMENT LOCALLY AND NATIONALLY

Academics and policy makers have long recognised that investment in physical capital is a key contributor to both current economic growth and future expansion of productive capacity and potential efficiency.

3.1 Introduction

Early models of economic growth noted the important role of physical investment to growth (e.g. Solow, 1957), while more recent empirical analyses have indeed confirmed this importance (e.g. De Long and Summers,1991; Mankiw, 1995). In fact, some economists even attributed the spectacular growth rates enjoyed by some of the East Asian newly industrialising countries in the 1980s up to the mid 1990s, mainly to investments in physical capital rather than productivity growth (see Krugman, 1994; Young, 1999; Collins and Bosworth, 1996).

Further, investment in productive physical assets (land, buildings, plant and machinery and vehicles) can also explain at least some of the variations in productivity at the company level. For example, recent studies of UK industry have found a high correlation between capital intensity and productivity at the firm level, and there is strong evidence that the greater capital intensity of foreign-owned firms in the UK accounts for a substantial part of their higher productivity relative to domestically owned enterprises (Oulton, 2001).

Moreover, investment in physical capital not only raises labour productivity directly by providing the equipment used by workers, but does so indirectly by helping to introduce new technology. However, investment by firms is only one aspect of physical investment. The stock of public infrastructure also makes a contribution to productivity and growth in a country or region, providing, for example, suitable transport links, educational provision, housing etc. (See Easterly and Rebelo, 1993; World Development Report, 1994).

Consequently, the analysis below considers the patterns of both business and public investment in the Northwest in general and MCR in particular.

3.2 Determinants of investment

Standard approaches to modelling investment treat investment decisions as being motivated by a firm seeking to reach its optimal level of capital stock. This is then driven by the capital market, though the market for goods and services is also important in determining the demand for new investment by the firm.

The demand for investment by a firm is essentially a response to changes in demand for the firm's goods and services, backed up by the ability of the firm to fund that investment. As such, the seminal papers that seek to model investment, such as Hall (1992) or Nickell (1979)[5], include measures of output, cash flow and profitability as the main determinants of a firm's demand for investment. This essentially assumes that for some (exogenous) reason, the firm identifies that it needs to purchase new capital equipment. Typically, the simplest way to express this is that the firm anticipates an increase in demand, and responds by investing in new equipment.

However, other factors are also important. For example, technological development is likely to stimulate investment, either because new products or processes are developed within the firm, that lead to the firm requiring new capital equipment. Alternatively, external innovation may lead to the firm needing to acquire new capital equipment in order to keep up with the competition.

Turning now to the supply of investment funds, this is potentially very pertinent in the current downturn. Most textbook treatments of investment assume that there are three ways for a firm to fund investment. It may do this through retained earnings, by taking on more debt or through issuing equity. It is generally assumed that a third of these occur only when a firm is seeking a significant new investment, involving a step change in its activities, such as a major expansion or diversification.

Where a firm is simply seeking a modest expansion of existing activities, one would anticipate that this will be funded by either retained earnings or debt.

The extent to which businesses invest and reinvest in their production capacity is linked directly to their economic competitiveness, with high investment industries typically showing above-average rates of growth. Further, as the manufacturing industry becomes ever more capital intensive an increasing volume of investment is required to provide a given number of jobs.

Given the highly cyclical nature of fixed investment and the fact that it accounts for a significant proportion of GDP, firms are more likely to invest if: (1) they are operating at a high level of capacity; (2) they are confident that demand will remain high and (3) interest rates are low.

In contrast, when these conditions are reversed, businesses are likely to cut back on fixed investments. Investment therefore tends to be highly cyclical and closely linked to business confidence relating to the sustainability of demand.

Over the last two and a half decades or so, the ratio of business investment to GDP (at constant prices) in the UK has been trending upwards, with the second half of the 1990s witnessing a sharp upturn in this trend (Bakhshi and Thompson, 2002). Various factors have been identified as possible explanations for this development, chief of which is a sustained fall in the relative price of investment goods.

Other important factors identified are the falls in the cost of finance and increases in replacement investment. However, the productivity of capital has been rising, especially in larger firms, as more firms engage in outsourcing or offshoring to relocate low value added activities abroad. In addition, more recently the trend in investment rates has been downwards, and one would expect to see a decline in investment rates throughout 2009.

5 For empirical treatments of this type of model, see Barrell and Pain (1996) or Bajo-Rubio and Sosvilla-Rivero (1994) for example.

3.3
Analysis of investment trends in the Northwest

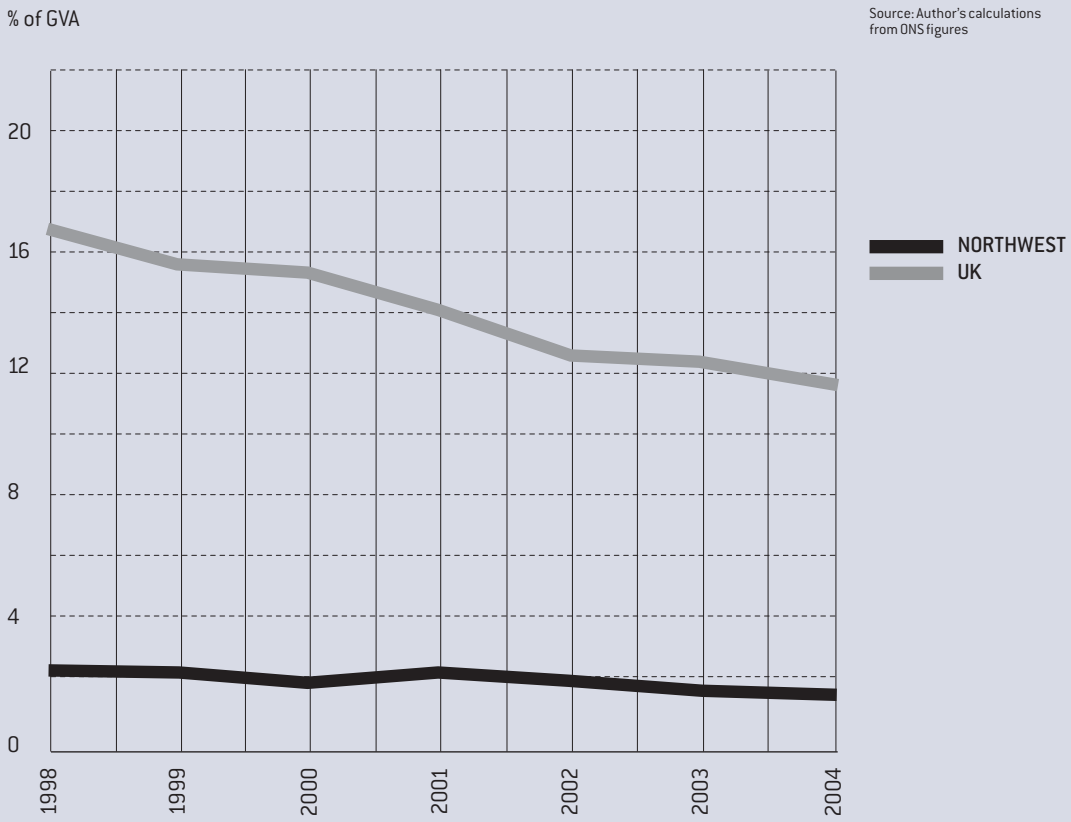
This section presents some introductory analysis of investment trends in the Northwest specifically, and in relation to the rest of the UK as a whole.

Figure 3.1 shows the net capital expenditure for this region specifically and the UK as a whole, as a percentage of national GVA. As shown in the figure there has been a downward trend in investment as a percentage of GVA both locally and nationally, with the trend being more pronounced in the case of the latter.

Investment as a percentage of GDP has been on the increase since 1980, while as a percentage of GVA it has declined more recently. This suggests that for the UK as a whole, productivity has increased faster than output.

Figure 3.1
Investment as a percentage of total GVA

Source: Author's calculations from ONS figures



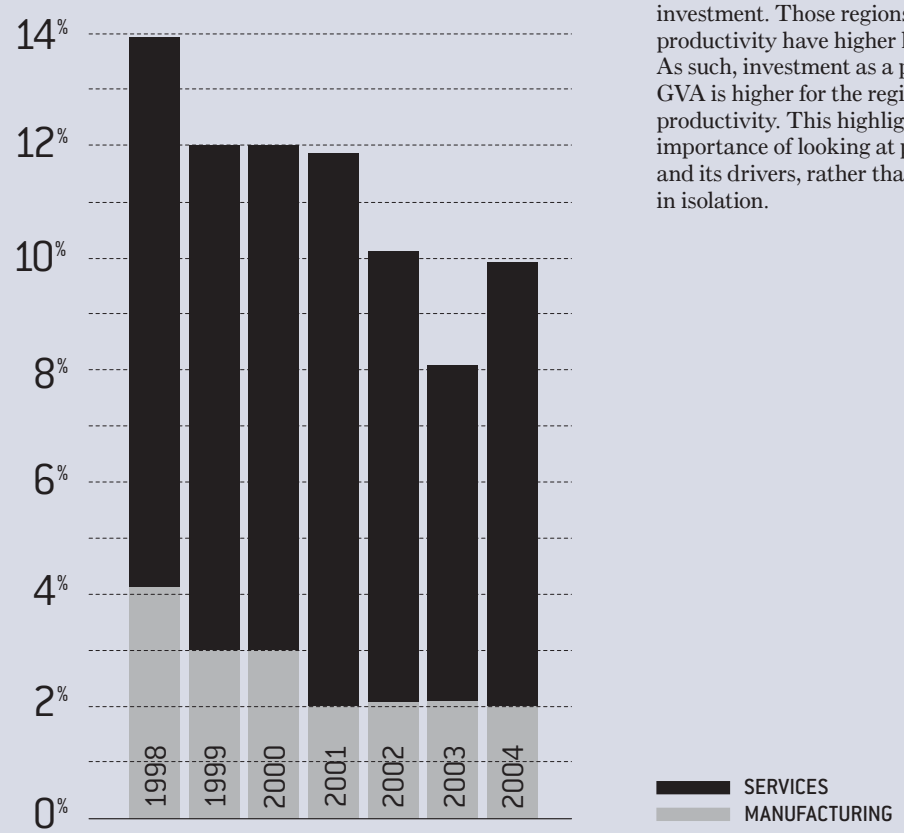
3.4
Comparison between sectors: Northwest

Relative to services, manufacturing accounts for a smaller and decreasing proportion of Net Capital Expenditure in the Northwest region.

Figure 3.2 highlights the significant differences in investment rates across sectors, not only in terms of magnitude, but in terms of investment intensities across sectors. It is clear that services now outpace manufacturing in terms of investment, while not surprisingly sectors such as energy, water etc. have far higher investment rates.

Figure 3.2
Investment in the Northwest as a percentage of GVA across manufacturing and services

Source: Author's calculations from ONS figures



3.5
Comparison between regions

In 2004, investment in UK regions as a percentage of GVA varied from 14.0% in Scotland to 9.3% in London. (See Figure 3.3) The Northwest ranks sixth of the twelve Government Office Regions (GOR; inclusive of Scotland, Wales and Northern Ireland), which is above both the UK and England averages.

In terms of UK company investment in manufacturing, in 2002, the Northwest was ranked second to Wales among the regions with the highest levels of investment as a proportion of regional GVA. Similarly, the region was well above the average for England in 2002, in terms of UK company investment in Services as a proportion of regional GVA.

To an extent, these results are driven by productivity differences, and may therefore say as much about differences in regional productivity as they do about investment. Those regions with higher productivity have higher levels of GVA. As such, investment as a proportion of GVA is higher for the regions with lower productivity. This highlights the importance of looking at productivity, and its drivers, rather than investment in isolation.

3.6
Sub-Regional analysis

As indicated earlier, sub-regional investment data are very limited, restricted to broad sub-regional areas (i.e. NUTS2 areas) and somewhat out of date. The latest available data (table 3.1) are for Gross Fixed Capital Formation (GFCF) as a percentage of output (i.e. GFCF/GVA) for the year 2000. This shows that for the Northwest as a whole, gross investment levels were very similar to the UK average over the period 1998 to 2000.

However, the decline in the Northwest's share of GFCF as a share of GVA was greater than that experienced nationally. One interpretation of this is simply that capital productivity in the Northwest was above average.

Additionally, there are some sub-constituent regional variations with, for example, the proportion of gross investment in output in Cumbria being well above the regional share. Further, there was a sharp decline in the share of investment in GVA in Lancashire over the period. Given the short review period, coupled with the lumpy or erratic nature of much capital expenditure (particularly at the sub-regional level), it is not possible to draw solid conclusions from this data.

Having said this however, the pronounced decline of investment in Lancashire over the period is argued to be part of a long-term trend which has seen this sub-region exhibit below par investment relative to the UK across most of its business categories (Kivell, 2007).

In terms of regional sectoral investment, the Northwest was the region area with the highest estimate of GFCF in manufacturing with £2.5 billion in 2000. This finding reflects the heavy influence of that industry in the Northwest region. In terms of the sub-regions, Greater Manchester's share of GFCF as a percentage of the total UK manufacturing GFCF fell appreciably from 4.1% in 1995 to 3.1% in 2000.

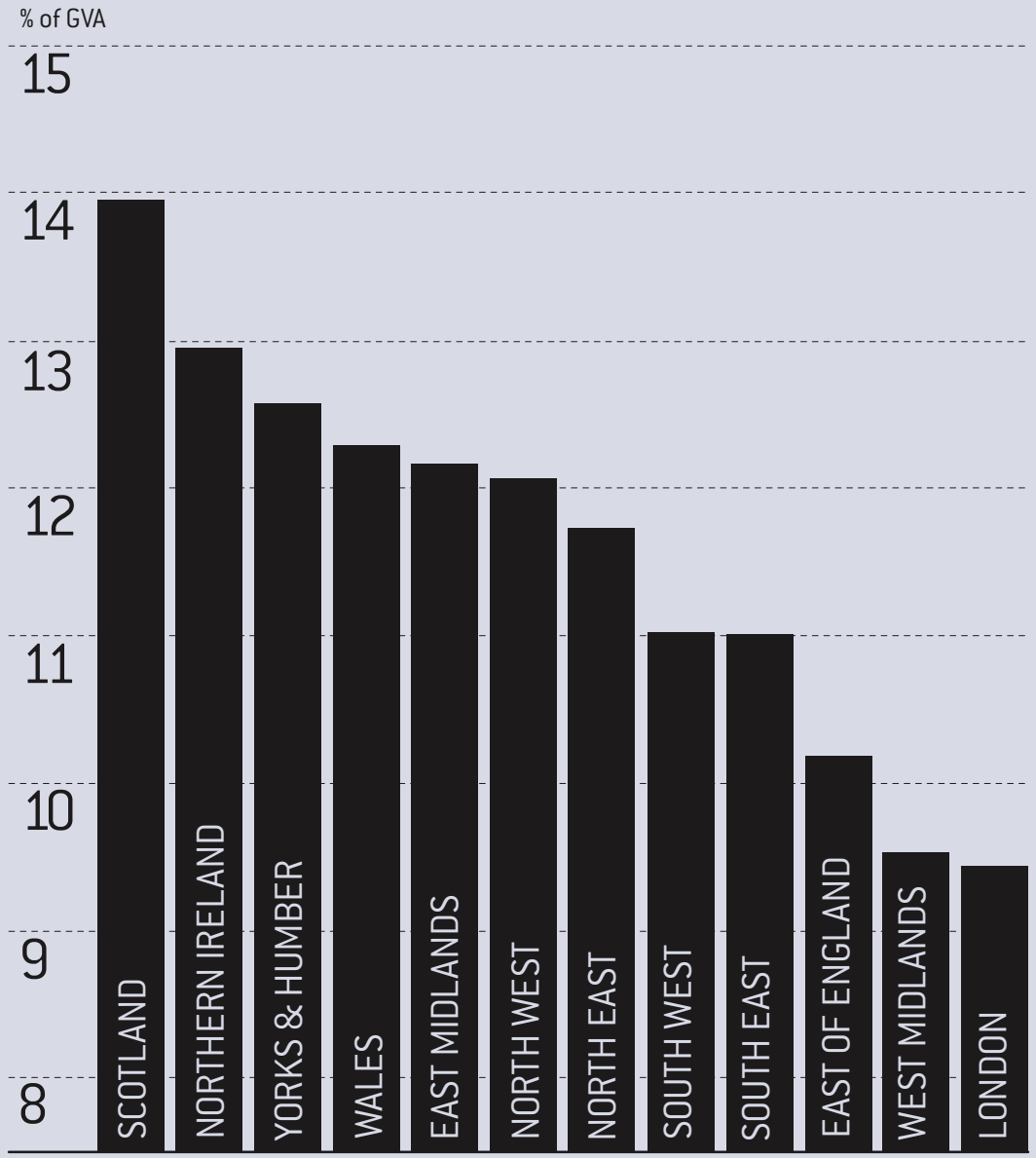
Having discussed the investment climate of the UK, and of MCR in particular, the focus now turns to our analysis in more detail.

Table 3.1
Gross Fixed Capital Formation as a Percentage of GVA

	1998	1999	2000
UK	19.6	19.0	18.8
Northwest	19.6	19.2	17.5
Cumbria	36.2	28.9	31.7
Cheshire	18.0	19.0	18.6
Greater Manchester	15.2	18.7	17.0
Lancashire	25.7	16.1	14.0
Merseyside	16.8	20.8	16.5

Figure 3.3
Investment as percentage of GVA by region, 2004

Source: Author's calculations from ONS figures



4.0 BRIEF DESCRIPTION OF THE MICRO DATA

The two datasets used in this project are AMADEUS[6] which is a comprehensive and rich pan-European firm-level dataset and ORBIS which is the global equivalent.

4.1 Data Sources

Both datasets are provided by Bureau van Dijk (BvD)[7], which is a leading electronic publisher of annual account information on several million private and public firms around the world. The data on these firms are collected from various sources including national official bodies in charge of collecting company accounts data. They are always the officially filed and audited accounts.[8]

The data are then compiled and organised by BvD in a consistent format following strict guidelines. Thus, the main advantage of the data are that they are comparable within a country and across countries. In the past, BvD collected data on mainly large firms, but in recent years the coverage has expanded to include many small and medium firms.

A standard company report includes a balance sheet, profit and loss account, industry codes, ownership and subsidiary information. Some of the variables of interest in this project are sales, turnover, fixed assets, number of employees, cost of employees, material costs, and also location based on postcodes. From these accounting variables we are able to construct suitable productivity estimates.

Finally and most importantly, the data includes detailed ownership and subsidiary information which is based on millions of links between firms and their shareholders and subsidiaries worldwide. A link establishes an ownership relationship between a firm, its shareholder and its subsidiaries.

A shareholder might be a corporation, a private individual, a government or a collectively described entity (such as the "public" for listed companies). A subsidiary, however, is always a corporation. Data lists the direct and indirect shareholders and subsidiaries of a given company with their percentage ownership.

Each ownership link contains a unique identification number, the name and nationality of the shareholder and ultimate owner. From this information, it is possible to distinguish between foreign-owned and domestically-owned firms. Thus, the nationality of a firm is determined by the ultimate parent's country of ownership. If the ultimate owner is not known, the nationality of the shareholder is taken. If both types of information are missing, a firm is considered domestically-owned.

The data also lists the subsidiaries of a given company together with their percentage of ownership. Again, each ownership link contains a unique identification number, the name and nationality of the subsidiary and a direct or total (or both) percentage of ownership in the subsidiary. This information is taken as evidence that a firm is either a multinational (if it has one or more foreign subsidiaries) or a purely domestic firm (if it does not have any foreign subsidiaries). This is another unique feature of the data set which allows the identification of domestic multinationals, an issue which is rarely addressed in the literature.

A growing number of researchers have used this rich firm-level dataset in recent years to analyse various economic issues, including Temouri et al. (2008) and Konings and Murphy (2006). It provides detailed financial and other operational information on private and public companies operating in Western as well as Eastern European countries. The dataset used in this paper comes from the intermediate version[9] of AMADEUS.

Although the actual timing of the investment decision is not given in the data set, we can in effect trace changes in ownership for many firms and determine the amount and the source country of the foreign capital throughout the panel period using earlier AMADEUS releases retrieved from historical discs. Equally, as we can observe changes in the capital stock of a firm at the subsidiary level, as well as reported depreciation, one can identify the level of new capital investment in fixed assets.

Our choice of data was driven by a number of factors:

- **These data typically are more current than official ONS data, such that they are more up to date.**
- **We can identify not only the sector of the firm (the subsidiary) but also of the parent – which is important in determining linkages.**
- **The way that ONS calculates investment at the sub-regional level, or allocates investment between plants of the same firm is problematic. In the course of this study we obtained some aggregate investment data from ONS, which came with a health warning[10].**

6 Analyse Major Databases from European Sources. Bureau van Dijk compiles public and private company accounts from so called regional information providers (IPs) which for the UK are from Jordans, a UK company formation agent providing company registration online.

7 BvD is best known for databases, such as BANKSCOPE and FAME, which are widely subscribed to by UK Universities. It can also be compared to COMPUSTAT which is extensively used in the US.

8 However, in some East European countries BvD collects data directly from companies because it is too difficult to get these from a central source.

9 The three versions are the top 250,000 companies in Europe, the top 1.5 million and all companies - which amount to approximately 9 million firms (including small firms).

Using the intermediate version of Amadeus, the selection of firms is based on satisfying at least one of the following criteria: number of employees equal to at least 20, total operating revenues and total assets equalling to at least 1.5 million and 3 million, respectively. This of course includes the coverage of purely domestic firms which on average are smaller though for the comparison of large to medium sized inward investors with domestic counterparts this presents no obvious problems.

10 ONS does not recommend the use of the regional capital expenditure figures contained in the special analysis supplied, but recognises that some users wish to have them. For the reference year 2005 onwards, figures on regional capital expenditure will no longer be made available on the ABI website pages.

