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Tax Competition And The Pattern Of European Foreign Direct Investment

By

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Abstract. This paper investigates the empirical importance of tax competitiveness for the location of foreign direct investment, focussing on the behaviour of UK and German corporations. We use two annual panel data sets covering their investment within eight other European countries as well as Australia, the United States and Japan, controlling for market size, relative costs, innovation, corporate financial constraints and sector-specific fixed effects. Our results indicate that tax competitiveness has had a significant effect on the level of foreign investment, particularly within Europe. Similar effects are obtained for relative labour costs, implying that the relative level of social security taxes may also affect investment location.

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Section I. Introduction

It has long been recognised that differences in national corporate tax systems might distort trade and investment decisions, with mobile factors of production gravitating towards countries of low taxation, thereby encouraging tax competition among nation states. This process fosters 'tax degradation', with tax rates being reduced in individual countries as each tries to protect its own tax base. Ultimately this could lead to the abandonment of taxation of mobile factors of production, or even to their subsidisation (Gordon, 1991; Kanbur and Keen, 1993).

Concerns such as these prompted the European Commission to set up a committee of experts under Onno Ruding to consider whether differences in taxation among member States caused major distortions in the internal market. Although their report (Commission of the European Communities, 1992) concluded that distortions did arise, there has been no further progress on the harmonisation of corporate taxation in Europe. However it is clear that concerns still remain about the potential impact of tax competition on location decisions, particularly since the decline in barriers to capital mobility within Europe. Both the OECD and the European Commission have established working parties to consider the possibilities for tax reform. Despite the official interest, there is in fact a paucity of empirical evidence concerning the impact of taxation on cross-border direct investment within Europe (Daly, 1995). The majority of empirical studies on this subject have been undertaken using detailed data on the operations of the foreign affiliates of US multinationals. Comparable data is not available for any EU economy. Indeed there are relatively few existing econometric studies of intra-EU foreign direct investment, and none of Culem (1988), Molle and Morsink (1991), Thomsen and Woolcock (1993) or Pain (1997) attempt to take any account of differences in national tax structures.

The qualitative survey evidence obtained by the Ruding Committee suggested that tax differentials were a factor in nearly half of all production location decisions and over three-quarters of decisions in the case of financial centres, but the quantitative importance of these findings is not clear. The survey evidence does not necessarily imply that greater harmonisation will have an important impact on location decisions; what matters is its importance compared to other factors such as labour costs and access to infrastructure (Gammie, 1992), the prevalence and effectiveness of barriers to market entry by means of trade (Barrell and Pain, 1998a) and the importance of firm-specific assets in the decision to invest overseas (Markusen, 1995; Pain, 1997; Barrell and Pain, 1997).

Some weak evidence for tax competition is that corporate tax rates were reduced in most industrial countries following the lead given by the United Kingdom and the United States in the mid 1980s, although it is not obvious to what extent this response was necessary to prevent a falling tax base or an imitative reaction to what was perceived to be a successful policy. Eltis and Higham (1995) claim that the relatively low level of corporate taxation in the

UK has been an important factor behind the growth of inward direct investment into the UK since the mid-1980s. The results of Young (1999) suggest that the international tax competitiveness of the UK has helped to raise the level of fixed investment within the manufacturing sector.

This paper presents panel data evidence on the extent to which the pattern of intra-EU capital movements within the manufacturing sector has been affected by differences between the national tax systems of member states. In particular we focus on the factors that have influenced the bilateral scale of foreign direct investment (FDI) by UK and German firms since the late 1970s in eight other European countries and Australia, Japan and the United States. We seek to evaluate the importance of tax effects within a model which also takes account of relative unit labour costs, firm-specific assets and corporate financial constraints arising from variations in interest gearing. This model allows for an impact from both corporate taxes and other business taxes imposed by national social security systems. After controlling for other factors we find evidence that there is a statistically significant relationship between the amount and the destination of FDI undertaken by UK and German firms and a measure of corporate tax competitiveness. Relative labour costs are also found to influence the investment decision, suggesting that differences in the tax burden imposed by national social security systems may also be of importance.