Accurate estimation of regional capital expenditure is dependant on there being a strong correlation between the variable on which any estimation is based, in this case local employment, and the variable for which we are attempting to produce estimates, here regional capital expenditure.

It has been established that the relationship between regional employment and regional capital expenditure is, in fact, unreliable. If you wish to publish ONS regional capital expenditure figures for any reference year, you should acknowledge ONS as the source and include the following statement in your publication: "The regional capital expenditure figures do not meet the ONS quality standards and, consequently, do not have National Statistics Status"

4.2
Overview of alternative data sources

In order to benchmark our firm level data against what is available from official sources, we also present some data drawn from ONS via the Annual Business Inquiry (ABI). The ABI provides consistent data on net capital expenditure broken down into 2-digit SIC level, as well as data at the UK regional level. Further, it provides an analysis of investment by UK-owned and foreign-owned firms. 'Net Capital Expenditure' is defined by ONS as acquisitions less disposals for land and existing buildings, vehicles and other capital equipment.

Data on public investment spending is derived here from the Public Expenditure Statistical Analysis (PESA), a database of UK public expenditure managed by HM Treasury.

Unfortunately, sub-regional analysis is not available for ABI investment data. The only sub-regional data derives from UK national and regional accounts, which uses Gross Fixed Capital Formation (GFCF) rather than net capital expenditure. GFCF is defined as acquisitions less disposals of tangible and intangible assets, and is not quite the same as net capital expenditure. The difference between them is 'consumption of fixed capital', which is essentially depreciation.

Sub-regional investment data are very limited, restricted to broad sub-regional areas (i.e. NUTS2 areas)[11] and somewhat out of date; the latest available data are for gross investment as a percentage of output (i.e. GFCF/GVA) for the year 2000.

However, there is one exception to the comments made here, and that is in productivity growth in retailing. While investment data at the store level is not even collected by ONS, for the reasons discussed above, there is an issue with the firm level data when seeking to derive the productivity effects of FDI in retailing. This is simply because our firm level data would significantly understate the scale and scope of FDI in retailing, based on the firm rather than the store. For this reason, we employ the retailing subset of the ABI data to examine productivity growth and spillovers in the retailing sector as a distinct piece of work.

We now turn to discussing the results of our analysis in more detail, with the background papers provided in appendices C and D of this report.

11 For NUTS2 (statistical areas) purposes the Northwest region is divided into five areas: Cumbria, Cheshire, Greater Manchester, Lancashire and Merseyside.

5.0 RESULTS OF THE ANALYSIS FOR MANCHESTER CITY REGION

Investment is one of the five 'drivers of productivity' identified by the Government.[12]

(HM Treasury 2000).

5.1 Analysis of investment

Investment in physical capital not only raises labour productivity directly by providing the equipment used by workers, but does so indirectly by helping to introduce new technology and thus implement product and process innovation. As the literature review indicates, not only is the level of investment important for a regional economy, but the volatility of investment over time matters, because highly volatile investment expenditure can lead in turn to large fluctuations in economic activity generally.

Investment can be studied from various perspectives. The corporate finance literature tends to focus on the sources of finance, for example whether debt or equity are used, while the industrial economics literature focuses on interactions between firms, or the relationship between financial performance or R&D. In a regional policy setting, the work tends to examine the extent to which policy initiatives have influenced the changing spatial patterns of investment over time.

Using suitable econometric estimation, the purpose of the analysis is to develop models of:

- **the determinants of investment by domestic (i.e. UK-owned) establishments in MCR;**
- **the determinants of investment by foreign-owned establishments in MCR;**
- **the nature of the relationship between domestic and foreign investment, i.e. does foreign investment complement or crowd-out domestic investment?; and**
- **the effects of FDI on productivity growth among domestic firms in MCR, allowing where possible for sectoral differences.**

12 The others are innovation, skills, enterprise and competition.

The full details of the econometric analysis are contained in the technical appendices. Here we draw out the key results of the analysis and set it in the context of the wider evidence from the literature for the UK as a whole and elsewhere.

We adopt a relatively standard approach to this analysis, based on the literature discussed in appendix A. The methodology is discussed in detail in appendix B, as are the full results.

In this section of the report we address the issue of the determinants of capital investment, in both the domestic and foreign owned sectors of the economy, and also the relationship between these. We do this for both manufacturing and services, and for sub-sectors where the data permits us to do so.

In general, the results highlight the importance of firm level differences rather than sectoral level differences. Investment by domestic firms is driven by innovation, and the ability to raise finance.

Domestic investment

The results from the analysis of the determinants of domestic investment are broadly similar to those reported elsewhere for the UK as a whole, but with some important differences. The key findings are as follows:

First, firm size is important: larger firms engage in higher levels of investment. This result holds even after allowing for differences between sectors, and allowing for firm level 'fixed effects'. This means that as firms become larger, they are likely to become more capital intensive. This is largely good news for MCR, and suggests that large domestic firms can be an engine for growth, rather than relying principally on the SME sector or on inward investment.

Second, there appears to be no substitution effect between capital and labour. Thus in aggregate for MCR, capital investment by domestic firms is not used to replace people with machines. This again is good news for employment, and is typically not mirrored in other parts of the UK, where substitution of capital for labour is relatively common.

Third, there is a strong indication that this investment is largely funded by debt. This is apparent in the model from the strong positive correlation between investment spending and the ratio of long-term debt to total assets. This is rather surprising, as typically cash flow rather than long-term debt is positively associated with investment.

This may be a concern for the longevity of the investment within MCR, first as debt becomes perhaps harder to service, and second because of the general finding in the literature – which is that in the long run, long-term debt tends to be negatively related to investment in physical capital and R&D.

Finally, there are some slight sectoral variations. Due to a lack of observations in some key sectors, separate estimations could be carried out only for the engineering, life sciences and other manufacturing sectors.

Interestingly, the link between long-term debt and investment is absent in the engineering sector, suggesting that investment is less likely to be funded by debt in this sector than in life sciences or other manufacturing, where the debt effect remains strong.

Foreign investment

The model for investment growth in the foreign-owned sector is designed to capture the firm-specific determinants of inward investment into MCR. As indicated in the appendix, the model pays particular attention to capturing the effects of intangible assets that are specific to the investing firm, such as technology, managerial skills etc. Because of data limitations, this analysis could be done only for the foreign sector as a whole, and separately for foreign manufacturing.

As with the determinants of domestic investment, this analysis again produces largely encouraging results.

First, investment is linked to R&D intensity, suggesting that investment is stronger in more research intensive and (by implication) more innovative firms. This is not by itself an unusual finding: there is strong evidence from the UK and elsewhere that R&D-intensive firms and those within R&D-intensive sectors are more likely to invest abroad.

However, it is important to stress that this holds even after allowing for sectoral differences. So it is not merely a story of some sectors being more innovative or investment intensive than others, but that foreign investment within MCR tends to come from the more R&D intensive firms within their sector. Interestingly, this result holds not just for manufacturing, but for the foreign-owned sector as a whole, perhaps suggesting the importance of research-intensity to foreign investment in the service sector.

Second, foreign firms with higher labour costs have higher levels of investment. This is a potentially important issue relating to the impact of inward investment on the labour market.

Foreign multinationals typically demonstrate higher levels of labour productivity, and in turn greater demand for high quality labour. Entry by such firms is therefore expected to impact on domestic labour markets in two ways.

First, inward investment generates a straightforward labour demand effect, stemming from an increase in output from the investing firm: previous evidence for the UK suggests that this is likely to favour skilled, rather than unskilled workers.

Secondly, foreign firms tend to pay higher wages. There is growing evidence for this in the UK – Driffield (1996) finds that foreign firms will pay wages above the industry average of around 7%, partly due to productivity differences, and Girma et al. (2001) report wage and productivity differentials of 5%.

The finding of a positive association between labour costs and foreign investment is consistent with these results. It is suggestive of foreign investment being complementary to skilled labour, which tends to suit the kind of highly productive forms of production employed by foreign firms. Once again, this effect is noticeable both for the sample of foreign firms as a whole, and for manufacturing.

5.2 Relationship between domestic and foreign investment

Turning now to the relationship between domestic and foreign investment, we examine both the effects within sectors, and the effects between them. The issue here is whether investment by foreign firms encourages complementary investment by domestic firms within MCR, or whether foreign investment 'crowds out' investment that would otherwise take place by domestic enterprises. We adopt a number of econometric approaches, and the results are consistent across these approaches. There are three main findings.

First, the results suggest a complementary relationship between inward investment and domestic investment. This is typically not the case elsewhere in the UK, and in particular is not mirrored by regions of the UK that attract inward investment through large subsidies (Driffield and Hughes 2003).

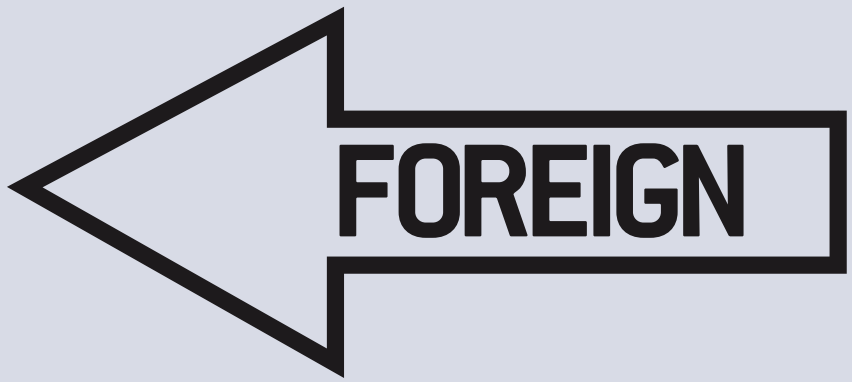
Second, this complementary relationship is especially noticeable in the food, textiles and telecommunication equipment sectors.

Finally, the complementary relationship between domestic and foreign investment is particularly strong for supply-chain links between sectors.

Foreign investment in upstream sectors is associated with investment by domestic firms in downstream sectors, suggesting that domestic firms which are customers of foreign firms within MCR obtain some benefit from this supply-chain relationship which allows them to expand. Such supply-chain links are also associated with the largest beneficial effects in the FDI spillovers literature, so this is doubly good news for MCR. This is consistent with the productivity growth analysis that follows in section 5.3.

Further, this relates to one of the themes drawn out of the literature review. Inward investment that is attracted simply by investment subsidies does little other than generate unskilled employment. In contrast, inward investment that is attracted by the underlying features of the local economy generates better linkages with local firms, and stimulates higher levels of domestic investment.

This may be particularly important for MCR given the perceived advantage that Merseyside may have in offering incentives for firms to locate there. However, much of the existing literature suggests that this should not be a major concern for policy makers for two reasons. First, inward investment that is attracted by subsidy has little impact in terms of technology transfer or indirect employment (Driffield 2003). Second, such investment serves largely to crowd out domestic investment (Driffield and Hughes 2003).



5.3 Productivity growth and spillovers from inward investment

In this section, as is discussed in detail in the appendices of this report, we employ two distinct data sets. While the AMADEUS data are the best firm-level data available, and identify distinct firm and sectoral differences, they have one drawback: AMADEUS data are collected at the level of the enterprise (i.e. firm).

This is perfectly suitable for the vast majority of industries, where multi-plant operations do not predominate. For a sector such as retailing however, where the predominance of large national retailers, means there are a large number of establishments (individual retail outlets) but relatively few firms, we employ the establishment-level data that are available through the ONS.

The issue here is the extent to which foreign investment leads to 'spillover' effects on the (total factor) productivity of domestic enterprises. As the literature review indicates, there are several mechanisms by which this may occur, including imitation and adoption of the superior technology of investing multinationals, improved productivity as a result of the competition induced by foreign firms, and the improved skills and tacit knowledge of workers moving from foreign to domestic firms.

Importantly, the literature reviewed in the appendix suggests that there is mixed evidence on the existence of such spillovers even among UK studies. This suggests that spillover effects cannot simply be assumed, but must be determined by detailed econometric analysis. The analysis is presented in detail in the appendix, and uses 'state of the art' estimation techniques in terms of the econometrics of productivity analysis.

Results from AMADEUS data

We begin with the results of the analysis using AMADEUS data. The structure of the data allows us to perform the estimations for all firms within the Amadeus database for MCR, and separately for high- and low-tech sectors, and for the engineering, life sciences and other manufacturing sectors individually. There are a number of key findings from the analysis.

First, in common with more general studies for the UK as a whole and other Western economies, there is no evidence of any 'horizontal' spillovers from inward investment. In other words, there is no evidence that technology or other types of knowledge 'leaks out' from inward investing foreign firms to domestic firms within the same industrial sector in MCR. This is not particularly surprising. Multinational enterprises have an incentive to prevent such leakage as much as possible, as it may involve the loss of proprietary knowledge to actual or potential local competitors.

Second, there are significant and positive spillovers between sectors, through supply chain linkages. Where domestic firms purchase inputs produced by inward investors, their productivity increases significantly. This is in line with Driffield et al (2005), as discussed in the literature review, and is clearly important for MCR. This is also consistent with a range of studies which suggest that buyer-supplier partnerships involving foreign firms are a mechanism for productivity spillovers, technology diffusion and more fundamental value chain restructuring.

In cases where indigenous firms buy from the foreign sector they potentially benefit from the greater scale and scope efficiencies, competency, innovative capacity and technology of the multinational. In some cases, foreign multinationals may provide direct assistance to customer groups. For example, Dunning (1993) found that US affiliates in the UK were more likely to provide training for clients, than their domestic customers.

These factors may explain the beneficial downstream spillover effects within MCR. Note also that these results are consistent with the complementarity between domestic and foreign investment discussed earlier.

Third, spillovers are strongest in 'low-tech' sectors. This is a common result in this type of analysis, and is indicative of domestic firms responding to inward investment by linking into the supply chain, and also assimilating the new technology or techniques employed by foreign firms.

Fourth, we also provide a breakdown of some of the sectors of particular interest to MCR. In general there is little evidence of spillovers from FDI in either the engineering or life sciences sectors, but rather more in the 'other manufacturing' sectors.

Fifth, the nature of the foreign investment affects the nature of the spillover. For example, we find evidence to suggest that market-seeking FDI, particularly from suppliers – where the multinational firm's output is principally geared towards external markets – have strong spillover effects. In the literature this is often interpreted as a 'market stealing' or competition effect: inward investors compete with domestic firms, forcing them to operate more efficiently.

Export oriented FDI on the other hand, where the multinational firm's output is principally geared towards external not internal markets, appears to have no productivity spillover effect. It should be stressed here that for the long-term health of MCR, this may be no bad thing, if more productive inward investors replace less productive local firms. Indeed, as is argued in the literature review, perhaps the greatest single benefit of inward investment is to reallocate production to more productive assets in the long run.

Finally, positive spillover effects are particularly strong in the clothing and textiles, computing, and precision instrument sectors. However, positive spillovers are weaker in transport equipment – where FDI has been strongest.

The strongest spillover effects are to be found in low-tech sectors, where inward investors purchase from or sell to domestic firms. The effect is still present for high-tech sectors, though weaker. This suggests that multinational suppliers in low-tech sectors with plentiful global market experience, transmit knowledge and information to their local buyers, which increases local firms' productivity. From upstream production chains, we find that domestic market seeking FDI has a positive effect on firms' productivity in low-tech sectors, while export-oriented upstream FDI has the opposite effect.

Overall, in line with the investment results discussed above, the results highlight firm specific rather than industry specific differences. For example, high levels of intangible fixed assets are associated with productivity growth, and large firms tend to be more productive. These results hold across all sectors.

Analysis for retailing

Retailing is one of the largest sectors of the economy, and a significant part of MCR. In common with most other regions, foreign-owned penetration in retailing has increased dramatically in the last 10 years, largely due to the change of ownership of ASDA. This, in common with a suitable data source available from ONS, makes retailing an interesting sector of study in its own right.

The description of the data for the retailing sector is provided in the appendices, as are the particular issues related to the measurement of productivity in the sector. The data used here are establishment data – that is shops, rather than firms. The results of the analysis for retailing suggest a number of key findings.

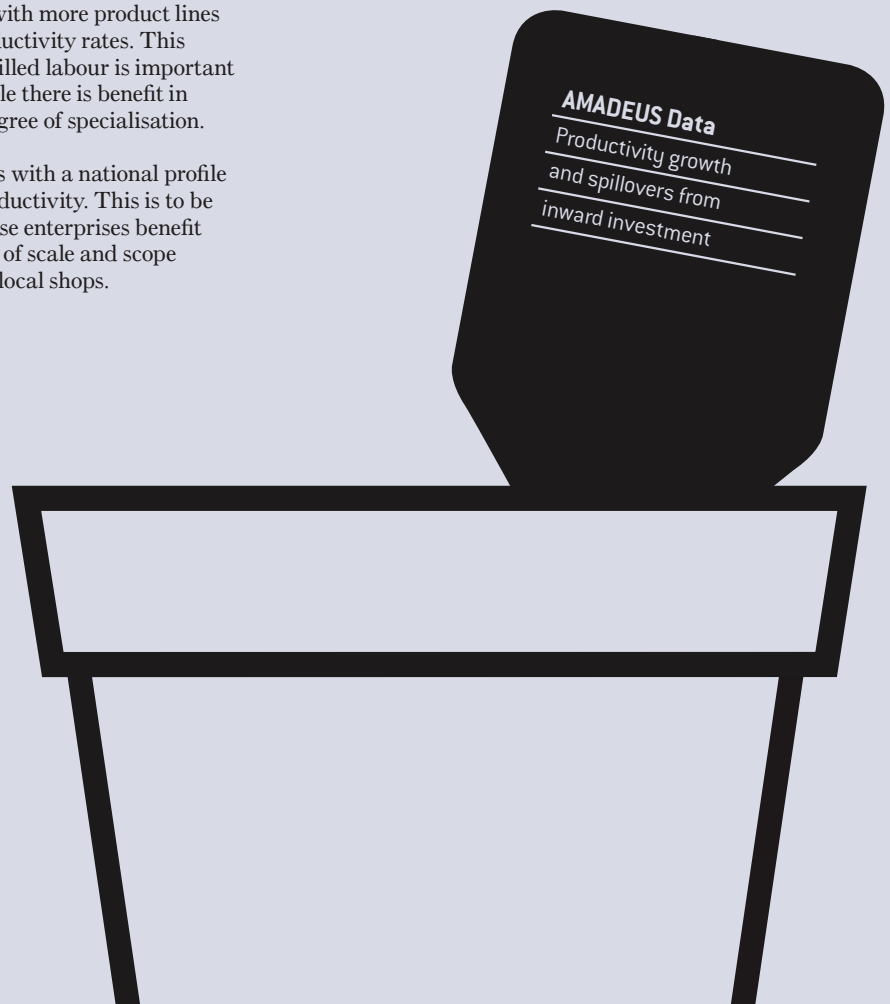
First, retailers that employ more skilled workers have higher productivity rates, while retailers with more product lines have lower productivity rates. This suggests that skilled labour is important in retailing, while there is benefit in at least some degree of specialisation.

Second, retailers with a national profile have higher productivity. This is to be expected, as these enterprises benefit from economies of scale and scope compared with local shops.

Third, there are productivity spillovers from foreign to domestic firms within retailing, and this effect is concentrated within the city region. Thus spillovers occur largely within MCR rather than firms within the city region appropriating spillovers from inward investment elsewhere.

In addition, spillovers occurring within MCR do not 'leak out' to regions outside MCR. Our results suggest that, on average, a 10% increase in foreign presence would raise productivity in domestic retailing firms by 0.5%.

This section has presented the highlights of our results, backed up by the more lengthy discussion in the appendices. The following section ties these in with the earlier sections and offers some conclusions.



6.0 CONCLUSIONS

The results of the analysis suggest a number of positive messages for investment activity within MCR.

Unsurprisingly, large domestic establishments are more likely to carry out capital investment. Importantly, investment by the domestic sector in MCR is generally not labour replacing, suggesting that increased capital investment by local firms can be combined with increased employment (collectively) by these firms within MCR. These findings suggest that, unlike many other parts of the UK, large domestically-owned firms can be an important engine of growth within MCR, both in capital investment and employment terms.

The one issue of possible concern here lies in the consistent finding that domestic investment is positively associated with the ratio of long-term debt to total assets, suggesting that there is a high reliance on such debt to fund investment among domestic firms.

If debt becomes more difficult to finance – and the full consequences of recent turmoil in the financial and banking markets are as yet unknown – this may adversely affect the capacity of the domestic sector to maintain its position as a driver of investment growth within MCR.

Foreign investment into MCR is driven by relatively large, R&D intensive enterprises. This holds even after allowing for sectoral differences, so it is not merely a story of some sectors being more innovative or investment intensive than others. As with domestic investment, there is little evidence that FDI into MCR is labour replacing: in other words, foreign investment into MCR appears to be generally complementary to skilled labour.

Another positive message comes from the relationship between domestic and foreign investment. There is evidence for the UK generally that foreign investment to some extent 'crowds out' or substitutes for domestic investment. This is especially the case where inward investment is attracted through subsidy. There is no evidence of such crowding out for MCR, and indeed there is evidence that foreign investment in upstream industries actually complements investment by domestic firms in downstream sectors.

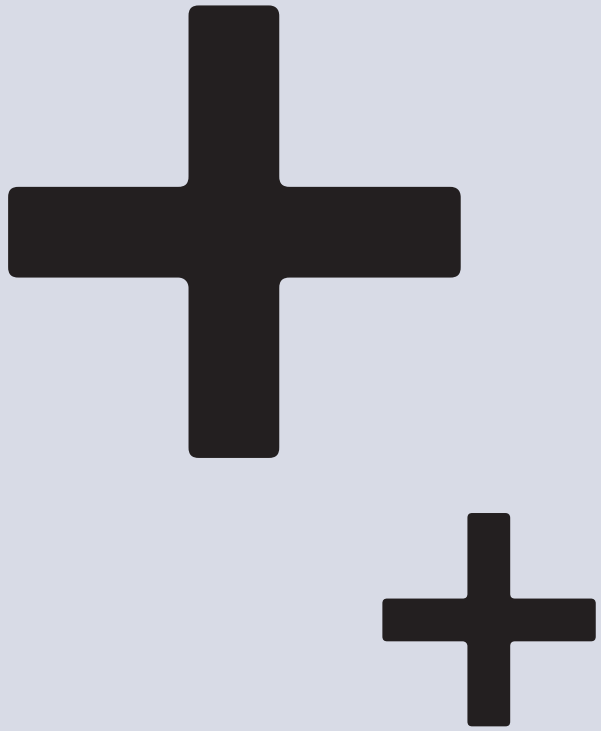
Thus, for MCR, foreign and domestic investment go hand-in-hand: one need not be thought of as a substitute for the other. This may be an unintended consequence of MCR being in a less favourable position than other regions of the UK to attract inward investment via subsidy. While global FDI flows have exhibited some significant peaks and troughs over the past 20 years, performance in MCR is strong, and largely mirrors the patterns nationally and globally. A greater proportion of the world's FDI is in the service sector, especially if one considers inward investment into developed countries. MCR's position reflects this change, and it is clear that the service and retail sectors are benefiting.

To some extent the relationship between domestic and foreign investment is reflected in the findings on the productivity effects of inward investment on domestic firms' productivity.

FDI has virtually no effect on the productivity of domestic firms in the same sector. However, there are positive effects in downstream sectors, suggesting that domestic firms do benefit from (direct or indirect) supply-chain linkages with foreign investors. This is most evident in relatively low-technology sectors, where supply-chain linkages may be strongest, and especially where the foreign investor has an export orientation. However, there is no evidence of spillover effects to the domestic sector in the engineering or life sciences sectors.

The separate estimations for the retail sector also have a substantially positive message. As might be expected, there is clear evidence that retailers with a national profile have higher productivity. Perhaps of more interest is the finding that there are positive productivity spillovers from FDI within retailing, and that these are strongly locally defined.

Broadly speaking, retailers within MCR capture most of the spillovers generated within the city region, and few of the positive spillovers which are captured by MCR retailers come from outside the region.



The overall thrust of these results is broadly positive for MCR. They suggest a region which has been able to generate both domestic and foreign investment without one crowding out the other, and without evidence of capital investment replacing jobs on average. In addition, there is evidence of positive productivity spillovers from FDI, possibly through supply-chain linkages, for industry overall within MCR and especially within the retailing sector. However, there is no evidence of such spillovers in the engineering or life sciences sectors.

In terms of pointers to growing indigenous and foreign investment within MCR, the findings of the econometric analysis suggest the following issues:

Size matters for investment by domestic firms within MCR. Therefore, the tendency for policy support to be geared towards SMEs has to be tempered with a recognition that relatively large domestic firms appear to be the main engine of domestic investment growth in MCR.

Attracting foreign firms into MCR has been beneficial both in terms of physical investment and in terms of labour market effects. It seems likely that continuing to be able to do so – and without recourse to widespread subsidy and other inducements – is likely to continue to be a major strength of MCR. This also suggests that having a pool of complementary skilled labour will continue to be an important pull for foreign investment into MCR.

Building supply-chain links between domestic and foreign firms is important. This has two beneficial effects:

- **productivity spillovers occur via these linkages; and**
- **they also allow complementary physical investment by local firms.**

Beneficial spillover effects are more likely in low-tech than hi-tech sectors, suggesting that foreign investment and local linkages in sectors such as clothing and textiles still have an important role to play within MCR.

We end this analysis with three caveats. First, as with all econometric analysis, the results are based on statistical correlations and links which have to be interpreted to give them meaning. The use of good panel data and state-of-the-art econometrics helps here, but ultimately econometric models by themselves tell us little about the mechanisms by which the inferred effects occur, e.g. the precise process by which foreign investment in one sector leads to higher productivity among domestic firms in another.

Second, as with all econometric analysis, the results obtained are based on the past. They are not forecasts, and the identified relationships cannot be assumed to hold in the future as more data become available.

Finally, and linked to the second caveat, we do not yet know the full impact of the credit crisis on either domestic or foreign investment within MCR, or on spillover effects in the future. The point noted above about the extent to which domestic investment is linked to long-term debt may be an important consideration here.

The full appendices and bibliography of the data and reports used in this study are available for download at:

www.manchester-review.org.uk

Professor Nigel Driffield (Project Director); and Professor Jim Love (Associate Dean) – Aston Business School, Economics and Strategy Group.

Professor Nigel Driffield is Professor of International Business at Aston Business School, and head of the Economics and Strategy Group. He is an applied industrial economist with experience of working on a wide range of issues. A key focus of Nigel's work has been on issues relating to FDI, and its impact on host countries. Nigel has carried out consultancy projects for the United Nations Conference on Trade and Development, World Bank (on spillovers from FDI), DTI, OFT, European Commission (on the impact of internationally mobile capital), and Advantage West Midlands.

Professor Jim Love is Professor of Economics and International Business, and Associate Dean (Research) of Aston Business School. Jim's research has focused on issues in regional development and industrial economics, particularly in the context of innovation and technology transfer, and the effects of FDI. Jim has carried out research and consultancy for among others: AWM, Invest NI, Industrial Development Board, Northern Ireland, Scottish Enterprise, Scottish Executive, OFT, and the European Commission.

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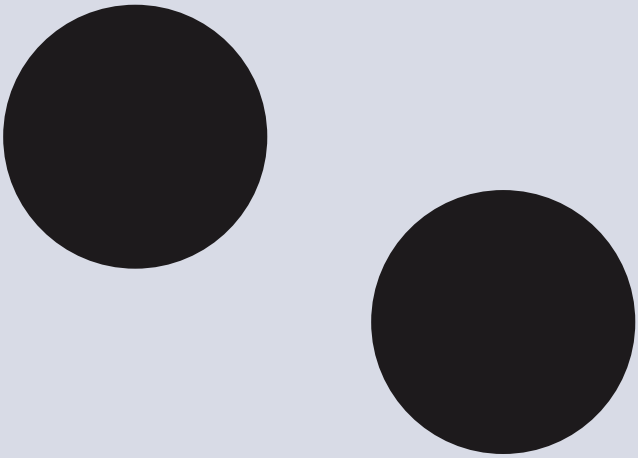


APPENDIX A

Appendix A: Literature Review of the impacts of FDI on host locations – lessons for this study

A1 Why do countries/regions seek to attract FDI?

The rationale for attracting FDI is usually expressed in terms of the following issues:

- Direct employment
- Secondary employment
- New technology
- Reduction in imports
- Growth in exports
- Technology spillovers
- Training
- Increased competition and consumer welfare.

Western governments have spent significant sums of public money in attracting inward investment, and indeed it may even be argued that attracting (and retaining) inward investment has been the main focus of industrial and regional policy in the UK. The merits of various approaches to regional policy are discussed in some detail in Armstrong and Taylor (1993). Leaving aside the issue of whether governments should intervene to address regional disparity, the theoretical literature on regional policy makes one essential distinction.

This focuses on the debate concerning whether regional policy should be designed to address the symptoms of regional disparity such as unemployment and low levels of investment, or whether it should seek to address the underlying causes, such as low productivity and low levels of innovation. Largely, UK regional policy has been concerned to identify regions with high levels of unemployment that could benefit from new fixed capital formation.[1] A detailed description of the types of instruments that have been employed in the UK under the aegis of regional policy, are described for example in Armstrong (2001), DTI (2000) Harris and Robinson (2001) and in Armstrong and Taylor (1993).The main instrument that has been employed in the UK since the early 1980s is Regional Selective Assistance (RSA). This was introduced in 1972, and is discussed in detail in many standard texts, such as Armstrong and Taylor (1993).

Taylor and Wren (1997) trace in some depth the changes in the administration of UK regional policy from the 1970s onwards, demonstrating that total spending on regional policy declined from 0.4% of GDP in the early 1980s, to 0.1% by the late 1990s. This apparent reduction is ascribed to a combination of better targeting of spending (and greater onus on the recipient firms to justify explicitly the need for support), and greater reliance on EU structural funds for the implementation of regional policy, albeit within the same assisted areas.[2]

1 This recognises that there are certain areas of inner cities for example that may have above average unemployment, but that seeking to attract large scale investment is not feasible due to congestion or other constraints. This is an essential reason why regional policy is based on relatively large areas rather than very small jurisdictions.

2 The units of analysis for the assisted areas map are the UK administrative regions that are the NUTS2 areas for EU comparison. The UK "assisted areas" are therefore the NUTS2 regions that have either objective 1 or objective 2 area status under EU regulations.

3 The changes in the implementation of UK regional policy are discussed in great detail by Wren (2002).

4 A ceiling is usually applied in terms of the "cost per job".

.

This period also saw a more careful redrafting of the Assisted Areas map in the UK, to target areas best placed to gain from such funding. As Wren (2002) demonstrates, regional assistance is much reduced compared with 25 years ago, with much stricter eligibility criteria, but it still essentially takes the form of investment subsidies to the private sector.[3] As such, regional policy and attracting internationally mobile capital, particularly in assisted areas, have become synonymous.

As Harris and Robinson (2001) outline in some detail, RSA is a capital subsidy designed to stimulate employment in regions with above average unemployment.[4] Recipients of RSA must be operating in Assisted Areas, and in practice most recipients have been in the manufacturing sector. Harris and Robinson (2001) provide a detailed breakdown by sector of the recipients of RSA, showing that RSA recipients accounted for an average of 8.4% of manufacturing employment over the period 1990-1998. RSA is concentrated in larger firms, and by definition in the peripheral areas of the UK. In Wales and Scotland for example, RSA recipients account for approximately a quarter of manufacturing employment, while the corresponding figures for the North of England and the West Midlands were 18.7% and 11.7% respectively. Harris and Robinson (2001) also show that RSA is over-represented among foreign establishments. This is perhaps not surprising, and fits with the stylised "fact" of multinational enterprises (MNEs) being attracted by subsidies, particularly to areas of high unemployment and (therefore) low wages. This is discussed at length in Munday et al (2001).

Connected to issues surrounding the contribution to domestic productivity growth made by manufacturing capital, is work both applied and theoretical, seeking to examine the role of multinationals in the host country's productivity growth, and role in improving allocative efficiency (Barrell and Pain, 1997). Theoretical perspectives on multinational enterprise generally suggest that foreign firms are potential agents of technological diffusion, having a series of ownership advantages over domestic firms (Dunning 1993). The multinational firms' original 'stock' of advantages may spillover or be appropriated by indigenous competing or supplier firms (Caves 1996; Markusen and Venables 1999). This type of appropriation is consistent with endogenous growth theory where non-internalised technological change and development from one industry can become an externality which is captured by other industries and individuals (Fingleton 2001).

A2 The policy agenda in the UK

During the 1990s, as discussed in Bailey and Driffield (2007), Britain followed trends elsewhere in stressing the significance of 'competitiveness' (largely meaning productivity). Whilst potentially opening up a wide range of potential policy interventions, the apparent shift from sectoral to horizontal measures during the 1990s largely reduced the content of national level industrial policy. Rather, there was a narrowing of focus around the coalescing themes of support for small firms, attraction of foreign firms (FDI) and science and technology, all increasingly delivered via a regionally-based approach. During the late 1990s and post 2000, British industrial policy has been recast at the regional level, with the new Regional Development Agencies (RDAs) given responsibility for delivering industrial policy, in terms of targeting so-called 'clusters', attracting FDI and a broader social inclusion agenda. The 'cluster' concept has been problematic, however. In some cases sectors have simply been rebadged by RDAs as 'clusters' and more recently there has been the suggestion that RDAs are reverting to using the term sectors. In effect

industrial policy is still a sectoral policy albeit one delivered at the regional level. In many cases the same 'clusters' are targeted across regions, in part because the DTI has controlled the cluster selection process in a top-down way whilst still pursuing a 'surrogate' industrial policy via its science and technology policy. A range of problems in policy design and delivery have been raised by the over-control of cluster selection and the simultaneous absence of coordination across regions. Even if the content of the new 'sectoral' measures are different (i.e. supporting 'clusters' of firms rather than 'picking' large 'national champions'), there remains the risk of repeating at the regional level previous national mistakes over targeting the 'wrong' clusters, if the selection process is not democratically determined.

In pursuing a range of economic objectives including reduced unemployment and social inclusion, RDAs still see FDI as particularly important as part of this regionally-based industrial policy. The results reported by Bailey and Driffield (2007) however, suggest that inward investment actually reduces the demand for unskilled labour. In so far as a key objective of regionally based industrial policies in attracting inward investment is to reduce structural unemployment, it is doubtful as to whether this is achieved by a heavy reliance on inward investment when the effect is to reduce demand for unskilled workers (the latter are often those most likely to experience long-term unemployment and be the target of policy intervention in the first place). This suggests that there is an incompatibility between the attraction of inward investment to reduce unemployment on the one hand and the goal of social inclusion on the other, suggesting in turn the need for greater attention in regionally-based industrial strategies to assist workers who lose out from such inward investment inflows.[5]

More broadly, and in line with Pitelis 2003 and Branston et al 2006, if a democratically-determined definition of competitiveness comprises a number of different objectives, then any 'new' British industrial policy focussed on competitiveness has to recognise the need for a range of policies as part of a joined up strategy that uses FDI where appropriate, but that also requires measures to employ and/or train labour as part of an inclusion process. Similarly, our results suggest that encouraging or subsidising investment by large firms does not stimulate growth in the SME sector, as policy makers and providers might hope. Other policies are therefore required if SME growth is seen as an important object of industrial policy.

If this is to be pursued at a regional level, then there needs to be a range of policies which are democratically determined and which need to be properly aligned as part of regional strategies. This has yet to be properly recognised in regionally-based industrial policies in Britain. Rather, there has been the merging of elements of previous industrial and regional policies, under the narrow guise of a partial and inconsistent definition of 'competitiveness', all delivered at the regional level, with incompatibilities and tensions arising as a result.

A3 FDI and productivity

In addition to the obvious employment effects of being able to attract large scale internationally mobile investments, much of the policy analysis around inward investment focuses on the spillover, or indirect technological benefits of FDI. Most traditional theories of FDI activity, are based on Dunning's (1979) eclectic paradigm, and particularly on the concept of ownership advantages. Such firm specific advantages are often characterised as technology based, relating to economies of scale, capital intensity and R&D. Indeed, Blomstrom and Kokko (1996) provide several reasons why such technology is expected to transfer from MNEs to domestic firms. This can occur directly, through the licensing of a particular technology, through supplier networks or subcontracting arrangements, or indirectly as knowledge becomes public, and spillovers are assimilated by the domestic sector. Barrell and Pain (1997) estimate that around 30% of the productivity growth in UK manufacturing between 1985 and 1995 could be associated to the impact of inward investment. The 'ripple through' effects of changes in production and working practices triggered by the presence of new inward investors have been particularly important. The above suggests that there could be productivity gains at the industry level connected with foreign investment in that industry. Secondly, there is the possibility that this technology 'spills over' in a less formal manner to domestic firms. The literature on technology externalities is now well developed, see for example Griliches (1992) for an excellent survey of this literature.

One of the main reasons why a country or region seeks to attract inward foreign direct investment (FDI) is that MNEs can act as agents for the transfer of technology across national boundaries. Moreover some of this "new" technology is likely to be assimilated by the domestic sector, thus generating technical progress and productivity growth in the host economy. Academic studies, together with a number of government sponsored reports, have sought to evaluate the extent of this phenomenon in aggregate (see for example, PACEC, 1995, Barrell and Pain, 1997 and the summary of this literature provided in Görg and Strobl, (2002).

The purpose of this study is, however, to examine the effects associated with one mechanism through which this is expected to occur – buyer-supplier linkages between inward investors and domestic firms. Dunning (1993) highlights the expected significance of such linkages, showing that foreign-owned firms can impact on supplier industries through terms of procurement, through the physical quantities they purchase, but also through the impact that they have on suppliers technical capability, managerial initiative and organisational competence (see also UNCTAD, 2001). Using data from the UK Census of Production, together with information from UK input-output tables, Driffield, Munday and Roberts (2004) look at whether the scale of linkages between foreign and domestic manufacturers affects productivity growth in the domestic sector.

The paper explores whether productivity externalities are greater where foreign firms are backwardly linked to domestic manufacturers (buying from) or where they are forwardly linked to domestic manufacturers (selling to). This is an important issue, as significant resources are being targeted towards "embedding" (encouraging buyer-supplier linkages) multinational firms into host economies across the globe, with increasing levels of local sourcing by foreign firms seen as an important developmental issue. These issues, from a policy perspective are discussed at length in UNCTAD, 2001, which provides an international review of policies designed to strengthen linkages between foreign and host country firms.

A4 Productivity spillovers from FDI

The issue of how far inward investment generates productivity spillovers has recently become of significant interest. Research has examined the connections between foreign investment and general technical change and progress, and in promoting domestic productivity growth in the UK (see for example Barrell and Pain, 1999, 1997; Hubert and Pain, 1999; Driffield, 2001a; De Mello, 1999). Research has been

5 Trade, on the other hand, can have a beneficial effect on labour, with again the benefits being greater for skilled workers.

motivated, in part, by a series of studies that argue that significant positive externalities from foreign investment are required to justify the large subsidies that are paid to inward investors to encourage their location at specific sites. Whilst there has been a surge of research in recent years seeking to quantify the spillover effects from foreign direct investment, these studies have tended to generate rather contradictory results.

However, the majority of papers suggest that empirical estimates of spillovers from inward investment are rather lower than might have been expected (see for example, Haskel et al. (2007); Girma et al. (1999, 2001), and Harris and Robinson (2002a, 2002b)). Indeed, Aitken and Harrison (1999) show that foreign direct investment exerts both positive and negative effects on domestic producers.

Research has also focused on the wider dynamics of the spillover process into defined parts of the UK domestic sector. Driffield and Munday (2000) examined the relationship between the comparative advantage of UK industries, and new inward investment into these industries. This research explored the link between inward investment and export performance in the UK economy and its regions, and provided evidence of dynamic benefits of foreign direct investment. Driffield (2001a), however, illustrates that inward investment per se is not sufficient to generate such spillovers, but that the scale and scope of spillovers is dependent on the actions of the inward investors, and the ability of the domestic sector to assimilate the imported technology.

Blomström and Kokko (1996) provide several reasons why technology is expected to transfer from MNEs to domestic firms. This can occur directly, through the licensing of a particular technology, through supplier networks or subcontracting arrangements, or indirectly as knowledge becomes public and spillovers are assimilated by the domestic sector.

However, these models of the impact of FDI, also assume an adverse effect on the domestic sector. Markusen and Venables (1999) outline the two main impacts on local firms of inward investment, as do Aitken and Harrison (1999). In addition to the standard productivity gains argument, Aitken and Harrison (1999) explain a further impact of a large MNE entering an industry. The foreign firm captures some of the domestic firms' market shares, forcing them to operate at a smaller scale, reducing output and (possibly) increasing unit cost. This is expected to be significant in imperfectly competitive markets, and is similar to the result reported by Driffield and Munday (1998).[6]

6 This phenomenon would still be expected in contestable markets. Theory suggests that firms in contestable markets operate at, or very close to their minimum efficient scale. As such, entry by a (superior) MNE would result in a loss of market share for the domestic firm, thus forcing it back up its long run AC curve, increasing average costs.

Buffie (1993) expresses particular concerns that inward investment simply has the effect of reducing domestic output. Holden and Swales (1995) discuss the importance of displacement, particularly in the context of regional policy. They show that, with the advent of more discretionary investment or employment subsidies, then the impact on the incumbent firms may be greater than otherwise anticipated, and displacement of such output or employment increased.

Given the existence of a foreign productivity advantage, productivity or technological spillovers from inward investment are dependent on two phenomena. Following the arguments by Blomström and Kokko (1996), Driffield (2001) or Porter (1996) for example, the scale and scope of spillovers from inward investment are determined by the ability of the domestic sector to assimilate the imported technology, and the extent to which agglomeration contributes to this. As such, domestic firms in the less technologically advanced regions of the UK may be less able to assimilate the new technology that may accompany FDI. The regions with assisted area status are also by definition those with high levels of unemployment, and a low skill base, so expansion through technological advance may be hindered in such regions.

Therefore, while previous studies suggest that spillovers may occur as a result of FDI, such externalities may be confined to those areas with a higher skill base, and with higher levels of productivity, viz. the areas of the UK not covered by Assisted Area status. Secondly, Assisted Areas are by definition less likely to generate agglomeration economies, and so by encouraging inward investment away from the core regions, much of the potential indirect benefit from FDI may be lost.

In a similar vein, there is significant evidence that such Development Agencies are not only actively competing to attract international capital (Lovering (1999), Young et al (1994), Gripaios et al (1997)), but in more recent years have been concerned to contain any spillovers from FDI within their region. Wren (2002) outlines examples of these policies, designed to increase the scale and scope of local spillovers from FDI.[7] However, while the extent to which such policies are likely to succeed has been questioned, Armstrong (2001), Wren (2002), it is never-the-less clear that such agencies have sought where possible to maximise local linkages from inward investment. Porter (1996) argues that policies designed to increase local sourcing will lead to a loss in overall agglomeration economies and will be to the detriment of other regions and possibly to the economy as a whole.

Economists have long viewed innovation as primarily generated by firms in their origin countries. Classic contributions in the economics of multinational corporations have consolidated this view. Vernon (1966) and Kindleberger (1969) for example theorised a quasi-colonial relationship between the parent company and foreign subsidiaries, wherein the latter are in charge of replicating the former's activities abroad, with strategic decisions - including R&D and innovation strategies - being rigidly centralised.Following the advice of multilateral development agencies, policymakers in developed, developing, and transition economies place attracting foreign direct investment (FDI) high on their agenda, expecting FDI inflows to bring new technologies, know-how and thus contribute to increasing productivity and competitiveness of domestic industries.