The paper is organised as follows. The next section outlines a simple model of foreign direct investment and discusses the essential role of factors, such as barriers to market entry and firm-specific assets in motivating the existence of multi-plant firms and determining the scale and form of foreign investment. The potential importance of taxes is discussed within this framework, drawing on the model of Young (1999). The following section describes the pertinent parts of the international tax system and develops an indicator of tax competitiveness, subsequently used to augment the empirical models of UK and German FDI in the existing studies by Pain (1997) and Barrell and Pain (1997). Section IV discusses data issues and the evolution of the regional pattern of FDI. Section V reports our primary empirical results from this basic model. Some concluding comments are contained in the final section.

Section II. Modelling Location Choice and Foreign Direct Investment

In the simplest model of location choice where there are no transport costs or other barriers to trade or agglomeration economies, the typical firm producing a single good under constant returns to scale will choose to produce in only one location: where its post tax profits are highest (Young, 1999). There is simply no reason to produce in more than one place when it can produce where costs are lowest and trade from there.

The difficulty with this model is that it fails to account for the existence of multinational companies who produce similar goods in several locations at the same time. Extensions are required to explain why foreign investment is preferred to trade and why this should take the form of direct investment rather than licensing. There are a number of possible directions which this might take, recognising the nature of modern corporations and the goods and services they supply.

For multi-product firms, or for vertically integrated firms the simple model may be an appropriate representation of the choice of location for each of the goods that they produce or each stage of production. For other firms which produce similar goods (different makes of car) using production technologies of different vintages the choice of location of the newest vintage could also conform to that of the simple model. Location choices are also affected by the existence of national and supra-national barriers to trade and capital mobility within and between large regional markets such as Europe and North America. Such barriers could force firms to undertake multi-plant operations if they wish to enter different national markets. Within North America there is evidence that regional free trade agreements have led some US multinationals to close subsidiaries within Canada and substitute exports for FDI as a result of the improvements in market access (Niosi, 1994).

Thus the simple model should not be dismissed because of the existence of multinational firms as these can be accommodated within its framework. Nevertheless, the model does need to be extended to account for the activities of those firms which produce the same goods and services in different locations using similar technologies. Extensions of this type tend to recognise the benefits that corporations derive from their presence in the markets in which they sell and the possibility of agglomeration economies from being near suppliers and customers (Venables, 1996; Barrell and Pain, 1998b). For example, foreign investment is more likely once allowance is made for the possible costs associated with market entry by means of trade (Pain, 1993). The costs of market entry include factors such as transport costs as well as the extent and prevalence of tariff and non-tariff barriers to trade. Barrell and Pain (1998a) provide empirical evidence of the extent to which the use made of contingent protection has raised the level of investment by Japanese companies in Europe and the United States.

The following simple model outlines a situation where it is optimal for a firm to produce in two locations, showing the influence that taxation has on the decision. The objective of the multinational firm that invests at home (*h*) and abroad (*a*) is represented by:

$$\Pi^G = (1-\tau^h)\Pi^h + (1-\tau^a)\Pi^a \qquad \textbf{(1)}$$

where Π^G is the total post tax profits of the multinational group, Π^h is the profit generated in the home country and τ^h is the overall tax rate charged on those profits; Π^a and τ^a are similar terms applying to the profits generated by its foreign subsidiary. It shall be assumed that the firm faces imperfect competition in each of the product markets, that it can produce a single good at home or abroad using the same technology, but that there are costs in trading between the two countries. It is also assumed for simplicity that the home country has a comparative advantage in the production of the good so we do not consider the possibility of the firm producing abroad and exporting back to the home country. Profits at home and abroad are:

$$\Pi^h = p^h S^h + p^a (1-t) X - C(Q^h) \qquad \textbf{(2a)}$$

$$\Pi^a = p^a S^a - C(Q^a) \qquad \textbf{(2b)}$$

where p^i is the product price, S^i is the sales of each firm in its domestic market, Q^i is output in country $i (i = h, a)$. X is exports from h to a, t is the per unit transport cost and $C(.)$ is the total cost function. The price in the home market is a function of the sales of the home firm, whereas the price abroad is a function of sales by the foreign operation and exports by the home firm. Sales in the foreign market are equal to foreign output ($S^a = Q^a$), domestic output is equal to home sales plus exports ($Q^h = S^h + X$).