At a national and sub-national level, instruments of domestic regional policy, as well as EU structural funds are often directed towards attracting foreign companies, through subsidies and tax holidays, often more favourable than those available to domestic firms. As the economic rationale for this special treatment, policy makers cite positive externalities generated by FDI through productivity spillovers to domestic firms.

The presumed mechanisms for these processes to occur can be summarized in table A1:

7 Initiatives such as 'source Wales' are an explicit example of this, as Morgan (1997) outlines in some detail.

Table A1: Spillover channels

Driver	Sources of Productivity Gain
Imitation	• Adoption of new production methods. • Adoption of new management practices. • Local knowledge creation
Competition	• Reduction in X-inefficiency. • Faster adoption of new technology. • Increased entrepreneurial activity.
Human Capital	• Increased productivity of complementary labour. • Tacit knowledge
Exports	• Scale economies. • Exposure to technology frontier.

However, the empirical evidence seeking to test for the existence of these effects is rather mixed. Indeed the difficulties associated with disentangling different effects at play and data limitations have prevented researchers from providing conclusive evidence of positive externalities resulting from FDI. While recent firm-level studies have overcome many of the difficulties faced by the earlier literature, the emerging message is not very optimistic.

The existing literature on this subject is of three kinds. First, there are case studies including descriptions pertaining to particular FDI projects or specific countries, which however rarely offer quantitative information and are not easily generalized (see for instance, Moran 2001).

Then, there is a plethora of industry level studies, most of which show a positive correlation between foreign presence and sectoral productivity. Their downside is the difficulty in establishing the direction of causality. It is possible that this positive association is caused by the fact that multinationals tend to locate in high productivity industries rather than by genuine productivity spillovers. It may also be a result of FDI inflows forcing less productive domestic firms to exit and/or multinationals increasing their share of host country market, both of which would raise the average productivity in the industry.

Finally, there is research based on firm-level panel data, which examines whether the productivity of domestic firms is correlated with the extent of foreign presence in their sector or region. However, most of these studies, such as for instance, careful analyses done by Haddad and Harrison (1993) on Morocco, Aitken and Harrison (1999) on Venezuela and Djankov and Hoekman (2000) on the Czech Republic cast doubt on the existence of spillovers from FDI in developing countries.

The researchers either fail to find a significant effect or produce the evidence of negative horizontal spillovers, i.e., the effect the presence of multinational corporations has on domestic firms in the same sector. The state of the art concerning technology spillovers from FDI can be summarized in the table A2.

Table A2: State of the art summary

Author(s)	Country	Spillovers effect	Author(s)	Country	Spillovers effect
Developing Countries			**Developed Countries**		
Blomström & Persson (1983)	Mexico	+			
Blomström (1986)	Mexico	+	Caves (1974)	Australia	+
Blomström & Wolff (1994)	Mexico	+	Globerman (1979)	Canada	+
Kokko (1994)	Mexico	+	Liu et al. (2000)	UK	+
Kokko (1996)	Mexico	+	Driffield (2001)	UK	+
Haddad & Harrison (1993)	Morocco	?	Girma et al. (2001)	UK	?
Kokko et al. (1996)	Uruguay	?	Girma and Wakelin (2001a)	UK	?
Blomström & Sjöholm (1999)	Indonesia	+	Girma and Wakelin (2001b)	UK	?
Sjöholm (1999a)	Indonesia	+	Harris and Robinson (2001)	UK	?
Sjöholm (1999b)	Indonesia	+	Haskel et al. (2007)	UK	+/?
Chuang & Lin (1999)	Taiwan	+	Girma (2002)	UK	?
Aitken & Harrison (1999)	Venezuela	-	Girma and Görg (2002)	UK	?
Kathuria (2000)	India	?	Ruane and Ugur (2002)	Ireland	+
Kokko et al (2001)	Uruguay	?	Barrios and Strobl (2002)	Spain	?
Kugler (2001)	Colombia	?	Driffield et al (2002)	UK	?
Görg and Strobl (2002c)	Ghana	+	Sembenelli and Siotis (2002)	Spain	+
Transition Countries			Dimelis and Louri (2002)	Greece	+
Djankov & Hoekman (2000)	Czech Republic	-	Driffield and Love (2003)	UK	+/?
Kinoshita (2001)	Czech Republic	?	Keller and Yeaple (2003) Görg and Strobl (2003)	US Ireland	+ +
Bosco (2001)	Hungary	?	Damijan et al (2001)	many	?
Konings (2001)	Bulgaria	-			+
Smarzynska (2002)	Lithuania				-
Zukowska-Gagelmann (2002)	Poland				

This highlights the contradictory nature of research in this area, while wider empirical research has recently contributed explanations as to why this may be the case. Evidence suggests that the mechanisms by which spillovers from FDI may occur are rather more complex than has hitherto been suggested.

It is possible, though, that researchers have been looking for FDI spillovers in the wrong place. Since multinationals have an incentive to prevent information leakages that would enhance the performance of their local competitors, but at the same time may want to transfer knowledge to their local suppliers, spillovers from FDI are more likely to be vertical rather than horizontal in nature. In other words, spillovers are most likely to take place through backward and forwards linkages, that is contacts between domestic suppliers of intermediate inputs and their multinational clients, and thus they would not have been captured by the earlier studies.[8]

8 For a theoretical justification of spillovers through backward linkages see Rodriguez-Clare (1996), Markusen and Venables (1999). For case studies see Moran (2001). Görg and Strobl (2002a,b) provide empirical tests of the Markusen and Venables (1999) model, although they do not focus on technology spillovers but on the entry of new domestic firms.

A5 Different motivations for FDI

It is not sufficient therefore merely to use 'inward investment' as a determinant of domestic productivity growth, but to focus on the nature of the investment. Important factors are the size of the foreign advantage, the extent to which the inward investor carries out R&D, the ability of the domestic sector to assimilate such information, and the scope for productivity gains in the industry. Pearce (1999) demonstrates that MNEs do carry out R&D in host countries, but clearly this is not always the case. R&D is likely to accompany high value-added production, while low level assembly operations are unlikely to attract any R&D from the parent company.

The traditional starting point for considering the determinants of FDI from the perspective of the firm involves the assumed possession of some competitive or 'ownership' advantage, often knowledge-based. The public good nature of these firm-specific assets may make international exploitation of the advantage by contractual means hazardous, thus giving an incentive to engage in FDI (Buckley and Casson, 1976; Dunning, 1988; Horstmann and Markusen, 1996). Recent theoretical work predicts that firms which choose to invest abroad are the most productive in the domestic economy, supporting the ownership advantage idea (Helpman et al., 2004).

However, the empirical and theoretical literature has begun to examine the possibility that an important motivating factor for FDI might be the desire not to exploit technology in a foreign country, but to gain access to technology; thus technology sourcing may be the motivation for FDI. For example, Fosfuri and Motta (1999) present a formal model of the FDI decision which embodies the possibility of technology sourcing. They are able to show that a technological laggard may choose to enter a foreign market by FDI even where this involves (fixed) set-up costs and where the transport costs of exports are zero.

This is because there are positive spillover effects arising from close locational proximity to a technological leader in the foreign country which, because of the externalities associated with technology, decreases the production costs of the investing firm both in its foreign subsidiary operations and in its home production base. Where the beneficial technology spillover effect is sufficiently strong, Fosfuri and Motta show that it may even pay the laggard firm to run its foreign subsidiary at a loss to incorporate the benefits of advanced technology in all the markets in which it operates. Similar theoretical results are obtained by Siotis (1999).

Driffield and Love (2003) provide empirical evidence of the domestic-to-foreign 'reverse spillovers' on which the

success of technology sourcing depends, and there is support for the technology sourcing motive from elsewhere in the empirical literature. Using R&D intensity differentials between home and host nations, Kogut and Chang (1991) find evidence that US-Japanese R&D differentials has encouraged the entry of Japanese joint ventures into the United States.

In a similar vein Neven and Siotis (1996) examined both Japanese and US investment into the EC from 1984 to 1989, and intra EC FDI flows for the same period. Using Kogut and Chang's R&D difference variable to examine the possibility of technological sourcing, Neven and Siotis examine actual FDI flows rather than the propensity for foreign entry, and find evidence that FDI flows from the United States and Japan are associated with sectors in which the EC had a technological advantage, providing support for the technology sourcing argument. Further, the literature on the internationalization of R&D suggests that there is a growing willingness to locate such facilities close to leading centres of research and innovation specifically with a view to absorbing learning spillovers from geographical proximity to such sites (Pearce, 1999; Niosi, 1999).

For example, an analysis of foreign R&D direct investment in the United States by Serapio and Dalton (1999) concludes that the nature of such investment is changing, with more emphasis on gaining direct access to American technology and expertise, especially in biotechnology and electronics. They also conclude that foreign firms are increasingly investing in R&D sites in the United States to access technologies that are complementary to those of the investing firms. Pearce (1999) comes to broadly similar conclusions from a survey of multinational corporations' production and laboratory facilities in the UK.

The exclusive focus on technology in explaining flows of FDI ignores the second key element of Dunning's (1979) analysis of FDI, location advantage. Driffield and Love (2007) therefore extend the analysis of the technology exploitation/sourcing motivation by allowing for the key element of locational influence. The possibility that FDI into high and low cost locations (relative to the source country) generates differential productivity and labour demand effects has largely been ignored in the literature. This analysis shows that different forms of FDI – sometimes characterised by source country (Haskell et al (2007) is important when seeking to determine the impacts of FDI.

Recently, however, there has been increasing theoretical and empirical emphasis on technology sourcing rather than technology exploitation as a motivation for FDI. This suggests that an important motivating factor in the internationalisation of production and R&D is not the desire to exploit existing technology within the firm, but to access the technology of leading edge firms within a host economy. Support for this perspective has come from economic evidence on the determinants of FDI (Kogut and Chang, 1991; Neven and Siotis, 1996), and from theoretical work on the existence of multinationals without advantages (Fosfuri and Motta 1999; Siotis 1999).

This literature is important for two reasons. First, it highlights the fact that the research on the impact of inward FDI is largely divorced from that which tries to explain the determinants of FDI at the firm, industry or national level. This is clearly unsatisfactory. Even casual analysis suggests that productivity spillovers will be determined, at least in part, by the nature of technology employed by the multinational and domestic firms, and there is evidence that technology sourcing and technology exploiting FDI have markedly different effects on domestic productivity (Driffield and Love 2002). Second, the existence of technology sourcing as a determinant of international investment flows draws attention to the impact on domestic productivity of outward FDI. Some commentators have gone as far as to conclude that FDI flows are predominantly technology sourcing in nature, and that FDI is a 'Trojan horse' motivated principally by the desire to take advantage of the technological base of host countries (van Pottelsberghe and Lichtenberg 2001).

While an emphasis on the technological determinants and effects of FDI flows is understandable, it should not blind research to other, possibly more basic, determinants of outward and inward investment flows. For example, the ability of the MNE to respond to factor price differentials across countries is used to explain FDI within theoretical or conceptual models,[9] and empirical evidence indicates that factor prices are important determinants of investment flows even between industrialised economies (Pain, 1993; Bajo-Rubio and Sosvilla-Rivero, 1994; Barrell and Pain, 1996).

However, such issues are often ignored in studies seeking to analyse the effects of FDI on host or source countries, although the developing literature on the effects of outsourcing (Feenstra and Hanson, 1999) suggests not only that the issue of factor price differentials is topical, but that a fuller picture of the impact of inward and outward FDI needs to take account not only of the productivity effects of such flows, but their impact on the demand for both skilled and unskilled labour.

9 See, for example, the growing empirical literature linking FDI flows to international labour market conditions, highlighted by the conceptual work of Buckley and Casson (1998, 1999); for example Sethi et al. (2003).

Driffield, Love and Taylor (2008), bring together these disparate strands of literature. We develop a taxonomy which relates the technological and factor price determinants of both inward and outward FDI to its potential productivity and labour market effects on both host and home economies.

This allows us to distinguish clearly between technology sourcing and technology exploiting FDI, and to identify that which is linked to factor cost differentials. We then empirically examine the effects of FDI into and out of the United Kingdom on domestic (i.e. UK) productivity and on the demand for skilled and unskilled labour at the industry level, partitioning FDI flows into the types discussed above. As far as we are aware, this is the first study to comprehensively link the different determinants of inward and outward FDI to its effects, in terms of both productivity and labour demand. This also represents an advance on previous work by distinguishing FDI determinants ex ante, rather than inferring investment motivation ex post from its effects (e.g. van Pottelsberghe and Lichtenberg, 2001; Hejazi and Pauly, 2003).

We find that the impact of inward and outward FDI varies markedly when allowance is made for the motivating influence of technological and factor price differentials between the UK and foreign industries, and conclude that this may be one reason why there is such heterogeneity in the results of empirical studies on the effects of FDI. Our results also highlight the difficulty for policy makers of simultaneously improving employment and domestic productivity through FDI.

A6 The importance of linkages between inward investors and domestic firms

A range of studies have suggested that buyer-supplier partnerships involving foreign firms are a mechanism for productivity spillovers, technology diffusion (Morris et al. 1993; Gorg and Ruane 1998), and more fundamental value chain restructuring (O'hUallachain and Wasserman 1999).

In a wider review, Crone and Roper (2001) examined the specific literature on knowledge transfers from multinationals, and concluded that the supply chain is the main route through which knowledge is transferred from multinational plants to indigenous firms, and that such transfers lead to important improvements in supplier performance. The more system-wide efficiency effects of growth in FDI were also demonstrated by Gillespie et al., (2000) for Scotland.

Despite its importance, examining the significance of production externalities generated by FDI in the supply chain has hitherto been problematic, largely due to data constraints. Nevertheless, there is some case evidence of the importance of such effects (see Oliver and Wilkinson 1992; Morris et al. 1993). Moreover, there is an apparent consensus that low levels of input-output linkages between the foreign and domestic sectors are an impediment to cluster development, a theme which is increasing in importance in several UK regional development agency strategy documents.

Indeed there is more general evidence purporting to demonstrate that those foreign investors with the lowest rates of local linkages contribute least to regional growth prospects and competitiveness (Crone and Roper 2001; see also Brand et al. 2000). There is then an underlying assumption that higher levels of transactions linkages between foreign and domestic firms are beneficial to the domestic sector, with an implicit recognition that the intensity of input-output linkages encourage knowledge and technology spillovers to indigenous sectors.

The focus of previous analysis has been on the level of backward linkage from multinationals to the indigenous supply base, on the assumption that those firms with the highest backward linkage contribute most to economic development prospects (Hirschman 1958, see also Scott 1982). This perspective can be linked to growth pole theory which focused attention on technological input-output linkages as a key generator of regional growth, particularly as a result of expansion in a relatively productive lead firm (see Erickson 1974).

Backward linkages then have the potential to generate greater indirect employment impacts than forward linkages in the regional economy. There is also some expectation that backward linkages are more important than forward linkages in creating productivity spillovers into the indigenous sector (Munday and Roberts 2001). However, as discussed below, there is some concern over who appropriates the derived gain.

In cases where indigenous firms buy from the foreign sector they potentially benefit from the greater scale and scope efficiencies, competency, innovative capacity and technology of the multinational. In some cases, foreign multinationals may provide direct assistance to customer groups. For example, Dunning (1993) found that US affiliates in the UK were more likely to provide training for clients, than their domestic customers. Moreover, reviewing what scarce evidence there is, Dunning suggests that foreign firms, through inward investments bringing new management techniques and production processes to host nations, have had the effect of raising standards in downstream sectors, this linking to the fact that by improving the quality of the output of their industrial customers, they create new advantages for themselves. Then domestic customers of foreign manufacturers could be in a stronger bargaining and 'learning' position than domestic suppliers, such that the proprietary knowledge embodied in the product and technology of the multinational will spill over more easily into domestic firms who are essentially the customers in the agreement.

A7 Interactions between inward investment and indigenous investment

The existing literature is rather contradictory. De Mello (1999) for example suggests that one effect is 'capital deepening', that domestic firms respond to FDI by increasing and updating their capital stock. Aitken and Harrison (1999) and Buffie (1993) however suggest that domestic firms experience increased competition as the result of FDI, thus reducing their output, and at least in the short term, investment. Hejazi and Pauly (2001) report a similar result for Canada, arguing that inward investment has the effect of replacing, rather than supplementing domestic capital formation. This literature highlights, as do Driffield and Hughes (2003) that the context of the study is important, that different sectors and different regions exhibit different effects of FDI on domestic investment. In turn, they suggest that inward FDI that has received significant subsidy is less likely to stimulate local investment, and more likely to lead to crowding out.

Linked to the spillover benefits of FDI, are the potential agglomeration economies associated with FDI. Models of regional development, that are based on agglomeration and capital mobility, essentially model economic development as a path dependent process, see for example Markusen and Venables (1999). The importance of agglomeration economies, both in the context of regional / industrial development, and in the determinants of efficiency or productivity have been understood for some time. Equally, agglomeration economies have long been assumed to be a contributing factor in explanations of industrial location. Ellison and Glaeser (1999) for example, show that agglomeration economies contribute to intra industry technology spillovers, as do Paul and Seigel (1999).

Equally, agglomeration economies have been found to be important in the determinants of the location of international production, Head et al (1999), and in the location of innovation activities, Cantwell (1991). The theoretical basis for the importance of agglomeration, and particularly agglomeration based on the ability to attract FDI, is derived from theoretical models of industrial development, see for example Markusen and Venables (1999).

Markusen and Venables show that inward investment into a region will not only stimulate domestic activity, but that this domestic development may eventually replace the original FDI. This result is dependent on the phenomenon generally described as the linkage effect, and is well documented in the regional science and technology spillovers literature, see for example Young et al (1989) or Driffield (2001b). Here, linkages are developed between the foreign and domestic sectors, which with complementarities and scale economies, stimulate development in the domestic sector and contribute to regional agglomeration economies. Markusen and Venables (1999) also demonstrate that from a theoretical perspective it is possible for the linkage effect to dominate, and therefore that FDI can contribute to regional development. Indeed, Markusen and Venables (1999) show that under certain circumstances agglomeration economies in the domestic sector can develop to the extent that the foreign investment is no longer profitable, and exit is induced.

This is clearly attractive from a policy perspective therefore, and explains why so many studies have concentrated on evaluating the scale and scope of linkages between the foreign and domestic sectors, (Rodriguez-Clare, 1996), and the contribution of inward investment to agglomeration economies (Driffield and Munday, 2000).

In the UK context, evidence is emerging of potential spillovers from inward investment, Driffield (2001b) and Wakelin and Girma (2000). However, these results also demonstrate that the impact of FDI is largely dependent on the extent to which MNEs introduce new technology to the UK, and the ability of the domestic firms to assimilate this technology. Görg and Strobl (1999) however show, that in Ireland, inward investment has stimulated domestic entry, particularly in high technology industries.

A8 Labour market effects of FDI

There are a number of studies that identify substantial differences in factor demand between foreign and domestic firms. The inference here is that foreign multinationals demonstrate higher levels of labour productivity, and in turn greater demand for high quality labour. Entry by such firms therefore is expected to impact on domestic labour markets via two mechanisms. Firstly, inward investment generates a straightforward labour demand effect, stemming from an exogenous increase in output. This is likely to be particularly important at the region and industry level rather than in the aggregate.

While previous evidence suggests that this is likely to favour skilled, rather than unskilled workers, this will of course depend on the nature of the activities undertaken by the inward investors. Secondly, linked to this is the likely impact on domestic firms of the inflow of new technology that is assumed to accompany FDI. There is growing evidence for this in the UK – Driffield (1996) finds that foreign firms will pay wages above the industry average of around 7%, partly due to productivity differences and Girma et al. (2001) report a wage and productivity differentials of 5%. Conyon et al. (2002) find a wage differential of 3.4% wholly attributable to productivity resulting from foreign acquisitions of indigenous firms.

This foreign wage differential may therefore also act on the supply of labour to the domestic sector, as workers observe higher wages on offer elsewhere.

Wage spillovers from FDI are found to be not as large, or as prevalent as productivity spillovers, based on previous work. Wage spillovers are largely confined to skilled, rather than unskilled workers, implying that the benefits of FDI are unevenly distributed. There are numerous explanations of this. Firstly, skilled workers are expected to benefit from an increased demand for labour, as the imported knowledge is complementary with skilled labour.

The imported knowledge is likely therefore to increase productivity of this complementary labour, and in turn generate higher wages. Further, Barrell and Pain (1997), show that the technology accompanying FDI is unskilled-labour augmenting, reducing the demand for unskilled labour, and therefore relative wages of unskilled workers. This follows the arguments of Machin and Van Reenen (1998), who demonstrate that new technology is complementary to skilled labour, and its introduction results in increased demand for skilled workers.

Equally, it is anticipated that there may be causes of friction in terms of wage spillovers, particularly between the foreign and domestic sector. Labour market segmentation is an important phenomenon, particularly when considering mobility between domestic and foreign firms, see for example Driffield and Taylor (2000). As such, there is no guarantee that workers in domestic firms will be able to obtain jobs in foreign firms, with different skill requirements. Equally, a large proportion of inward investment in the UK is located in areas of high unemployment, so wage increases as a result of labour demand increases are perhaps unlikely.

Over the past two decades a number of studies have documented the relative decline in unskilled wages for a number of countries (Bound and Johnson, 1992; Katz et al., 1995; Machin, 1996; and Berman et al., 1998). Since the relative supply of unskilled workers has also declined in recent years, the trends in relative wages are seen as evidence of a shift away from unskilled workers caused by an increase in relative demand for higher skilled labour.

The two most common explanations behind such a demand shift are technological change biased in favour of skilled labour and growing international trade (Levy and Murnane, 1992; Gottschalk and Smeeding, 1997).

There is some disagreement about whether technology or trade is the most important factor in causing increasing demand for skilled workers (Machin and Van Reenen, 1998; Wood, 1994; and Desjonqueres et al., 1999), and this is as much a theoretical issue as an empirical one (Haskel, 2000; Slaughter, 1999). However, what is clear is that in the case of the UK there has been a parallel trend of increasing wage inequality and inward investment (Bailey and Driffield, 2002).

APPENDIX B

Appendix B: The Determinants of Domestic and Foreign Investment in the UK: Evidence for Manchester

B1 Determinants of domestic investment

The pace and pattern of business investment in fixed capital is seen as central to both economists and policy makers understanding of economic activity. It is also seen as a key driver of productivity growth, particularly in terms of labour productivity, and at the firm level to the ability of firms to attract and retain key staff.

Theoretically, it is trivial to show that labour productivity is directly determined by the value of a firms capital stock, and that in turn labour productivity determines incomes. Also, as is discussed elsewhere in this report, productivity is the biggest underlying determinant of not only competitiveness, but also growth and development.

Investment however is noticeably volatile. There are essentially two reasons for this that are explained in detail in the classic empirical studies of investment (see for example Nickell, 1979, and Catinat et al 1992).

Firstly, investment is sometimes a discrete decision (the decision to re-tool a factory, or purchase new premises) leading to significant "spikes" in the data, where firms invest several million pounds in one year, and then little in subsequent years.

Secondly, that firm level investment often does behave as it is "supposed to" in theory. Theoretically, the greatest single determinant of investment is interest rates (or the user cost of capital).

Indeed, in November and December 2008, the calls for successive interest rate cuts were based on the need to boost investment. In practice, however the availability of capital is generally seen as important, which is not the same as simply the price – as the commentary at the time on the need for banks to release funds for small business showed. However, by far the most important driver is demand, and more importantly perhaps anticipated demand.

This places investment at the centre of any debate or study on regional development. Not only is it crucial for productivity growth, it is also an indicator of future success. This is for example why forecasters and commentators place so much store on instruments such as the CBI confidence survey, as they are inextricably linked to demand.

For example, the considerable volatility of investment expenditures is seen as a prime contributor to aggregate fluctuations. Additionally, insufficient business investment is commonly linked to a host of economic ills (Chirinko, 1993).

Consequently, investigations into the investment decisions of firms have occupied a prominent place in the research programs of several areas of economics as well as corporate finance. This interest has been driven by both theoretical concerns and policy questions. In terms of the former, for example, there have been debates over which model offers the best explanation of investment behaviour, while in the case of the latter one concern has been over how changes in monetary policy or tax policy affect investment (Hubbard, 1998).

Over much of the 1980s and 1990s, several researchers have extended traditional models of business fixed investment to incorporate a role for "financing constraints" in determining investment. A well cited paper in this regard that empirically explored the role of financing constraints is Fazzari et al. (1988). They argue that the presence of financing constraints implies that a firm's cash flow will be positively related to its investment rate only when the firm faces constraints on its external financing. Further, for a large panel of U.S. manufacturing firms during the 1980s, Hall (1990) and Hall (1991) found strong evidence that changes in the financial structure of firms that moved their balance sheet towards debt were followed immediately by substantial reductions in both investment and R&D.

In the case of the UK, there was a sharp rise in the share of business investment in GDP in the latter half of the 1990s (Bakhshi and Thompson, 2002). Among the factors identified as possible explanations for this development are the sustained fall in the relative price of investment goods, and in the cost of finance, together with an increase in replacement investment.

B2 Data description and econometric estimation

Throughout the analysis which follows it is always made clear which source is being used, but in all cases the general term 'investment' is used regardless of source. It should also be pointed out that these data refer to flows of investment expenditure. There are no reliable data on regional stocks of investment (HMT 2001, p18).

Drawing on the microeconomic literature on the determinants of investment level, we seek to isolate the factors that explain domestic business investment at the level of the firm for the region of MCR, UK. We do so by employing a functional form, estimation strategies and a subset of variables common to empirical studies in this literature (see for e.g. Hall, 1992; Fazzari et al., 1988; Driffield and Hughes, 2002). This takes the form of a dynamic equation, where the firms capital stock this year is in part determined by its capital stock next year. In line with the literature this is based on the notion that a firm has an optimal capital stock (though the firm itself may not know what this value is). This then reflects demand and cost conditions, and the availability of funding. Our estimated equation is: B1

$$k_{ijt} = \beta_0 + \beta_1 k_{ijt-1} + \beta_2 q_{ijt} + \beta_3 l_{ijt} + \beta_4 cf_{ijt} + \beta_5 ld_{ijt} + \alpha_j + \lambda_t + \varepsilon_{ijt}$$

Where k_{ijt} is the logged difference of investment for the i_{ijt} firm in the j_{th} industry at time t; k_{ijt-1} represents investment in the previous period; q_{ijt} is the logged difference of output (proxied by operating revenue) and included in order to control for scale effects. l_{ijt} is the logged difference of employment; cf_{ijt} is the logged difference of a firm's cash flow and ld_{ijt} the logged difference of long-term debt; both expressed as a ratio of total assets. As indicated above, it is well accepted that financial considerations impact on the investment decisions of firms and that the extent of the impact varies with the

type of investment. The latter two variables are aimed at capturing these effects on the investment decisions of firms in Manchester. a_{jt} is an industry dummy to capture industry effects and a y_t time dummy aimed at capturing shocks over time that are common to all firms. Finally, E_{ijt} represents the error term.

However, the considerations expressed above, in terms of the importance of future expectations in investment place considerable demands on the econometrician. Formally, there is the problem of endogeneity – investment being determined by demand, and the availability of finance, but also an indicator of future expectations. While there are numerous methods for dealing with this endogeneity, which are discussed below, one is left with a model that establishes correlations between variables.

B3 Determinants of foreign investment

There is quite a large literature detailing the factors that lead to inward investment by foreign firms into a given country (see Blonigen, 2005 for a review). The theoretical explanations of the multinational enterprise are now well understood, following the seminal works such as Buckley & Casson (1976), Dunning (1979), Dunning (1988). These essentially explain the decision to become multinational, through foreign direct investment, as a function of three types of advantage that may be generated for the firm.

Firstly, ownership advantage; that in order to succeed in host markets the firm must possess some inherent advantage over the domestic competition. Secondly, location advantage, that by locating assets in a particular country or region, the firm is able to gain due to the factor endowments available in that location. Thirdly, internalisation advantage, that FDI must be more efficient than arms length trading.

Ownership advantages

In the short run, these can be firm specific, based on technological advantage in the source country. As such, Davies & Lyons (1992) measure the foreign advantage in terms of labour productivity, which in itself is a function of not only the size, but also the quality of the capital stock. In a similar vein, Pearce (1992) argues that ownership advantage is generated through R&D. Other firm specific phenomena, associated with the creation of some firm specific advantage, can be seen in the same light. Examples of these are advertising, and the exploitation of economies of scale.

In addition, there is another category of sources of ownership advantage, which are essentially related to industry structure. Entry barriers for example, are likely to be a source of ownership advantage in cases of expansion of a foreign enterprise, rather than new foreign entry. This introduces an important distinction in the nature of inward investment. Such investment may not be new entry, but the expansion of an existing concern. As such therefore, the extent to which the foreign firm possesses a productivity advantage over the domestic competition will be an important determinant of such investments

Location advantages

In addition to firm specific ownership advantage, explanations of FDI are also based on location advantage. This concerns the benefit conferred on the organisation, due to its presence in a particular location. This is generally related to country specific phenomena, or within the international economics literature, the factor endowments of a particular country or region. Again, measuring these directly is somewhat problematic, but it is assumed that a region or country blessed with a favourable configuration of factor endowments, will exhibit a revealed comparative advantage in the appropriate industry. For further discussion of this, see Maskus & Webster (1995).

Thus, location advantage can be proxied by a measure of revealed comparative advantage, see for example Milner & Pentecost (1996), or Neven & Siotis (1996).

Finally, there is an established link between agglomeration economies and FDI. While particular locations may be expected to confer certain advantages on the firms concerned, the reverse may also be true. Porter (1990) stresses the importance of spatial agglomeration in location theory, and the performance of certain industries and firms. Regional concentration of industries within the UK may therefore be seen as a location advantage, beyond merely factor endowments, through agglomeration economies. Clearly then, new investment in such an industry and location, will serve to generate additional benefits.

More recently, explanations of FDI have relied on the 'new I-O' literature, based on game theory or rivalry action. Rowthorn (1992), for example, shows that FDI will be dependent on market size. In addition, Rowthorn demonstrates that multinational firms undertake FDI to protect their home markets. Bhagwati et al. (1992), show that FDI occurs in order to facilitate tariff jumping. This is particularly pertinent to cases where industries or governments are concerned with the problem of 'job exporting'. Motta (1994), extends the analysis one stage further, viewing FDI as an aggressive phenomena within a model of reciprocal investments. Firms from large countries may even seek to undertake FDI with the aim of defeating the competition from host country firms, thus extending their monopoly. This is a similar concept, however, to Dunning's ownership advantage. Finally, Horstmann and Markusen (1996) consider FDI as an alternative to licensing. Their theoretical model generates a common set of predictions, that market size will be positively related to the probability of FDI, while risk will deter FDI, in favour of licensing.

According to Blonigen, the literature that motivates and tests its analysis of FDI determinants on the basis of a partial equilibrium view of the MNE have identified both internal (firm specific) and external factors as likely determinants of the location and magnitude of FDI. In terms of the former, i.e. firm specific factors, R&D intensity and advertising have been mainly used as proxies to capture intangible assets that are specific to the firm such as technologies, managerial skills and the like. In terms of the latter, external factors such as exchange rates and taxes have been identified along with factors that are likely more endogenous with FDI activity such as trade protection and trade flows (Kogut and Chang, 1996; Blonigen, 2002), and institutions (Barrel and Pain, 1999; Wei, 2000) among others.

Then there are the traditional demand factors such as wage rates, capital costs, market size and proximity to local markets that most of the recent literature on the determinants of FDI, and consequent choice of location by a multinational, has employed (see for e.g. Milner and Pentecost, 1996; Brainard, 1997; Barrell and Pain, 1996).

B4 The Model

The theory of FDI, and the motivation for firms to engage in FDI is discussed in detail in the large literature review appendix A. Based on the above discussion, it is possible to derive a simple model of FDI. The probability of a foreign firm entering, or expanding in an industry is determined by expectations of future profits (Π^{e}_{t+p}).

In the expression below T is the expected life of the investment, and r is the discount rate: B2

$$\text{Prob. (FDI)} = \phi_1 \left[\sum_{p=0}^{T} (1/1+r)^{p} \Pi^{e}_{t+p} \right]$$

This is clearly unobservable, but this model can be re-written as a function of a vector of industry characteristics such that: B3

$$\sum_{p=0}^{T}(1/1+r)^{p}\Pi^{e}_{t+p} = \phi_2(x_{1i}, x_{2i})$$

In the above model, x_{1i} is the set of variables postulated to be positively related with expected profitability, whilst x_{2i} is the set of variables postulated to reduce expected profitability.

This can then be operationalised by expressing inward foreign investment in a similar manner to that in equation 1, which is the fundamental investment function, augmented with R&D and labour costs, as proxies for ownership and location advantage respectively.

In light of the above and the constraints imposed by data availability, we specify and estimate the following equation: B4

$$ifdi_{ijt} = \beta_0 + \beta_1 ifdi_{ijt-1} + \beta_2 output_{ijt} + \beta_3 size_{ijt} + \beta_4 R\&D\_Int_{ijt} + \beta_5 cost\_emp_{ijt} + \beta_6 Cap\_Int_{ijt} + \alpha_j + \lambda_t + \varepsilon_{ijt}$$

Where $ifdi_{ijt}$ is the logged level of inward FDI flows which is measured in terms a foreign firm's fixed assets. $ifdi_{ijt-1}$ is the preceding variable lagged by one year; output is proxied by the firm's operating revenue and is intended to capture the effects of market size; $size_{ijt}$ is a measure of firm size and is proxied by the number of employees; $R\&D\_Int$ and Cap_Int are measured as the ratios of R&D to output and capital to output respectively.

As indicated above these measured are aimed at capturing the intangible assets of the firm which are normally unobservable. α_j is an industry dummy to capture industry effects and λ_t a time dummy aimed at capturing shocks over time that are common to all firms. Finally, ε_{ijt} represents the error term.

B5 Estimation results

Table 1 presents results from estimations of Equation B1 based on both OLS and GMM (Blundell and Bond) estimators for firms across all industries in MCR, and in manufacturing specifically. For two of the three regressions, output proxied by operating revenue is positively and significantly correlated with investment. Of the financial variables only the ratio of long term debt to total assets is shown to be significant.

However, the sign contradicts our priors and previous findings in the literature. The relevant diagnostic tests for second order serial correlation and instrument validity have been met.

The results highlight the inferences made above, the output is the single most important determinant of investment in the simplest model, though this effect declines when one allows for endogeneity and uses GMM.

However, the results also highlight an important consideration given the current credit crunch. Overall, the single most important determinant of investment is debt. For small firms especially therefore, the ability to raise finance for investment is crucial. Interest rate cuts clearly help with this, but the availability of finance is as important as the price of it.

Table B1: Determinants of Domestic Investment in Manchester (1992-2007)

DEPENDENT VARIABLE: Investment Growth (Kt)			
	(a) OLS	(b) GMM	(c) GMM (Manuf.)
Kt-1	-0.0272	-0.0070	0.0919
	(-0.77)	(-0.19)	(0.91)
Q	0.2839	0.2549	0.1748
	(4.24)***	(1.57)	(1.68)*
L	0.2654	-0.1716	.361795
	(2.35)**	(-0.38)	1.06
CF	-0.0130	.0488889	0.0037
	(-1.15)	(1.35)	(0.26)
LD	0.0966	0.1308	0.0993
	(5.78)***	(2.31)**	(3.35)***
Cost_Employees		0.0003	
		(0.95)	
Constant	0.3549	0.0711	0.1767
	(5.91)***	(0.84)	(0.76)
Extraction of crude petroleum	-0.347 (-3.30)***	0.343 (1.08)	
Food Products and beverages	-0.182 (-2.87)***	0.114 (1.37)	0.120 (0.56)
Textiles	-0.169 (-2.34)**	0.148 (1.82)*	0.238 (1.02)
Wood and Cork Products	-0.259 (-3.36)***	0.036 (0.45)	0.073 (0.33)
Pulp and Paper products	-0.193 (-2.12)**	0.120 (1.08)	0.136 (0.59)

Recorded media	-0.236 (-3.49)***	0.043 (0.53)	0.057 (0.26)
Chemical products	-0.233 (-3.79)***	0.041 (0.52)	0.075 (0.34)
Rubber and Plastic products	-0.229 (-2.96)***	0.064 (0.75)	0.201 (0.56)
Non metallic mineral products	-0.241 (-2.77)***	0.058 (0.56)	0.076 (0.34)
Basic metals	-0.033 (-0.13)	-0.018 (-0.06)	0.201 (0.56)
Fabricated metal products	-0.276 (-3.64)***	0.031 (0.37)	0.056 (0.25)
Machinery and Equipment	0.009 (0.02)	0.244 (0.55)	0.214 (0.73)
Office machinery and computers	-0.239 (-1.24)	0.347 (2.04)**	0.188 (0.70)
Electrical Machinery and apparatus	-0.305 (-3.99)***	-0.010 (-0.10)	-0.003 (-0.01)
Radio, television and communication	-0.069 (-1.16)	0.320 (0.41)	0.316 (0.92)
Medical, precision and optical instruments	-0.217 (-1.50)	0.142 (1.18)	0.082 (0.34)
Motor vehicles, trailers and semi-trailers	-0.200 (-0.45)	1.134 (1.10)	0.096 (0.22)
Other Transport equipment	-0.089 (-0.62)	-1.263 (-1.17)	-0.136 (-0.30)
Furniture	-0.241 (-3.61)***	0.047 (0.59)	0.034 (0.16)
Recycling	-0.202 (-1.33)	0.089 (0.44)	
Construction	-0.284 (-2.71)***	0.031 (0.38)	
Motor vehicles and motorcycles	-0.318 (-3.40)***	0.036 (0.36)	

Wholesale trade and commission trade	-0.219 (-3.54)***	0.055 (0.73)	
Retail trade	-0.237 (-3.54)***	0.052 (0.64)	
Hotels and Restaurants	-0.248 (-3.15)***	0.021 (0.21)	
Land transport	-0.364 (-3.51)***	-0.048 (-0.43)	
Air transport	-0.240 (-3.14)***	0.066 (0.84)	
Transport activities	-0.372 (-4.96)***	-0.059 (-0.66)	
Post and Telecommunications	-0.047 (-0.18)	-0.555 (-0.56)	
Financial intermediation	-0.295 (-3.40)***	0.013 (0.12)	
Insurance and Pension funding	-0.267 (-2.84)***	0.012 (0.10)	
Financial intermediation	-0.252 (-2.85)***	0.130 (0.61)	
Real Estate	-0.057 (-0.61)	0.155 (1.28)	
Renting of Machinery and equipment	-0.170 (-2.22)**	0.143 (1.52)	
Computer and related activities	-0.240 (-1.21)	0.057 (0.26)	
Research and development		1.015 (0.81)	
Other business activities	-0.311 (-4.35)***	0.025 (0.28)	
Education	-0.372 (-3.63)***	-0.065 (-0.53)	
Health and Social work	-0.244 (-1.84)*	0.174 (0.61)	
Recreational,	-0.185	0.064	

cultural and sporting activities	(-1.79)*	(0.71)	
Other service activities	-0.217 (-2.42)**		
Observations	1404	1391	442
R-squared	0.16		
AR(1)		0.011	0.049
AR(2)		0.364	0.344
Overid. (Hansen)		0.727	0.926

(All regressions contained year dummies which have been omitted for brevity. *** indicates significance at the 1% level; ** indicates significance at the 5% level; * indicates significance at the 1% level. Robust t-statistics are in parenthesis.)

Table B2: Determinants of Inward FDI in Manchester (1992 - 2007)

DEPENDENT VARIABLE: Log of Real Fixed Assets of MNEs			
	(a) GMM		(b) GMM (Manuf.)
FA_{t-1}	0.2129		0.6611
	(0.83)		(5.32)***
K_INTENSITY	-0.0385		0.7554
	(-1.85)*		(1.86)*
R&D_INTENSITY	0.0339		0.2688
	(1.77)*		(1.77)*
SIZE	0.4733		0.1085
	(2.19)**		(0.88)
Q	0.3057		0.0643
	(1.54)		(0.58)
Cost_Employees	0.1930		0.0889
	(2.49)**		(2.02)**
Constant	-1.4015		0.6829
	(-1.64)		(1.31)
Food Products and beverages	0.462 (1.23)		
Textiles	-0.104 (-0.39)		-0.887 (-2.79)***
Wood and Cork Products	-0.532 (-0.49)		-0.931 (-2.73)***
Pulp and Paper products	0.479 (0.89)		0.119 (0.15)
Recorded media	-0.191 (-0.41)		-1.030 (-3.37)***
Chemical products	0.357 (0.78)		-0.789 (-2.33)**
Rubber and Plastic products	-0.243 (-0.24)		-0.730 (-1.86)*
Non metallic mineral products	0.244 (0.68)		-0.794 (-2.32)**
Basic metals	-0.063 (-0.20)		-0.757 (-2.25)**
Fabricated metal products	0.513 (1.47)		-0.664 (-2.05)**
Machinery and	-1.948 (-0.96)		-0.688 (-1.80)*

Equipment			
Office machinery and computers	-0.378 (-1.14)		-0.878 (-2.51)**
Electrical Machinery and apparatus	-0.480 (-1.22)		-0.703 (-1.86)*
Radio, television and communication	0.043 (0.07)		-0.697 (-2.17)**
Medical, precision and optical instruments	0.250 (0.54)		-0.868 (-2.62)***
Motor vehicles, trailers and semi-trailers	-1.58 (-1.46)		-1.196 (-3.51)***
Other Transport equipment	-0.664 (-1.96)**		-0.988 (-2.74)***
Furniture			
Recycling			
Construction	0.179 (0.47)		-0.789 (-2.13)**
Motor vehicles and motorcycles	3.092 (0.43)		
Wholesale trade and commission trade	-2.241 (-0.71)		
Retail trade	-0.457 (-1.36)		
Hotels and Restaurants	-0.621 (-1.47)		
Land transport	-0.614 (-1.28)		
Air transport	-0.360 (-1.25)		
Transport activities	-0.063 (-0.21)		
Post and Telecommunications	-0.087 (-0.29)		
Financial intermediation			
Insurance and Pension funding	-0.516 (-0.74)		
Financial intermediation	0.116 (0.08)		
Real Estate	-0.586 (-1.49)		
Renting of Machinery and equipment	0.113 (0.32)		
Computer and related activities	0.837 (1.60)		
Research and development	3.394 (1.42)		
Other business activities	1.302 (1.99)**		
Education	-0.655 (-2.04)**		
Health and Social work	0.208 (0.34)		
Recreational, cultural and sporting activities	-0.447 (-1.40)		
Other service activities	0.373 (1.24)		
Food Products and beverages	-1.065 (-1.39)		
Textiles	0.211 (0.51)		
Wood and Cork Products			
Observations	1143		327
AR(1)	0.200		0.066
AR(2)	0.917		0.775
Overid. (Hansen)	0.290		

(All regressions contained year dummies which have been omitted for brevity. *** indicates significance at the 1% level; ** indicates significance at the 5% level; * indicates significance at the 1% level. Robust t-statistics are in parenthesis.)

The results for the determinants of inward FDI in Manchester are shown in Table B2.