The first order conditions are derived by maximising **(1)** with respect to Q^h, Q^a and X, subject to the above constraints:

$$\frac{\partial \Pi^G}{\partial Q^h} = (1-\tau^h)\left(p^h\left(1+\frac{1}{\varepsilon^h}\right) - \frac{\partial C}{\partial Q^h}\right) = 0 \qquad \textbf{(3a)}$$

$$\frac{\partial \Pi^G}{\partial Q^a} = (1-\tau^a)\left(p^a\left(1+\frac{1}{\varepsilon^a}\right) - \frac{\partial C}{\partial Q^a}\right) = 0 \qquad \textbf{(3b)}$$

$$\frac{\partial \Pi^G}{\partial X} = (1-\tau^h)\left(-p^h\left(1+\frac{1}{\varepsilon^h}\right) + (1-t)\,p^a\left(1+\frac{1}{\varepsilon^a}\right)\right) = 0 \qquad \textbf{(3c)}$$

where $\varepsilon^i, i = a, h (\varepsilon < -1)$ is the price elasticity of demand. Equations **(3a)** and **(3b)** indicate that output is chosen such that marginal cost is equal to marginal revenue in every market

where production takes place.[1] Equation **(3c)** is the condition which provides cohesion to the firm's decisions across markets. It says that when the firm exports, it will do so until marginal revenue at home is equal to post trading cost marginal revenue abroad. But in general it will export and produce abroad only when the marginal revenue generated by a unit of exports (costing the domestic marginal cost plus the costs of transport to produce) is equal to the marginal cost of foreign production. Given that marginal and average costs in each country are constant, this only occurs by chance. It is more likely that the firm will either produce only at home and serve the foreign market by exports (in which case equations **(3a)** and **(3c)** hold exactly) or produce at home and abroad but not export (in which case equations **(3a)** and **(3b)** hold exactly).

To determine the optimum strategy for the firm, it is necessary to compute the post tax level of group profits generated under each option. The level of foreign investment conditional on a foreign location being chosen is then determined by standard conditions. That is, output is determined by the marginal cost equals marginal revenue condition **(3b)**, and factor demands are determined according to the least cost method of producing that level of output. That is, the demand for capital abroad conditional on producing abroad is

$$K^a | Q^a = f(Q^a, w^a, c^a) \qquad \textbf{(4)}$$

where w^a and c^a are the cost of labour and capital respectively. Note that the foreign stock of capital is unaffected by any home country variables. These do however affect the decision as to whether to produce overseas. The unconditional demand for overseas capital is then determined by an expression of the following type:

$$K^a = f(Q^a, w^a, c^a)\, g\left(\frac{\tau^h}{\tau^a}, \frac{w^h}{w^a}, \frac{c^h}{c^a}, t\right) \qquad \textbf{(5)}$$

That is relative levels of labour and capital costs and relative taxes on profits as well as the extent of trading costs all influence the demand for overseas capital.

In this model, the typical firm's decisions can be represented as a two step process where the factor mix in any particular location is determined by standard considerations relevant only to that region, but competitiveness influences whether the firm locates there at all.[2]

In fact there is also a third stage in the decision process: whether the foreign operation should be directly owned or licensed. The decision to establish foreign operations is likely to reflect the existence of knowledge-based, firm-specific economies of scale. In particular the trade-off between direct investment and licensing may be sensitive to the need to protect firm-specific

[1] Note that profit taxes play no part in this decision except to the extent that they affect the cost function.

[2] Devereux and Griffith (1998) propose a related model.

assets such as product quality and the knowledge of new products and processes (Markusen, 1995). Direct investment offers a means of expanding overseas production whilst ensuring the protection of an innovation through internalisation. The alternative of licensing has the associated risk of enabling potential competitors to acquire firm-specific knowledge more rapidly. If so, this implies that the level of outward investment should be stimulated by a high level of innovatory activity in the home economy. The panel data findings of Pain (1997), Barrell and Pain (1997 and 1998b) suggest that the level and timing of direct investment by British, German and US firms can be explained in part by the level of domestic innovatory activity, captured either through research and development expenditures or through registered patents. In our empirical work we use constructed measures for the 'stock' of knowledge-based assets. A three-year cumulative measure is used as there is likely to be some time lag before the full commercial potential of most research activity patents is realised.[3]

A number of recent models of international trade under monopolistic competition have considered the extent to which firms establish foreign affiliates rather than engage in trade. These confirm the potential importance of entry barriers and firm-specific assets in the foreign investment decision. If country characteristics differ then single-plant firms are relatively better placed than multinational firms, since the latter have to locate some capacity in a location with higher relative factor costs, as well as incur the fixed costs associated with the establishment of an additional production facility. If country characteristics are similar and transport costs (or more generally barriers to trade) are high, then multinational firms may be relatively better placed than single-plant firms if they have knowledge-based assets which act as a joint input across plants, giving lower fixed costs per market.

[3] Use of a 'stock' measure cumulated over many years would be inappropriate, since knowledge of new products and processes can be gradually acquired by competitors. Experiments suggest that the degree of cumulation makes little difference to the reported results.

Section III. The International Tax System and its Influence on Cross Border Investment

Profits generated by cross border investment are subject to three different forms of taxation prior to their distribution to shareholders:

(a) As they accrue, they are subject to corporation tax in the host country.

(b) When they are repatriated from the host to the home country, they are subject to withholding taxes from the government of the host country.

(c) When they are received in the home country as foreign source income, they are then subject to tax from the home country government.

These different forms of taxation impinge in a variety of ways on the activities of multinational firms, affecting the returns to their investment, location and financing decisions.[4] There are two possible routes by which taxes might affect the real investment decisions of multinational firms. First, taxation in the host country affects the optimum capital stock of subsidiaries located there through the effect of taxation on the user cost of capital (implicitly included in Π^a in equation **(1)** in the previous section). Second, the combination of host and home country taxes affects the decision as to where production should be located.

Empirical investigations of the effects of taxes on foreign direct investment have generally focused on the first of these routes, examining the influence of host country effective tax rates on FDI and ignoring the impact of home country taxes (see the survey by Hines, 1996). As Jun (1994) suggests, this is partly because of a lack of country specific data, but also because of the theoretical proposition due to Hartman(1985) that home country taxes are irrelevant in determining FDI by mature corporations.[5] This argument is an extension of the so called "New View" that dividend taxes have no effect on investment decisions since they are unavoidable, reducing both the cost and return on investments by a proportionate amount.[6] This has some force where multinationals are dealing in goods or services which are prohibitively costly to produce in one country and sell in another, where the choice is whether to produce there or not. But the argument is not applicable when they are able to supply one

[4] These are discussed in an unpublished appendix to this paper, available from the authors on request.

[5] Exceptions to this are the studies by Slemrod (1990) and Swenson (1994) which attempt to allow for the effects of home country taxes through use of effective and statutory tax rates and dummy variables to take account of the nature of the home tax system.

[6] That is, investment decisions abroad are affected only by those taxes that affect Π^a. Those that affect only τ^a do not influence optimum investment decisions although they do affect the return on investment.

market from a variety of locations. Then the competitiveness of different tax systems is one of the factors influencing the profitability of different locations, and hence its choice.

More recently there has been a greater awareness of the different ways in which taxation affects FDI. Jun (1994), Devereux and Griffith (1998), Grubert and Mutti (1996) and Young (1996) all allow for the separate effects of some measure of tax competitiveness in determining where FDI should be located. But with the exception of Devereux and Griffith (1998) and Young (1996), these papers make no allowance for host country withholding taxes or home country taxes on foreign source income. Further, only these papers make any attempt to allow for the effects of tax competition from other third countries in influencing the amount of investment done by firms from one country in another.