Equation B4 is estimated under the assumption that some or all of the explanatory variables are endogenous. Consequently the System GMM estimator of Blundell and Bond is employed. In the main, the results are consistent with those found by previous ones particularly in terms of firm size (larger sample) and R&D intensity.

The model of FDI is largely in line with the theoretical predictions. Firm size and R&D intensity are important determinants of inward investment at the firm level. However, wage costs are positive which is counter intuitive.

This however provides an indication that the inward investment attracted to MCR is not driven by the desire to source cheap labour, but that FDI is driven by R&D, seeking high quality labour. This is particularly good news for MCR.

Interestingly, the sign on the capital intensity coefficient switches from negative to positive as the sample changes from all industries to manufacturing only.

The model highlights very little in terms of sectoral differences overall. In column 1, no industry dummies are positive – implying that none of the sectors are significantly different from the reference group of sectors 34 and 35 (transport equipment) in their propensity to attract FDI. Sector 33 shows a significant negative coefficient, implying that MCR is less likely to attract inward investment in electrical and optical equipment than the reference group, but the effect is not that strong.

Interestingly, when one focuses on the manufacturing sector in isolation, many sectors are significantly negative compared with the reference group of 34 and 35. Again, this merely suggests that the automotive sector is more likely to attract FDI than other sectors in MCR.

The significant negative ones are:

15 Food and drink

17 textiles

20 manufacture of wood etc

21 manufacture of paper

24 chemicals

25 rubber and plastics

26 non metallic minerals

28 fabricated metal products

30 office machinery

31 electrical apparatus

32 radio, television and communication equipment

33 medical and precision instruments

36 furniture

The coefficients on these sectors are significantly different from zero, but not significantly different from each other. What this implies is that, once one has allowed for the crucial firm level differences, these sectors are less likely than average to attract FDI.

B6 The relationship between domestic and foreign investment

In this section we examine the relationship between domestic and foreign investment in MCR. Thus we augment Equation B1 to include various measures of inward FDI. Driffield and Hughes (2003) also considered this relationship in the context of the UK, specifically examining whether inward FDI promotes regional development or crowds out domestic investment.

However, the authors did not distinguish between the various types of FDI and consequently treated the measure of FDI as a homogenous variable. Here we try to gauge the possible heterogeneous effects of inward FDI on domestic investment. Regression (a) in Table B3 shows OLSD estimates for the augmented Equation (1) containing three (3) measures of FDI.

First, horizontal FDI (HFDI) which is defined as the proportion of industry-region output accounted for by multinational companies in industry j at time t.

Second, a measure of downstream FDI: DFDI. This seeks to capture the spillovers received by domestic firms in upstream sectors.

Third, a variable capturing the spillovers effects resulting from regional FDI in upstream or forwardly linked sectors which we label UFDI.

The results from this regression (a) shows that of the three FDI measures, the only statistically significant effect results from the upstream FDI measure (UFDI) which suggests that there are positive and significant spillovers effects accruing to local firms in downstream sectors that have linkages with MNEs in upstream sectors.

This result holds when we assume the right hand side variables to be endogenous and perform GMM estimation: Regression (c). This result is good news for the local Manchester City Region economy. There is, in contrast to locations that give large subsidies to attract inward investment, no evidence of crowding out from inward investment in MCR. However, where foreign firms enter supply chains, firms further down the supply chain benefit. This is an important result for policy makers, as it implies that is not simply backward linkages (ie inward investors purchasing from local firms) that generate growth effects, but also where inward investors produce intermediate goods for local sale. This result is in line with that reported by Driffield et al (2002, 2004).

Regression (b) shows OLS estimates for the measures of FDI further disaggregated on the basis of market orientation (domestic or foreign). Here, again there is some suggestion that upstream FDI, specifically with a domestic market orientation, is associated with increased growth in domestic investment. Thus suggesting complementarity effects between FDI and domestic investment. This again is a very positive result for MCR, and in contrast with other regions away from the south east of England.

The results from this estimation are largely consistent with the OLS estimates in regression (b). However, regression (a) does demonstrate a negative coefficient on the horizontal FDI measure (HFDI). This suggests that there are competition effects from FDI, that are likely to result in less efficient domestic firms exiting the industry. While this seen as an adverse result in the short term, it leads to productivity growth in the longer term, and as such to greater competitiveness.

This again highlights the complementary effects of between FDI and domestic investment. These results are informative in the context of the seminal theoretical contribution of Markusen and Venables. This highlights the impact on agglomeration and local development that FDI can have, especially when one considers the linkage effects.

Further, these results are in line with the results on productivity and spillovers reported in appendix C and discussed in sections 5 and 6 of the report. Inward investment does have a positive effect on indigenous development, consistent with the stimulation of agglomeration economies.

This is consistent with inward investors interacting with certain core competences in MCR, rather than simply entering a low cost location and seeking to assemble imported components. As such, these results are in keeping with a vibrant manufacturing base, capable of assimilating new technology, rather than simply low cost assembly operations.

Table B3: Effects of Foreign Investment on domestic Investment

Regression (d) present fixed effects estimates for the six measures of FDI.

DEPENDENT VARIABLE: Investment Growth (Kt)				
	(a)	(b)	(c)	(d)
	OLS	OLS	GMM	Fixed Effects
Kt-1	0.0837	.0840039	0.0340	-0.1362
	(1.61)	(1.61)	(1.53)	(-1.65)
Q	0.1330	0.1317	0.2122	0.1850
	(1.24)	(1.28)	(1.28)	(2.30)**
L	0.2002	0.2170	-0.0464	0.0776
	(1.70)*	(1.87)*	(-0.18)	(0.39)
CF	-0.0046	-0.0051	0.0246	0.0039
	(-0.34)	(-0.36)	(1.40)	(0.28)
LD	0.0639	0.0604	0.0884	0.0833
	(3.09)***	(3.00)***	(2.59)***	(3.54)***
Cost_Employees			0.0007	
			(0.78)	
HFDI	-.02522		0.0678	
	(-0.23)		(0.51)	
DFDI	-1.0449		-0.5384	
	(-1.03)		(-0.69)	
UFDI	1.0256		1.1118	
	(2.34)**		(2.87)***	
EHFDI		-1.1968		-0.1636
		(-1.52)		(-0.44)
DHFDI		0.0317		0.0903
		(0.30)		(0.75)
EDFDI		-.04468		4.3938
		(-0.01)		(0.93)
DDFDI		-2.0079		-3.1632
		(-1.22)		(-1.64)
EUFDI		.05438		-0.8496
		(0.05)		(-0.54)
DUFDI		2.5119		3.1872
		(2.43)**		(2.15)**
Constant	0.2038	0.1674	0.0943	0.0508
	(2.45)**	(1.83)*	(0.96)	(0.64)
Food	-0.176 (-3.16)***	-0.177 (-3.11)***	0.126 (2.91)***	
Textiles	-0.167 (-2.66)***	-0.176 (-2.77)***	0.139 (3.30)***	
Wood and Cork Products	-0.250 (-3.44)***	-0.248 (-3.40)***	0.050 (1.10)	
Pulp and Paper Products	-0.228 (-1.57)	-0.160 (-1.29)	-0.220 (-0.20)	
Recorded Media	-0.455 (-4.19)***	-0.455 (-4.23)***	-0.191 (-2.60)***	
Chemical products	-0.225 (-4.07)***	-0.216 (-3.76)***	0.054 (1.28)	
Rubber and Plastic products	-0.258 (-4.08)***	-0.266 (-4.02)***	0.043 (0.87)	
Non-metallic mineral products	-0.244 (-3.09)***	-0.229 (-2.80)***	0.055 (0.89)	
Basic metals	-0.030 (-0.11)	0.020 (0.07)	0.210 (0.73)	
Fabricated metal products	-0.272 (-3.89)***	-0.278 (-3.85)***	0.016 (0.31)	
Machinery and equipment	0.003 (0.01)	0.085 (0.23)	-0.042 (-0.28)	
Office machinery and computers	-0.261 (-1.31)	-0.273 (-1.35)	-0.062 (-0.24)	
Electrical machinery and apparatus	-0.281 (-4.62)***	-0.289 (-4.61)***	-0.002 (-0.03)	
Radio, Television and Communication equipment and apparatus			0.470 (2.31)**	
Medical, precision and optical instruments	-0.224 (-1.58)	-0.207 (-1.40)	0.045 (0.40)	
Motor vehicles, trailers and semi-trailers	-0.416 (-0.97)	-0.479 (-1.26)	-0.225 (-1.65)*	
Other transport equipment	-0.143 (-0.37)	-0.482 (-0.89)	-0.077 (-0.23)	
Furniture, Manufacturing	-0.301 (-4.76)***	-0.274 (-4.46)***		
Observations	436	436	436	436
R-squared	0.214	0.237		0.218
AR(1)			0.051	
AR(2)			0.210	
Overid. (Hansen)			0.773	

APPENDIX C

Appendix C: The Impact of FDI Spillover Effects on Productivity growth in Manufacturing and Service Sectors of MCR

C1 Methodology

To evaluate the effects of FDI spillovers on productivity growth, we first estimate total factor productivity (TFP) following the methodology of Levinsohn and Petrin (2003). The advantage of this method lies in controlling for the simultaneity between firm's choice of input levels and unobserved productivity shocks by using firm's intermediate inputs (in this case we use tangible fixed assets) as proxies.

Assuming a Cobb-Douglas production function for firm i at time t is: 1

$$y_{it} = \beta_0 + \beta_l l_{it} + \beta_k k_{it} + \omega_{it} + \varepsilon_{it}$$
$$\equiv \beta_l l_{it} + \phi_t(k_{it}, m_{it}) + \varepsilon_{it}$$

where Y is log of value added, which is sales net intermediate inputs (m), l is labour input and k is capital input, and

$$\phi_t \equiv \phi_t(k_{it}, \omega_{it}) = \beta_0 + \beta_k k_{it} + \omega_{it}(k_{it}, m_{it})$$

is an unknown function of capital and intermediate inputs. ϕ_t is strictly increasing in the productivity shock ω_{it}, so that it can be inverted and one can write

$$\omega_{it} = \omega_t(m_{it}, k_{it})$$

for some function ω_t. Levinshon and Petrin (2003) approximate $\phi_t(k_{it}, m_{it})$ by a third order polynomial in k and m, $\sum_{j=0}^{3}\sum_{j}^{3}\delta_{ij}k_{it}^{j}m_{it}^{i}$ and obtain and estimate of β_l and ϕ_t (up to the intercept) via OLS. This constitutes the first stage of the estimation procedure. At the second stage, the elasticity of capital β_k is defined as the solution to

$$\min_{\beta_k^*} \sum_i \sum_t \left(y_{it} - \hat{\beta}_l l_{it} - \beta_k^* k_{it} - \varpi_{it} \right)^2,$$

where ϖ_{it} is a nonparametric approximation $E[\omega_{it} | \omega_{it-1}]$. Since the estimators involve two stages, the calculations of the covariance matrix of the parameters must allow for the variation due to all of the estimators in the two stages. Levinshon and Petrin (2003) note that the derivation of the analytical covariance matrix is quite involved, and suggest the bootstrapping procedure to estimate standard errors. In this study 200 bootstrap replications are performed. Once consistent estimates of the input elasticities are derived, the log of productivity can be obtained as $\hat{\omega}_{it} = y_{it} - \hat{\beta}_l l_{it} - \hat{\beta}_k k_{it}$. We estimate equation (2) for each NACE 2-digit industries in our sample.

Output Y is measured by the operating revenue deflated by the 4-digit UK deflator. Employment is measured by the cost of total employees or total number of employees. Intermediate inputs are proxied by the cost of goods.

Capital stock is measured by tangible fixed assets. Missing observations and negative values on relevant variables are removed, so are the observations with no regional information.

Once we obtain a reliable TFP measure, we next turn to model FDI spillover effects on productivity growth. To investigate the, we estimate the following TFP equation: (2)

$$\ln TFP_{it} = \ln TFP_{it-1} + \Gamma Z_{it} + \gamma_j \sum_k FDI_{it}^k + \beta_t + \eta_j + \varepsilon_{it}$$

where i, j and t are index firms, three-digit industry and time periods, respectively.

Equation (2) states that the level of TFP depends on the initial level of TFP ($\ln TFP_{it-1}$), a set of firm characteristics Z and foreign presence. Specifically, Z_{it} represents a set of variables capturing other firm characteristics, including firm age and its squared term, a measure of three-digit industry concentration (Herfindhal index), and asset structure (intangible fixed assets/ total fixed assets).

FDI_{it} is a vector that captures foreign presence at the 3-digit industry, which will be explained in detail in the Data section. We also control for time specific effect (ßt), to account for macro productivity shocks, and two-digit industry affiliations (ɳ).

Finally, E_{it} is a random error term which is assumed to be distributed independently of the explanatory variables. The regressions are conducted for domestic establishments only to prevent any potential bias in pooled results due to the fact that foreign investors tend to acquire stakes in large and most successful domestic companies (see Djankov and Hoekman, 2000).

Table C1: By year

year	No. of observations	Percent
1992	129	3.06
1993	143	3.39
1994	150	3.56
1995	150	3.56
1996	98	2.33
1997	468	11.11
1998	455	10.8
1999	429	10.18
2000	402	9.54
2001	372	8.83
2002	371	8.81
2003	326	7.74
2004	270	6.41
2005	236	5.6
2006	191	4.53
2007	23	0.55
Total	4,213	100

Table C2: By NACE 2-digit industrial classification

NACE 2-digit code	Industry	No. of observations	Percent
15	Manufacture of food products and beverages	288	6.84
16	Manufacture of tobacco products	8	0.19
17	Manufacture of textiles	387	9.19
18	Manufacture of wearing apparel, dressing and dyeing of fur	119	2.82
19	Tanning and Dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	26	0.62
20	Manufacture of wood and of products of wood and cork, except furniture, manufacture of articles of straw and plaiting materials	110	2.61
21	Manufacture of pulp, paper and paper products	206	4.89
22	Publishing, printing and reproduction of recorded media	273	6.48
23	Manufacture of Coke, refined petroleum products and nuclear fuel	9	0.21
24	Manufacture of chemicals and chemical products	559	13.27
25	Manufacture of rubber and plastic products	252	5.98
26	Manufacture of other non-metallic mineral products	114	2.71
27	Manufacture of basic metals	114	2.71
28	Manufacture of fabricated metal products, except machinery and equipment	501	11.89
29	Manufacture of machinery and equipment n.e.c	183	4.34
30	Manufacture of office machinery and computers	34	0.81
31	Manufacture of electronic machinery and apparatus n.e.c.	194	4.6
32	Manufacture of radio, television and communication equipment and apparatus	40	0.95
33	Manufacture of medical, precision and optical instruments, watches and clocks	153	3.63
34	Manufacture of motor vehicles, trailers and semi-trailers	70	1.66
35	Manufacture of other transport equipment	35	0.83
36	Manufacture of furniture, manufacturing n.e.c.	496	11.77
37	Recycling	42	1
Total		4,213	100

Table C3: By nominated key sectors

Key Sector	No. of observations	percent
Creative/Digital/New Media	266	6.31
Engineering	1,076	25.54
Environmental Technology	42	1
ICT Digital / Communications	91	2.16
Life sciences	559	13.27
Other Manufacturing	2,179	51.72
Total	4,213	100

C2 Data and Summary Statistics

C2.1 Amadeus database

The main dataset used for the analysis is Amadeus database. It provides firm-level data on some 1.5 million listed and non-listed firms across a sample of old and new European countries, and enables the identification of ownership of assets worldwide.

The current version of the dataset allows our access to the data between 1992 and 2007. The manufacturing sector in MCR is covered by NACE codes from 15 to 37, and currently there are 4,213 effective observations in the data. Below are the data compositions by year, NACE 2-digit industrial sector and nominated key sector.

C2.2 Measures of FDI

The degree of horizontal FDI in industry j at time t, say $HFDI_{jt}$ is defined as the proportion of industry-region output accounted for by multinational companies. This and all other indices of FDI are constructed for about NACE three-digit industry in MCR.

Based on HFDI, we then calculate two indices of foreign presence in backwardly and forwardly linked industries in line with existing practice in the literature (see for example, Smarzynska- Javorcik, 2004). For example, the FDI of the extent of backward linkages (spillovers received by domestic firms in upstream sectors) can be measured for industry j at time t as:

$$DFDI_{jt} = \sum_{\forall k \neq j} \alpha_{kj} HFDI_{kt}$$

where α_{kj} is the proportion of sector *j's* output supplied to industry *k*. It is assumed that the greater the proportion of output supplied to an industry with foreign multinational presence, the greater the degree of linkages between foreign and local firms. We refer to this as downstream FDI.

The index of regional FDI in upstream (forwardly linked) sectors is calculated in a similar fashion as

$$UFDI_{jt} = \sum_{\forall k \neq j} \beta_{kj} HFDI_{kt}$$

where β_{kj} represents the proportion of sector k's output supplied to industry j. This measure of FDI, which we label upstream FDI, captures the extent of forward linkages local firms in downstream sectors have with MNEs in upstream sectors.

We further distinguish FDI between by the market orientation, more specifically, whether a multinational firm's market being domestic or international. Based on each of the FDI indices (viz. HFDI, DFDI and UFDI), we then construct two sets of FDI indices: export-oriented HFDI (DFDI, or UFDI) and domestic-oriented HFDI (DFDI, or UFDI).

To calculate measures of foreign presence in downstream sectors and upstream sectors we employ annual input-output (IO) matrices provided by the Office of National Statistics (ONS) UK. As they are available for 1995–2005, we use the 2005 matrix for year 2005-2006. The input–output matrices contain information on 105 sectors and each firm in our dataset is matched with the IO sector classification based on its primary three-digit NACE code using the concordances provided by the ONS.

All sectors with available information on foreign ownership and operating revenue are used in computing FDI spillover proxies.

10 In practice there are very few (less than 0.1% of all firms) and the results are robust to assuming that these firms are domestic – which from the names they appear to be – or to omitting them from the analysis.

C2.3 Summary statistics

To focus on the analyzing the spillover effects of FDI, we drop all observations for which ownership cannot be determined[10]. We also drop some suspicious observations with negative values of fixed assets or zero employee.

The cleaned data allow us to conduct our estimation for the period of 1995-2006, and the summary statistics of the variables used in the estimation are presented in Table C4.

Table C4: Summary statistics

Variable/definition	Observations	Mean	Std. Dev.	Min	Max
Capital: tangible fixed assets	3688	9896.412	46396.380	0.000	1035733.000
Firm size/No. of employees	3768	192.533	477.568	1	12570
Output: operating revenue	2886	43402.280	130501.600	1.059	1851819.000
Intermediate inputs: Cost of goods	2447	32732.060	113948.400	0.560	1477763.000
TFP, measured by Levinsohn and Petrin (2003)	2359	1.800	0.643	-2.796	4.685
Growth of TFP	1803	0.026	0.216	-2.527	1.815
Asset structure: ratio of intangible fixed assets/total fixed assets	3648	0.0483	0.1574	0.000	1.000
Industrial concentration: Herfindhal index (HHI)	3768	0.434	0.267	0.000	1.000
FDI indicators					
Horizontal FDI (HFDI)	3729	0.1038	0.1925	0.0000	1.0000
Export-oriented Horizontal FDI (EHFDI)	3729	0.0156	0.0613	0.0000	1.0000
Domestic-oriented Horizontal FDI (DHFDI)	3729	0.0599	0.1447	0.0000	1.0000
Downstream FDI (DFDI)	3768	0.0250	0.0421	0.0006	0.4455
Export-oriented downstream FDI (EDFDI)	3768	0.0142	0.0339	0.0001	0.4414
Domestic-oriented down-stream FDI (DDFDI)	3768	0.0049	0.0072	0.0000	0.0988
Upperstream FDI (UFDI)	3768	0.0502	0.0950	0.0005	0.8850
Export-oriented upperstream FDI (EUFDI)	3768	0.0120	0.0220	0.0000	0.1849
Domestic-oriented upperstream FDI (DUFDI)	3768	0.0251	0.0619	0.0000	0.8850

Table C5: FDI spillover effects: the full sample estimation results

Full sample	TFP level			
	OLS		Fixed-effect Panel estimator	
L.TFP	0.831***	0.829***	0.135***	0.136***
	(0.037)	(0.037)	(0.025)	(0.025)
Size	0.0676***	0.0676***	0.157**	0.158**
	(0.025)	(0.025)	(0.066)	(0.066)
Size-squared	-0.267	-0.258	0.607	0.623
	(0.24)	(0.24)	(0.67)	(0.66)
Asset structure	0.234***	0.239***	0.0462	0.0514
	(0.054)	(0.055)	(0.062)	(0.062)
HHI	-0.00141	-.000875	-0.0325	-0.0380
	(0.025)	(0.025)	(0.041)	(0.041)
FDI indicators				
HFDI	-0.116**		-0.0233	
	(0.057)		(0.064)	
EHFDI		0.00512		-0.128
		(0.19)		(0.19)
DHFDI		-0.145**		-0.0278
		(0.073)		(0.089)
DFDI	0.380		0.549**	
	(0.24)		(0.26)	
EDFDI		-1.781*		-0.471
		(1.05)		(1.21)
DDFDI		0.850**		0.909***
		(0.38)		(0.33)
UFDI	-0.217		-0.142	
	(0.19)		(0.13)	
EUFDI		0.380		0.576
		(0.60)		(0.45)
DUFDI		-0.545*		-0.256
		(0.32)		(0.19)
Industry dummy				
Manufacture of textiles	-0.00453	-0.00315		
	(0.0245)	(0.0245)		
Manufacture of wearing apparel, dressing and dyeing of fur	0.0832*	0.0826*		
	(0.0455)	(0.0462)		
Tanning and Dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	-0.213	-0.215		
	(0.151)	(0.153)		
Manufacture of wood and of products of wood and cork, except furniture, manufacture of articles of straw and plaiting materials	-0.0215	-0.0238		
	(0.0339)	(0.0339)		
Manufacture of pulp, paper and paper products	-0.0142	-0.00636		
	(0.0263)	(0.0270)		
Publishing, printing and reproduction of recorded media	-0.0306	-0.0439		
	(0.0360)	(0.0386)		
Manufacture of chemicals and chemical products	0.0414	0.0325		
	(0.0260)	(0.0253)		
Manufacture of rubber and plastic products	-0.00392	-0.00611		
	(0.0261)	(0.0261)		
Manufacture of other non-metallic mineral products	-0.0452	-0.0452		
	(0.0567)	(0.0566)		
Manufacture of basic metals	0.00654	-0.000306		
	(0.0314)	(0.0315)		
Manufacture of fabricated metal products, except machinery and equipment	0.00509	0.000327		
	(0.0275)	(0.0276)		
Manufacture of machinery and equipments n.e.c	-0.0173	-0.0309		
	(0.0559)	(0.0580)		
Manufacture of office machinery and computers	0.200***	0.205***		
	(0.0536)	(0.0538)		
Manufacture of electronical machinery and apparatus n.e.c.	-0.0287	-0.0338		
	(0.0276)	(0.0284)		
Manufacture of radio, television and	0.0259	0.0166		

communication equipment and apparatus				
	(0.0477)	(0.0479)		
Manufacture of medical, precision and optical instruments, watches and clocks	0.104**	0.0943**		
	(0.0416)	(0.0418)		
Manufacture of motor vehicles, trailers and semi-trailers	0.0503	0.0516		
	(0.0830)	(0.0849)		
Manufacture of other transport equipment	-0.0973**	-0.111**		
	(0.0443)	(0.0515)		
Manufacture of furniture, manufacturing n.e.c.	0.00112	-0.0105		
	(0.0312)	(0.0332)		
Recycling	-0.0688	-0.0679		
	(0.0513)	(0.0514)		
Constant	0.163*	0.176**	0.899***	0.880***
	(0.083)	(0.083)	(0.16)	(0.16)
Observations	1342	1342	1342	1342
R-squared	0.88	0.89	0.32	0.33
Hausman test	-	-	Chi2(17)=928.43; P-vlaue=0.000	Chi2(20)=909.11; P-vlaue=0.000

The OLS estimations include yearly dummies and nace 2-digit industrial dummies.