In principle, the tax competitiveness of country *j* seen from the perspective of a firm from country *i* is judged by comparing the overall rate of tax paid on profits generated there with that in all other possible locations. This can be represented by:

$$TC_i^j = \frac{(1-\tau_i^j)}{(1-\overline{\tau}_i)} \qquad \textbf{(6)}$$

where τ_i^j is the rate paid on profits generated in country *j*, reflecting the three forms of taxation referred to above; $\overline{\tau}_i$ is a similar term measuring tax rate paid by the firm on profits generated in alternative locations. τ_i^j is defined formally to reflect the three forms of taxation of foreign profits and is given by:

$$(1-\tau_i^j) = \theta_i^j (1-\tau_{ij}^*)(1-\tau_j^r) \qquad \text{for all } j \text{ except } i. \qquad \textbf{(7)}$$

where τ_l^j takes account of the taxation of retained profits in country *j*, (in τ_j^r), as well as any additional taxes paid to the host government on these profits upon repatriation (in θ_i^j) and further taxes due to the home government on the firm's foreign source income (in τ_{ij}^*). These terms are defined below.

The taxation of distributed profits by the host country government is reflected in the term θ_i^j, which reflects the degree of discrimination between retentions and gross dividends in the tax system. It measures the additional dividends, gross of imputation credits, which the home company would receive if one unit of foreign profits were repatriated. It is defined to encompass most international tax systems as:

$$\theta_i^j = \frac{1}{\frac{1-\tau^{jr}}{1-\tau^{jd}}(1-i_i^j)+\omega_i^j} \qquad \textbf{(8)}$$

where τ^{jd} is the tax rate on distributed profits, i_i^j is the imputation rate on profits distributed to country *j* and ω_i^j is the withholding tax on profits distributed from *j* to *i*. The withholding taxes applied by national governments to profits repatriated overseas depend on the bilateral tax treaty between the respective countries.

The home country taxation of foreign source income is reflected in the term τ^*_{ij} in **(7)** and is defined by:

$$\tau^*_{ij} = F_i \max \left[\frac{\tau_i^r - \tau_j^d}{(1 - \tau_j^d)} - (\omega_i^j - i_i^j), 0 \right] \qquad \textbf{(9)}$$

where F_i is a zero - one indicator variable that takes the value zero for countries which exempt foreign source income from domestic tax and the value unity for countries which alleviate double taxation by providing a credit for tax paid abroad. Additional taxes are levied by the these governments to bring the tax paid on foreign source income up to the level that would have been paid if the profits had been earned at home. However, there is no remission of tax when overseas tax exceeds that which would have been paid at home.

As an example consider the relative position of UK and German firms investing in France. Both pay the same taxes in France, but could also face a withholding tax on distributions and additional taxes at home. In fact, over our sample period, no additional tax has been levied at home on their income generated in France. For German firms, this is because of the exemption of foreign source income from domestic tax. For UK firms, it is because the UK tax rate on retentions has been below the combined withholding tax and rate on distributions in France. However, the position on withholding taxes has not been the same. For example, in 1990 the withholding tax from France was 5 percent on dividends to the UK and zero on dividends to Germany.[7]

Thus over our sample, German firms paid a lower tax rate on income generated in France than UK firms because of the lower rate of withholding tax. This of course does not necessarily imply that France is more likely to be host to German than UK firms. What matters in determining tax competitiveness is the comparative advantage of a location: how the tax rate paid in one particular country compares with that which would be paid in other locations, as in equation **(6)**.

This has been evaluated for all the host countries in our sample by comparing the tax rate paid by either UK or German firms in that location with the rate paid by UK or German firms in a

[7] The general importance of withholding taxes is illustrated by Devereux and Pearson (1989), although their impact may have diminished over time within Europe, with the 'parent-subsidiary' directive that came into force in 1992 eliminating withholding taxes on inter-company dividend flows to parent companies with a stake of over 25 per cent in the foreign subsidiary. This means that the taxation of foreign source income by home governments now constitutes the main distinction between the rates of tax paid by UK and German firms on the profits generated by their subsidiaries in third countries.