The null of Hausman test is regressor-effect independence, accepting which gives evidence that random effect panel estimator is appropriate. In this case, we are able to emphatically reject the null and support fixed effect panel estimator.

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

C3 Empirical results

Three estimators used to estimate the TFP equation are: the OLS estimator, the fixed-effect panel estimator, taking into account clustered firm effects in the panel, and dynamic panel estimator with a slightly different focus of looking at TFP growth. The fixed-effects panel data model is estimated for the full sample (results in Table C5) and for the high-tech sectors and low-tech sectors respectively.

The reason for splitting samples in such a way is that the two sectors are likely to face different investment needs due to their technological differences (eg. Rajan and Zingales, 1998). We also present the estimation results of some key sectors which contain sufficient observations. The results are presented in Table C6.

The results from the estimation of equation (2) on the full sample are presented in Table C5, in which Panel I report the OLS estimates and Panel II report fixed-effect panel estimates. As expected, initial TFP level enters positive and significant in TFP level equation, indicating a highly productive firm tends to be more productive in the following periods.

There is significant and positive sign for firm size, but no significance is attached to its squared term, suggesting larger firms tend to be more productive and the relationship tends to be linear within the examined period. Firm asset structure appears to have a highly significant sign on TFP level according to the OLS estimates, indicating a higher proportion of intangible fixed assets in a firm' total fixed assets relates to higher productivity.

This is however not the case in the fixed-effects panel estimation, suggesting that the significant effects of assets structure are more likely to be individual firm specific. Finally we do not find any significant impact of market concentration on firm TFP level.

Focusing on fixed-effects panel estimator, we do not find that horizontal FDI has any sizable impact on the productivity of the local firms. Although not being statistically significant, the HFDI estimates tend to exhibit negative signs.

We find strong productivity spillover effects from downstream FDI, which are more marked by domestic market seeking FDI (DDFDI). This suggests that multinational suppliers are associated with the increase in local firms' productivity, and this strong spillover effects mainly come from those multinationals whose markets are mainly domestic.

Table C6: FDI spillover effects: by sectors

Fixed-effect panel	High-tech sectors		Low-tech sectors		Engineering		Life Sciences		Other	
ITFP	0.174***	0.178***	0.116***	0.110***	0.149**	0.159**	0.140***	0.139***	0.199***	0.191***
	(0.046)	(0.046)	(0.030)	(0.030)	(0.072)	(0.071)	(0.037)	(0.038)	(0.028)	(0.028)
Size	0.400**	0.396**	0.148**	0.156**	0.217	0.192	-0.133	-0.120	0.257***	0.264***
	(0.18)	(0.19)	(0.073)	(0.073)	(0.20)	(0.20)	(0.14)	(0.14)	(0.072)	(0.071)
Size-squared	-1.724	-1.725	0.668	0.664	1.459	1.639	3.488**	3.390**	-1.074	-1.042
	(1.90)	(1.93)	(0.73)	(0.73)	(1.88)	(1.88)	(1.35)	(1.38)	(0.73)	(0.72)
Asset structure	-0.0481	-0.0548	0.115	0.123	0.333*	0.346*	-0.268***	-0.264**	0.189**	0.199**
	(0.093)	(0.094)	(0.083)	(0.083)	(0.20)	(0.20)	(0.10)	(0.10)	(0.083)	(0.082)
HHI	-0.179***	-0.198***	0.00331	-0.0202	-0.112	-0.118	-0.0216	-0.0500	0.00955	-0.00517
	(0.068)	(0.070)	(0.053)	(0.053)	(0.10)	(0.10)	(0.081)	(0.096)	(0.049)	(0.049)
HFDI	-0.0646		0.0350		-0.0074		-0.0556		0.0518	
	(0.081)		(0.10)		(0.21)		(0.070)		(0.087)	
EHFDI		-0.102		-0.344		-0.100		-0.0744		-0.357
		(0.20)		(0.43)		(0.37)		(0.21)		(0.29)
DHFDI		-0.134		0.0181		-0.235		-0.0255		0.157
		(0.11)		(0.15)		(0.23)		(0.13)		(0.14)
DFDI	0.101		0.778**		0.0952		0.418		0.568*	
	(0.41)		(0.36)		(0.54)		(1.55)		(0.33)	
EDFDI		-0.0599		2.051***		-0.148		-0.324		0.862*
		(0.44)		(0.52)		(0.63)		(2.30)		(0.47)
EDFDI		5.599		-0.634		-13.56		3.798		1.202
		(5.87)		(1.31)		(10.5)		(8.53)		(1.19)
UFDI	-0.132		-0.211		0.0377		0.632		-0.0461	
	(0.26)		(0.16)		(0.39)		(1.08)		(0.17)	
EUFDI		0.00397		-0.590**		0.229		1.537		0.165
		(0.35)		(0.24)		(0.60)		(1.59)		(0.24)
DUFDI		-1.783		0.765		-1.660		-8.322		-0.583
		(1.44)		(0.50)		(2.21)		(11.1)		(0.63)
Constant	0.420	0.427	0.715***	0.689***	0.292	0.366	1.701***	1.704***	0.493***	0.471***
	(0.42)	(0.43)	(0.18)	(0.18)	(0.46)	(0.46)	(0.31)	(0.33)	(0.18)	(0.18)
Observations	426	426	916	916	308	308	211	211	661	661
Hausman test	Chi2(17) = 218.43; P-vlaue =0.000	Chi2(20) = 275.11; P-vlaue =0.000	Chi2(17) = 672.57; P-vlaue =0.000	Chi2(20) = 819.21; P-vlaue =0.000	Chi2(17) = 115.43; P-vlaue =0.000	Chi2(20) = 129.11; P-vlaue =0.000	Chi2(17) = 115.43; P-vlaue =0.000	Chi2(20) = 129.11; P-vlaue =0.000	Chi2(17) = 603.35; P-vlaue =0.000	Chi2(20) = 609.158 P-vlaue =0.000

Note 1: The null of Hausman test is regressor-effect independence, accepting which gives evidence that random effect panel estimator is appropriate. In this case, we are able to emphatically reject the null and support fixed effect panel estimator.

Note 2: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

In Table C6, we find that large firms tend to be more productive for both high-tech and low-tech sectors, and the size effect is more significant for high-tech sectors than low-tech sector. HHI registers a negative and significant impact on productivity among firms in high-tech sectors, indicating that more industrial concentration seems to be linked with lower productivity level.

Again we do not observe any significant productivity spillover effects from Horizontal FDI. Although the coefficient estimates are positive for low-tech industries, while negative for high-tech industries. The spillover effects from downstream sectors tend to be positive, particularly for low-tech sectors. Interestingly, the significant productivity spillover effect on low-tech sectors are mainly due to the export-oriented downstream FDI.

It is hence likely that the multinational suppliers in low-tech sectors with plentiful global market experience transmit knowledge and information to their local buyers, which has enhanced locals' productivity.

From upstream production chain, we find that domestic market seeking FDI has a positive effect on firms' productivity in low-tech sectors, while export-oriented upstream FDI has a deleterious effect. The signs are quite the opposite for high-tech sectors, although lack of statistical significance.

Table C7 reports the estimation results using dynamic panel estimator. It is worth noting that the interpretations of the dynamic model estimates are slightly different from the static estimates, as all the variables enter the equation with changes. Hence, the estimates indicate the TFP growth associated with changes in explanatory variables.

We find evidence that the increase in horizontal FDI relates negatively to TFP growth, which is particularly the case for domestic market seeking FDI. In other words, it appears more market seeking multinationals in the same industry generate negative spillover effects, especially in high-tech sectors.

In line with the static model estimates, we find domestic market seeking downstream FDI have positive productivity spillover effects. From upstream production chain, there is evidence that more export-oriented upstream FDI promote TFP growth, and domestic market seeking FDI has negative impact on TFP growth.

Table C7: FDI spillover effects: Dynamic Panel Estimation

	TFP growth					
	Full sample		High-tech sector		Low-tech sector	
ΔI.TFP	0.959	0.905	0.242	0.346	0.622	1.452
	(0.69)	(0.64)	(0.23)	(0.24)	(1.32)	(1.96)
ΔSize	-0.0375	-0.0345	0.0799	0.172	0.0831	-0.194
	(0.24)	(0.23)	(0.28)	(0.29)	(0.42)	(0.65)
ΔSize-squared	2.579	2.701	1.747	0.810	1.705	3.969
	(2.03)	(1.93)	(2.96)	(3.05)	(3.37)	(5.19)
ΔAsset Structure	0.216	0.236*	-0.157	-0.154	0.366	0.541
	(0.14)	(0.13)	(0.10)	(0.10)	(0.25)	(0.37)
ΔHHI	0.0519	0.0111	-0.153	-0.167*	0.0818	0.0511
	(0.092)	(0.084)	(0.095)	(0.096)	(0.098)	(0.13)
ΔHFDI	-0.322*		-0.193**		-0.118	
	(0.17)		(0.089)		(0.28)	
ΔEHFDI		-0.537		-0.333		-0.508
		(0.38)		(0.23)		(1.10)
ΔDHFDI		-0.468**		-0.375***		-0.382
		(0.23)		(0.13)		(0.53)
ΔEDFDI	0.213		0.869		0.108	
	(0.68)		(0.89)		(0.93)	
ΔDFDI		-3.388		7.555		-5.627
		(2.52)		(6.54)		(5.87)
ΔDDFDI		1.716**		0.944		1.575
		(0.81)		(0.98)		(1.32)
ΔUFDI	-0.283		-0.540		-0.225	
	(0.32)		(0.67)		(0.33)	
ΔEUFDI		2.771***		2.688		3.514
		(1.06)		(3.45)		(2.28)
ΔDUFDI		-1.401***		-1.043		-1.549*
		(0.48)		(0.81)		(0.91)
Constant	0.0166	0.0164	0.0267**	0.0199*	0.0215	0.0104
	(0.015)	(0.013)	(0.010)	(0.011)	(0.021)	(0.027)
Observations	675	675	236	236	439	439
Sargan test p-value	0.9507	0.8028	0.7342	0.7365	0.1228	0.3659

Note 1: The null of Sargan test is validity of the instrumental variables used in the dynamic panels estimation. In this case, we are unable to reject the null and hence prove the validity of the IVs.

Note 2: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

The results for OTHER MANUFACTURING are consistent with the GMM estimation for ALL MANUFACTURING obtained for the determinants of domestic investment in earlier drafts of the study. Additionally, long-term debt (LD) appears to be a significant means of financing investment.

APPENDIX D

Appendix D: The Impact of FDI Spillovers on the Productivity of Retailers: Evidence for MCR[11]

D1 Objectives

There has been strong evidence that inflows of foreign investment into the manufacturing sector have served to drive higher productivity in domestic firms. But is the same happening on the high street and in the shopping malls? The objective of this report is to examine empirically the impact of Foreign Direct Investment (FDI) spillovers in the productivity of domestic retailers in the Manchester City Region (MCR) during the period 1997-2003. Examining the evidence for FDI spillovers is important, as it is the existence of positive spillovers which provides the rationale for government incentives to attract FDI.

D2 Empirical specification

To identify the influence of foreign presence on the productivity dynamics of domestic retailers in the Manchester City Region, we employ a two-step procedure (see Griffith, 1999). The first step consists in the estimation of the retailers specific TFP levels, which we relate in a second step to a vector of foreign presence. Specifically, the first step estimates a log-linear transformation of the following Cobb-Douglas production function:

$$Y_{it} = A_{it} K_{it}^{\beta_K} L_{it}^{\beta_L} M_{it}^{\beta_M} \quad \text{(D1)}$$

where Y_{it} is real gross output of firm i at time t, Kit is physical capital, L_{it} is labour (measured in terms of full equivalents), M_{it} are real cost of intermediate inputs, and A_{it} is a measure of the firm's time-varying total factor productivity (TFP).

We use a semi-parametric procedure suggested by Levinsohn and Petrin (2003), which is considered to effectively control for productivity shocks and thus obtain consistent and unbiased estimates of the input coefficients.

The second step relates the estimated retailer's total factor productivity (TFP) to relevant indicators of foreign presence and several control variables. Specifically, to investigate the role of FDI spillovers on retail productivity we estimate the following total factor productivity (TFP) equation[12]

(D2)

$$\ln TFP_{it} = \gamma_j \sum_k \ln FDI_{it}^k + \Gamma Z_{it} + \beta_t + \eta_j + \delta_r + \varepsilon_{it}$$

where *i, j, r,* and t are index firms, three-digit industries, county and time periods, respectively. Equation (1.2) states that the log of TFP depends on foreign presence and other set of firm characteristics. Specifically, FDI_{it} is a vector that captures foreign presence at the industry and regional level, and Z_{it} represents a set of variables capturing other firm characteristics, namely distributive services, plant age, a measure of four-digit industry concentration (Herfindhal index), relative skills, relative expenditure on ICT, etc.

11 This work contains statistical data from ONS which is Crown copyright and reproduced with the permission of the controller of HMSO and Queen's Printer for Scotland. The use of the ONS statistical data in this work does not imply the endorsement of the ONS in relation to the interpretation or analysis of the statistical data. This work uses research datasets which may not exactly reproduce National Statistics aggregates.

12 We use a TFP growth rather than levels equation as this purges any establishment specific time invariant effects that impact on TFP in levels.

13 We observe around 300 firms per year.

14 The threshold was lower in the past. See Barnes and Martin (2002) for more details.

We also control for time specific effect (β_t), to account for macro productivity shocks, and the three-digit industry affiliations (η_j), and the county in which the establishment is located (δ_r).

Finally, ε_{it} it is a random error term which is assumed to be distributed independently of the explanatory variables. The regressions are only conducted for domestic establishments to prevent any potential bias in the results due to the fact that foreign investors tend to acquire stakes in large and most successful domestic companies (see Djankov and Hoekman, 2000).

D2.1 Modelling FDI spillovers in retailing

The existence of FDI spillovers is tested by means of a set of variables that capture the dimension (in relative terms) of the external presence. In particular, four measures of FDI spillovers are computed. We first obtain a general measure of regional FDI spillovers, as the employment share of foreign retailers (stores) located in the Manchester City Region. Secondly, we allow the impact of FDI on domestic productivity of MCR retailers to vary both across regions and across counties. To do so we model three dimension foreign direct investment vector, FDI_{it}^1 in equation (1.2). Firstly, FDI_{it}^k is the share of employment of foreign stores located in the firm's same metropolitan borough. It is designed to capture the local spillover from FDI. Secondly, FDI_{it}^2 is a measure of foreign presence outside the metropolitan borough but within the same Manchester City Region. Thirdly, FDI_{it}^3 measures FDI in other regions. If the productivity impact of FDI were only regional or local, we would not expect this type of spillover to be important.

D3 Data

D3.1 Data description for the retail sector

Our sample of a total of 2121 retailers[13] over the period 1997-2003 is drawn from the Annual Respondents Database (ARD) provided by the ONS. A detailed description of the ARD dataset is provided by Barnes and Martin (2002); while Haskel and Kwanja (2003) present a comprehensive account of the retail sector in the ARD. Therefore, only a brief discussion of the data is given here.

The ARD dataset consists of individual establishment's records from the Annual Business Inquiry (ABI), extracted from the Inter Departmental Business Register (IDBR). Only businesses above a certain employment threshold (currently 250) are annually sent an ABI form[14]. The sampled businesses form the so-called "selected sample".

The "non-selected sample" includes those businesses in the sampling frame which were not selected for the survey: of these units, limited information is recorded in ARD (namely industrial classification, region, employment and foreign ownership status). This sampling structure requires the data to be weighted by sampling weights derived from both the selected and non-selected samples.

The ABI dataset contains information on reporting units (RU), from which productivity measures can be obtained, and local units (LU). Typically a RU may coincide with a local unit if the firm is a single-plant unit, while in a multi-plant unit the RU is a group of local units.

The problem of multi-plants is particularly relevant for geographical analysis as only in the case of single local unit there will be no ambiguity with regard to the specific location of a RU. One solution to this problem would

be to carry out the empirical analysis at the local level unit. The difficulty though is that there is not enough information on inputs and outputs at local level that would allow us to estimate a production function[15]. In common with previous studies (Griffith and Simpson, 2004), we carry out the productivity analysis at the RU level[16].

However, there are two important ways in which we will make use of the local unit information. This is not possible with other dataset, such as FAME. The first is in the construction of measures of regional FDI presence. As, particularly large and multinational retailers possess a chain of stores scattered around different regions, relying simply on establishment (RU) data could be misleading[17]. This is important, as in our case foreign chains could report for stores across different regions or sectors.

However, using data on employment, ownership and industrial affiliation of the local unit (i.e. store) it is possible to correctly calculate the foreign presence in a particular region or metropolitan borough. The second way information in the non-selected file is used is in the identification of single location (i.e. retailers with presence in a single region) and multiple location establishments.

The country of ownership of a foreign retailer is provided in the ARD[18]. On the other hand, to identify UK MNEs we use the Annual Foreign Direct Investment (AFDI) register. The AFDI is an annual survey of businesses which requests a detailed breakdown of the financial flows between UK firms and their overseas parents or subsidiaries.

The working definition of FDI for this purpose is that the investment must give the investing firm a "significant" amount of control over the recipient firm. The ONS considers this to be the case if the investment gives the investor a share of at least 10 percent of the recipient firm's capital. We consequently define as "multinational" each establishment in the ARD that is owned by a firm which appears in the AFDI register[19].

15 The only financial information at local unit level is employment.

16 Besides approximately two-thirds of retailing outlets were accounted for by stand-alone businesses (see Haskel and Kwanja, 2003). Therefore, most of the data from the ARD used in this study are in effect plant level data.

17 The problem of multi-plant firms is more severe for retailing than for other sectors of the economy. That is why in this case we use the ARD data set instead of FAME. The ARD is not devoid of limitation either. Unfortunately we cannot say anything in terms of foreign investment flows at regional level, given the plant level dataset only reports data on employment, but no data on investment. Therefore, although we know how many employees are in each foreign store located in MCR, we cannot say anything about the size of their investment. Similarly, the AFDI also reports investment data at the firm level, but not at the store level.

18 This is collected every year by the ONS from the Dun and Bradstreet publication Who Owns Whom.

19 A reported problem with the AFDI register is that information is not always up-to-date. The register population has varied over the years with the ONS' success in identifying the firms that have been engaged in FDI. Only after the ONS learns from various sources that a firm has engaged or received FDI, it will include the information in the AFDI register. However, we believe that this problem does not weaken the conclusions that can be drawn from our results.

20 For the retail sector, the ONS produces a separate index called the Retail Sales Index, which collects retail sales figures on a monthly basis. This is used to produce a disaggregated price index for the 4 digit SIC codes within the retailing sector, which we are using.

21 The ARD provides information on headcounts and the fraction of employees who are part-time, but not on hours worked. We use data on hours worked from the Labour Force Survey to obtain an estimate of the FTEs.