range of locations (including the home country) using GDP-based weights.[8] Tables 1 and 2 show estimates of the tax rates on the profits earned by UK and German firms respectively in various countries from 1970 to 1990, under the assumption of a common tax base. Over the sample considered, the overall tax rate on profits paid by German firms was higher than of firms from the UK. The simple explanation of this is that, contrary to the situation with France, most countries applied a higher rate of withholding tax on distributions to Germany than the UK (see OECD, 1991, table A.1.10)

The information on tax rates also illustrates that when the UK corporate tax rate at home is high, there is no tax advantage to UK resident companies investing overseas because the credit system ensures that any benefits arising out of lower overseas corporate tax rates would be offset by higher domestic taxes on foreign source income. This tends to reduce the dispersion of overseas tax rates from the perspective of UK companies when the domestic tax rate is high as the figures for 1974 to 1982 illustrate. The dispersion is seen to be greater when the UK rate is relatively low. These effects do not arise under the German system of exempting foreign source income.

In 1990 the pecking order of countries according to their tax rates was fairly similar for both UK and German firms: Ireland, Sweden and the UK had relatively low rates of tax whereas Germany, Japan and Norway had relatively high rates. The main exception to this was Italy where only UK firms received half of the imputation credit available to domestic investors (see OECD 1991, p 59). In the main, the similarity in the overall tax rates reflects the fact that Germany exempts foreign source income from domestic tax and the UK, although operating a credit system, effectively offers an exemption by virtue of its low corporate tax rate.

[8] We have not allowed for any possible differences in the taxation of foreign source income arising from dividend and royalty payments in calculating the tax competitiveness term.

Section IV. Data Issues

In this section we discuss the evolution of UK and German FDI since the late 1970s and the basic form of the model and the data used in the empirical analysis.

IV.1 The Evolution of Direct Investment

The UK and Germany account for over half of the aggregate stock of overseas FDI by EU member states, and nearly a quarter of the aggregate FDI stock of OECD member states. Both publish detailed statistics on the geographical and sectoral composition of their foreign investments in regular annual publications. The evolution of the regional pattern of their total foreign investments are shown in tables 3 and 4. The figures indicate that, for both countries, the proportion of investments held within the EU has risen since 1984, with a decline in the share of investments held within developing countries and, to a lesser extent, North America.[9] The geographical dispersion of investments appears to have become more concentrated over time, with sharp falls in the share of UK investments held within some Commonwealth member states, and the share of German investments held within Latin America.[10]

In the empirical analysis below for the UK we consider FDI in Belgium, France, Germany, Ireland, Italy, the Netherlands, Spain, Sweden, the US, Japan and Australia. Other EU members and the EFTA states are excluded as they have received little investment. For Germany we also distinguish eleven locations, with the UK and Austria replacing Germany and Australia in the panel used for UK outward investment.[11]

At first sight the changes that have occurred in the location of both countries FDI are remarkably similar, with the proportion of UK foreign direct investments located in the EU rising from 21 per cent in 1981 to 33 per cent in 1992 and the share of intra-EU investment by German firms rising from 30 per cent to 40 per cent. However there are marked differences in the intra-EU pattern of investments, with the investments of German firms retaining a more consistent geographical pattern than those of British companies. Whilst the share of intra-EU German investment located in the UK only rose from 10.4 per cent in 1984 to 13.3 per cent in 1992, the share of intra-EU investment from the UK located in Germany fell from 27.5 per cent to 16.6 per cent over the same period. These figures appear comparable with aggregate capital movements, with direct investment inflows into the UK rising sharply in the late 1980s while direct investment inflows into Germany have stagnated, raising concerns about the attractiveness of Germany as a business location (Barrell and Pain, 1997). The other

[9] The aggregate EU figures are for the twelve member states as of 1994; they therefore include data for Greece, Spain and Portugal prior to their accession into the EU.

[10] Pain (1997) and Barrell and Pain (1997) provide a more detailed discussion of trends in FDI in Europe.

[11] Although German FDI in Ireland is not inconsiderable, the majority of investments are classified as non-manufacturing ones in the German data.

marked change over our sample period lies in the share of UK investments located in the Netherlands, with a third of all intra-EU investment located there by 1992.