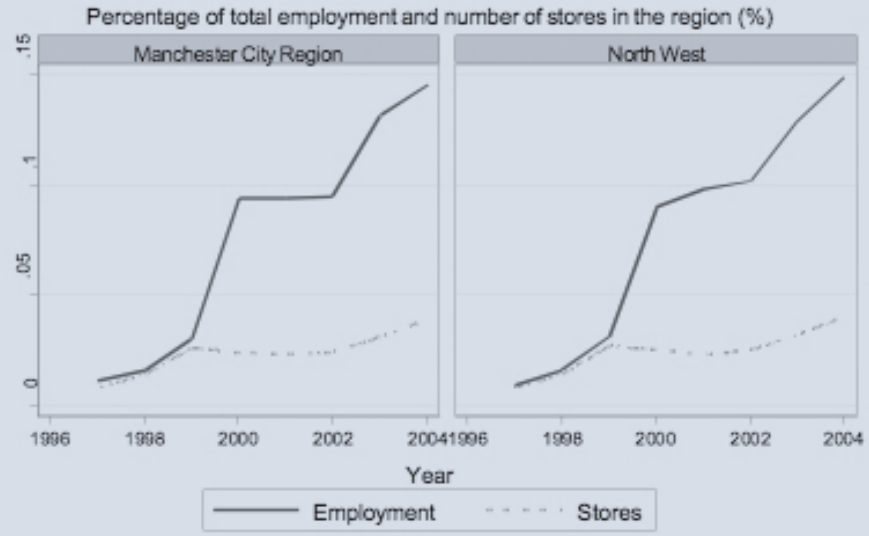
22 Both the degree of product assortment and the level of advertisement expenditures are expressed relative to the mean of the 4 digit industry to which the firm belongs to.

The retail sector is covered by SIC92 codes from 52.1 to 52.7. Output is measured by the gross output deflated by the 4-digit Retail Sales Index[20] deflators available at the ONS. Employment is measured by number of employees in full time equivalents (FTE)[21]. Intermediate inputs are obtained by using information on input purchases and are deflated by a weighted average of the producer price indices of the supplying sectors following the approach by Oulton and Srinivasan (2003). The weights are given by the input-output matrix and represent the proportion of inputs sourced from a given sector. Capital stocks have been obtained by the perpetual inventory method using information on investment and are available at the ONS. Missing observations and negative values on relevant variables are removed as well as observations with no regional information.

Special attention is paid to the measurement of productivity in retailing. Since measuring the output is a major task in any analysis of services (Griliches, 1992), we conceive the output of retailing in two dimensions: the quantity of goods sold and a set of distribution services that implicitly accompany any retail exchange (Betancourt, 2004).

In particular, and due to data availability, we control for the degree of product assortment and the level of information (proxied by expenditure on advertisement). We assume that for a given number of goods sold, higher levels of assortment will entail higher costs for the retailer, for instance the cost of labelling and layout. The same applies for the cost of advertisement (see Betancourt, 2004)[22].

Figure D1. Importance of foreign subsidiaries in retailing



Source: ONS, ARD data

D3.2 Overview of the retail industry in the MCR

Retailing is one of the largest and most significant industries for the UK economy in terms of both output and employment. Due to its importance, the analysis and measurement of productivity in retailing has received acute interest in recent years. Recent estimates suggest that the British retail industry generates almost 6% of total GDP and accounts for the employment of 11% of total workforce (ONS).

With respect to MCR, in 2004 the retail sector generated GVA totalling £3.1bn. In 2006 the sector employed 178,400 (employees: 153,900; self employed: 24,500), making it the fourth largest sector in employment terms (MIER, 2008).

Traditionally, most of the literature analysing the impact of foreign ownership on productivity has focused on the manufacturing sector. The availability of data and the traditional low levels of internationalisation in service industries has been the reason behind the lack of research in this area.

However, the British retail industry has experienced a rapid process of internationalization. Nowadays, it is an industry with an extremely high level of multinational activity. In 2001, 43% of the British workforce was employed by multinational corporations, with 8.2%% employed by a foreign multinational (see Griffith et al, 2004).

Figure D1 shows the increasing importance of foreign retailers over time in MCR and the North West, both in terms of the share of retailing stores and employment. In 2001, the percentage of employees working for a foreign subsidiary in MCR was of 9.4 %, slightly superior to the figures presented by Griffith et al (2004) for the UK in general. In 2004, this figure rose to 14.6% in MCR.

Sample characteristics are shown in Table D1. The statistics in Table D1 compare the mean and standard deviation of the main variables of interest among different samples of retailers. The statistics seem to suggest that the average MCR retailer is as productive as the average North West and British retailer.

However, the average MCR retailer seem to obtain lower sales and use less inputs (labour, capital, and intermediate inputs) than the average British retailer. It is also interesting to see that retailers in the MCR spends on average more on advertisement relative to the industry average and are younger than the average British retailer. More significant is, however, the difference, between the average expenditure in ICT by MCR retailers and that by the average North West and British retailer.

Table D1. Descriptive statistics for domestic firms (2002)

	MCR		Northwest		Great Britain	
Variable	mean	s.d.	mean	s.d.	mean	s.d.
Ln (TFP)	4.789	(0.359)	4.776	(0.322)	4.774	(0.346)
Ln (GO)	8.869	(1.172)	9.044	(1.276)	9.034	(1.256)
Ln (L)	4.482	(0.904)	4.688	(1.107)	4.68	(1.046)
Ln (K)	6.597	(1.500)	6.908	(1.651)	6.925	(1.592)
Ln (M)	3.901	(1.327)	4.088	(1.404)	4.064	(1.357)
Rel_advertissment	1.278	(5.008)	1.094	(4.519)	0.906	(3.121)
Rel_assortment	0.931	(0.644)	0.991	(0.691)	0.999	(0.648)
No. of regions	1.075	(0.676)	1.597	(2.079)	1.463	(1.817)
Age	1.482	(1.301)	1.772	(2.212)	1.751	(1.771)
Multi-plant	0.200	(0.401)	0.25	(0.433)	0.234	(0.423)
Rel_skill	-0.005	(0.751)	-0.063	(0.678)	-0.009	(0.658)
Rel_ICT	0.587	(2.348)	0.906	(3.946)	0.933	(5.945)
Observation	220		512		4811	

Source: ONS

Table D2: Effect of regional FDI Spillovers on TFP

Dependent Variable Log TFP, Sample: MCR retailers

	(1)	(2)	(3)
lnFDI	0.053***	0.054***	
	(0.013)	(0.013)	
lnFDI_1			0.039*
			(0.021)
lnFDI_2			0.391*
			(0.230)
lnFDI_3			-0.547
			(0.360)
HHI4	-0.254*	-0.266*	-0.263*
	(0.137)	(0.137)	(0.137)
Rel_advertisment	0.003	0.001	0.001
	(0.002)	(0.002)	(0.002)
Rel_assortment	-0.024	-0.028*	-0.026*
	(0.015)	(0.015)	(0.015)
No. of regions	0.002	0.009*	0.011*
	(0.005)	(0.006)	(0.006)
Age		-0.003	-0.004
		(0.005)	(0.005)
Multi-plant		-0.075***	-0.076***
		(0.019)	(0.019)
Rel_skill		0.147***	0.148***
		(0.016)	(0.016)
Rel_ICT		-0.007*	-0.007*
		(0.004)	(0.004)
Time dummies	Yes	Yes	Yes
County dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
N	1369	1317	1317
Adj. R^2	0.039	0.125	0.125

Notes: Robust standard errors in parentheses * significant at 10%; ** significant at 5%; *** significant at 1% regressions include time, 4 digit sectoral, and county dummies

23 The standard errors are robust to cluster-correlation (Williams 2000; Wooldridge 2002 pp. 411). Cluster-correlated data involves serial dependence within cluster induced in firm level regression by macro or industrial explanatory variables. In this specific instance, the variables causing the cluster-correlation are the indices of foreign presence since they are industry specific variables. Estimates of cluster-corrected standard errors are consistent if the number of cluster tends to infinity.

24 Estimates of FDI spillovers are obtained using employment shares. As discussed previously, we cannot say anything in terms of foreign investment flows; given the plant level dataset only reports data on employment, but no data on investment. Nevertheless, this approach is common in other studies based on the ARD (e.g. Girma and Wakelin, 2007

D4 Empirical findings

Table 2 presents the results from the estimation by Ordinary Least Squares with cluster corrected standard errors of equation (1.2) for the sample of all domestic firms located in MCR.[23] More specifically, column (1) is the baseline model, where a proxy for regional FDI spillovers is included that captures the presence of foreign retailers located in MCR. Column (2) adds a new set of controls to the previous models, such as firm age, whether the firm is multi-plant, the retailer's expenditure in ICT relative to the industry average, and a proxy for the skill level. Column (3) includes a vector of three measures of FDI[24].

In this case FDI_1 captures the foreign presence of retailers at the metropolitan borough level, FDI_2 captures foreign presence within the MCR but excluding the borough where the retailer is located, and FDI_3 captures spillovers from foreign presence in other regions of Great Britain. In all specifications, we introduce a set of time dummies (to control for time heterogeneity), metropolitan county dummies (to control for county variation) and industrial sector dummies (to control for sector heterogeneity).

Focusing on the role played by regional foreign presence, the results indicate that there is a regional spillover effect from having foreign multinational retailers located in the MCR. We find that FDI in the same region benefits MCR retailers in the form of higher productivity levels. This result is consistent across all specifications. The magnitude of the effect is economically meaningful as a ten percent increase in the foreign presence in the retail sector of MCR is associated with a 0.54 percent rise in productivity of each domestic retailer of the MCR.

In column (3), we explore the presence of FDI spillovers in retailing at the metropolitan borough level. The results suggest that retailers in MCR benefit not only from the foreign presence within the borough (FDI_1) but also from the foreign presence within the wider MCR (FDI_2).

On the other hand, we fail to find any evidence of an impact on productivity from FDI in the same retail sector but outside the region (FDI_3), i.e. from foreign retailers located in other regions of Great Britain. In other words, we may say for instance that retailers in Bolton may benefit from the foreign presence of retail stores in the same metropolitan area and also from retailers in close boroughs. This supports the notion that knowledge spillovers from FDI in the retail sector have a strong regional and local dimension. This may be appropriate in the case of retailers, when the domestic firm would learn by observing and copying, as well as when the knowledge enters through labour turnover, since labour mobility should be higher within local or regional labour markets than on the national level.

The results also suggest that retailers with a greater relative number of product lines are less productive. Other things being equal, multi-plant establishments, as well as those spending more on ICT relative to the industry average, seem to be less productive. On the other hand, firms with a positive wage differential with respect to the industry are more productive. The wage differential could be interpreted as a proxy for the skill gap, with retailers employing a higher number of skilled workers with respect to the industry average experiencing greater productivity rates. This result is robust to all specifications. In addition, retailers with a higher national expansion seem to attain higher productivity levels.

FDI might also affect the level of competition in local markets, and through this channel, domestic firms' survival, behaviour and performance. To control for this effect, following and Haskel et al. (2002), we have introduced in the regression the industry concentration measured by the Herfindahl index at the four digit industry level. We expect that – to the extent that this index reflects changes in the levels of competition – changes in allocative and technical efficiency produced by an increased FDI should be captured by the index.

Additionally, these variables should also capture changes in other unobservable variables that affect competition and that might have disciplined the domestic industry to become more efficient. The results show that the coefficient estimate on the regional spillover variable remains statistically significant.

Our findings are in line with previous studies that for the UK have also shown the regional dimension of FDI spillovers. Driffield (2000), using UK sector level data, found the existence of positive productivity spillovers from FDI in the same manufacturing sector and region.

Using establishment-level data for the UK, Girma (2003) and Girma and Wakelin (2002, 2007) find positive regional spillovers from FDI. They find that intra-industry spillovers are mostly confined to the region in which the foreign multinational locates, suggesting that geographical proximity is important.

In particular, Girma and Wakelin (2007) sing plant-level data from the U.K. electronics sector, found evidence of spillovers from regional FDI. Similarly to our results, they also failed to establish any relationship between domestic plant's productivity and FDI outside the region.

D5 Concluding remarks

In this study we have examined the potential benefit of foreign-owned establishments to MCR retail sector through the existence of positive productivity regional spillovers affecting domestic retailers. Our empirical methodology is characterized by some important features, which distinguish it from previous studies.

First, productivity estimates have been obtained by using semi-parametric techniques in taking account of the endogeneity problem in the estimation of the production function (Levinsohn and Petrin, 2003).

Second, while most of the previous literature n FDI has focused on the manufacturing sector, our estimations concentrate on retailing, a specific service sector that has experienced a rapid process of internationalization in the last decade.

The results have shown that positive spillovers from foreign retailers are limited to the region and metropolitan borough in which these foreign stores locate. These findings imply that the competitive pressure exerted by the entry of foreign actors leads to the diffusion of a large set of organisational innovations (new formats, new marketing strategies, new organisational and information structures, and the re-organisation of supply chains) among local modern retailers.

These local spillover effects seem to compensate to a great extent for the destructive effects of competition in terms of productivity gains. These results have important policy implications. If the productivity of domestic retailers benefit from the presence of foreign-owned retail MNEs, policies aimed at attracting foreign investment may, as a consequence, be an instrument to boost the performance of MCR retail industry.

APPENDIX E

Appendix E: Extended Discussion of Recent Trends in Global FDI

FDI flows tend to be highly volatile, and reflect the underlying economic conditions of the countries concerned. Global FDI flows peaked in 2000 at $1.4 trillion, and then fell sharply until 2004, when they began to rise sharply once more. By 2006, global FDI inflows had reached $1.3 trillion (in nominal terms) the second highest level ever recorded (Figure E1).

Provisional figures from UNCTAD suggest another increase in 2007 to $1.5 trillion. While both developed and developing countries have seen substantial rises in inflows in the last three years, as is usual in a time of FDI upswings, the share of global FDI accounted for by developed economies is rising: in 2006 approximately two-thirds of all FDI inflows were to developed economies, flowing mainly from other developed economies (Figure E2).

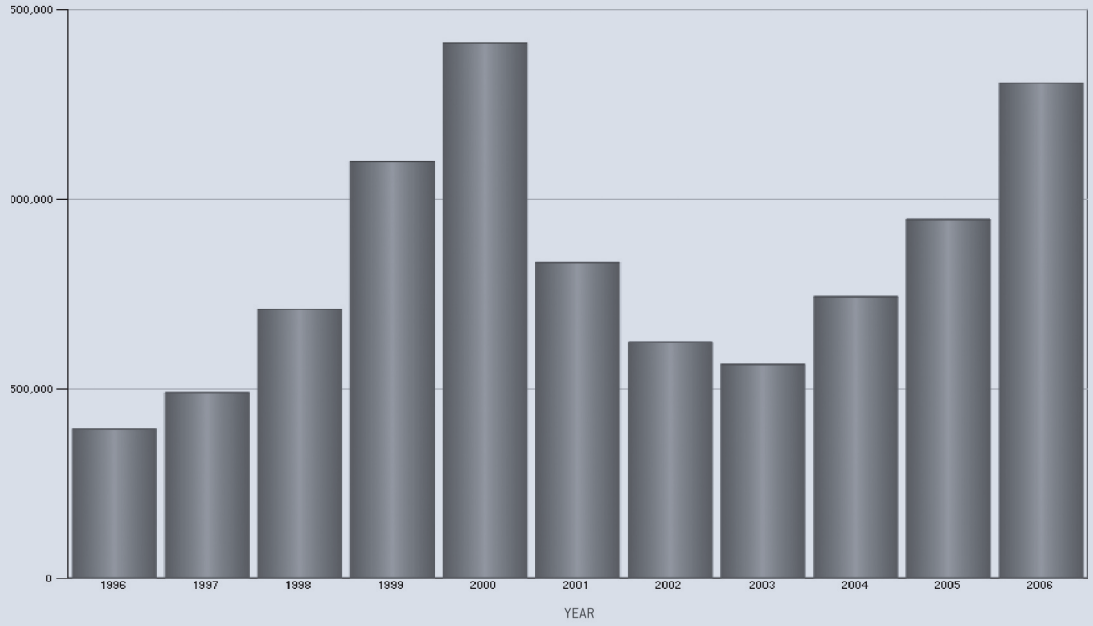
The rapid rise in FDI flows since 2004 largely reflects significant economic growth in many major economies coupled with a weakening dollar. In particular, high corporate profits and stock prices led to a sustained increase in cross-border mergers and acquisitions (M&A), which accounted for over 80% of total FDI inflows in developed economies in 2006.

The total stock of global outward FDI has been rising steadily since the early 1980s, and by 2006 had reached $12.4 trillion, double the value of 2000 (in nominal terms). Over 85% of both the outward and inward stock of FDI is accounted for by developed economies, principally the USA and Europe. The European Union alone accounts for almost half of the stock of inward FDI and over half of the outward stock.

The UK had an inward FDI stock of over $1 trillion and an outward stock of $1.5 trillion in 2006, accounting for 12% of outward and 9% of inward FDI stocks. UNCTAD (2005, 2006) ascribe these changes to changes in patterns of FDI. In particular, transition economies and eastern Europe experienced a significant increase in FDI, that more than offset the decline in FDI both within the EU 15 and between the EU15 and America.

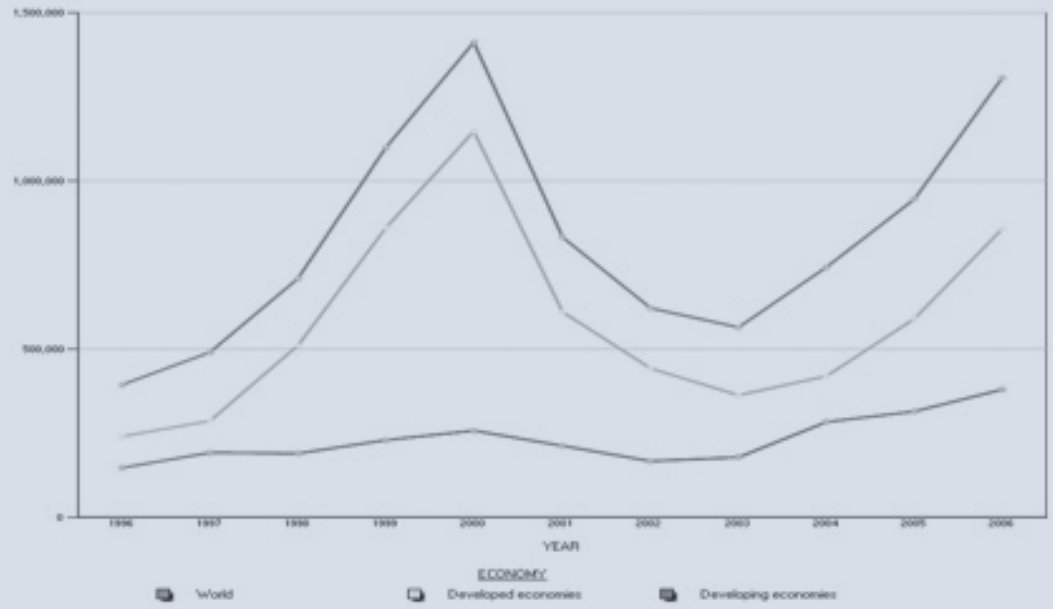
Equally, the rise in service sector FDI more than offset the decline in manufacturing. More recently, UNCTAD (2007) have highlighted the resurgence in what had been thought of as a 1960s/ 1970s phenomenon, of FDI in extractive industries in developing countries.

Figure E1: Global FDI inflows 1996-2006 (billions of dollars)



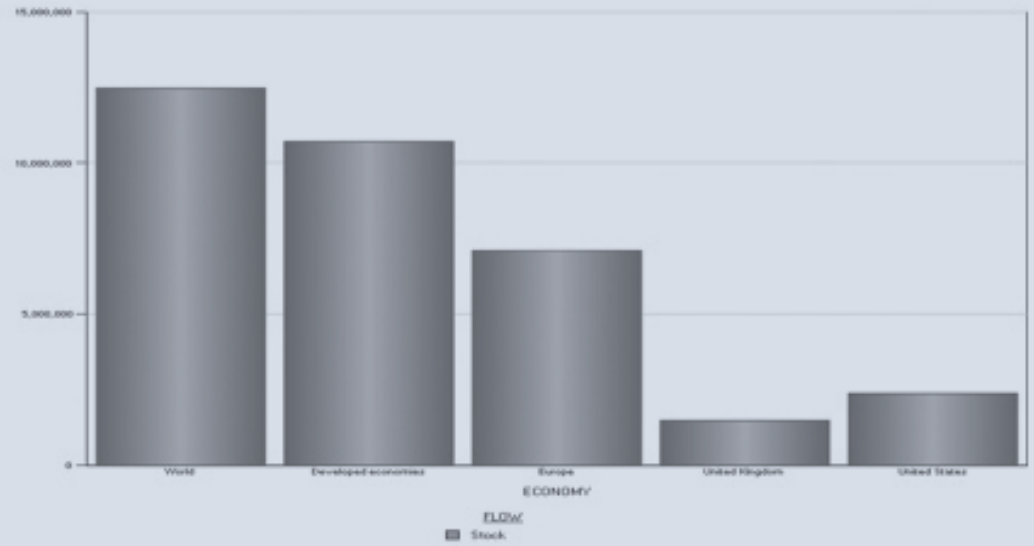
Source: UNCTAD

Figure E2: FDI inflows 1996-2006 by economy (billions of dollars)



Source: UNCTAD

Figure E3: Outward FDI stocks 2006 by economy (billions of dollars)



Source: UNCTAD

A key change in the industrial pattern of FDI over the past 20 years has been the shift towards services, accompanied by a decline in the share of FDI in primary industries and manufacturing.

While FDI has increased significantly in absolute terms in primary industries, manufacturing and services, the shares of these sectors in total flows have declined, as the service and financial sectors have increased in importance.

In 2006, manufacturing accounted for around 30% of FDI stock, compared with over 40% in 1990. Services represented over 60% of the global FDI stock in 2006, up from half in 1990.

While the primary sector still represents less than 10% of FDI stock, there has been a rapid rise in FDI in the extractive industries during 2005 and 2006.

The same trend is even more noticeable with respect to recent flows of FDI. According to recent data from UNCTAD, over the period 2003-05 only 16% of FDI inflows into developed economies were in manufacturing, and 62% in services (UNCTAD 2007 Annex Table A.I.11). Within the service sector, financial and business services were the two largest sources of FDI inflows, each accounting for approximately 18% of total inflows into developed economies.

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