IV.2 The Basic Empirical Model

The long-run form of the general model we use can be summarised as:

$$\ln(FDI_{jt}) = a_j + a_1\ln(Y_{jt}) + a_2\ln(REL_{jt}) + a_3\ln(RELC_{j,t-1}) + a_4\ln(TAX_{j,t-1}) + a_5\ln(INN_{t-1}) + a_6F_{t-1} + a_7DEU_{jt} + a_8\ln(FDI_{j,t-1}) + v_{jt} \quad \textbf{(10)}$$

where FDI_{jt} denotes the stock of FDI in country *j* at time *t*, Y is a measure of market size, REL denotes relative home-host country labour costs, RELC denotes the relative home-host country user cost of capital, defined from the perspective of a home country investor (see appendix), TAX is the tax competitiveness of country *i* from the perspective of a firm from the home country, INN is a measure of the 'stock' of innovation in the home country, F is a corporate financial indicator[12] and DEU is a dummy to allow for host country EU membership. The country specific fixed effects a_j allow for unobserved influences that remain constant over time. All other influences will be contained in the disturbance term v_{jt}.[13]

We allow for dynamic adjustment towards this long run solution by estimating equations in partial adjustment form. The existence of a lagged dependent variable induces small sample bias into panel estimates produced using OLS, so that an instrumental variable estimator has to be employed. There are a number of potential instruments that can be used for the lagged dependent variable. In this paper we employ the rank order of the lagged dependent variable (Durbin, 1954). This latter instrument is clearly strongly correlated with the variable being instrumented, but has been 'cleaned' of the lagged disturbance term.[14]

We use constructed data on the stock of direct investment at constant prices. This was obtained by deflating the nominal (dollar) value of the FDI stock by the national GDP deflator of each panel member. For the UK we have annual data from 1978 to 1992, and for

[12] It is clear that some allowance should be made for the possible influence of financial conditions on the timing of investment expenditure. Existing studies of corporate fixed investment within the UK, Germany and elsewhere suggest that expenditure may be affected by financial conditions (Young, 1993; Carlin, 1994). There is some existing evidence that the timing of foreign investment is also influenced by financial conditions in the home economy from the empirical results obtained by Pain (1997), Barrell and Pain (1997 and 1998a,b). Here we explore the influence of two measures, corporate interest gearing and corporate net debt.

[13] For Germany **(10)** is augmented by one additional dummy variable. This is equal to (-1,1) for the United States in 1977 and 1978 to capture outliers in the recorded data in those years.

[14] The rank order may be a weak instrument if there is substantial measurement error present in the instrumented variable and, hence, in the associated rank order. There are a number of alternative estimators available, but most would force us to estimate an equation for the investment flow rather than the investment stock as first differences of the data would have to be employed.

Germany we have annual data from 1977 to 1992. The sample is truncated at this point to avoid possible structural change, whether from increased investment in Eastern Europe, or from higher investment in the former East Germany. With eleven separate country groupings there is a total sample size of 165 observations for the UK and 176 observations for Germany.

Demand effects are captured through market size in the host region, measured by real GDP in dollar terms. For each member of the EU we use total EU GDP, reflecting a belief that investments in these localities are primarily intended to service the wider regional market (Pain, 1993). For the other European countries we use GDP in EFTA. Labour costs are proxied by unit labour cost data converted into a common currency. This provides a measure of the real bilateral exchange rate. Unit costs are used so as to allow for differentials in productivity as well as wages and payroll taxes. Most of the main explanatory variables are in natural logarithms, allowing direct estimates of their elasticities. A number of variables are lagged to avoid possible simultaneity.

Section V. Empirical Results

V.1 Econometric Estimates

The empirical results for the UK and Germany are summarised in Tables 5 and 6 respectively. We begin by estimating a conventional fixed effects panel model with common slope parameters imposed across all host locations, and then subsequently examine whether there is evidence of any differential effects between regions. The first column of Table 5 (labelled (5.1)) reports the coefficients obtained for the basic model **(10)** for the UK. This suggests that it is possible to obtain a parsimonious, economically coherent model for the pattern of FDI by UK firms over the period from 1978, with the pattern of FDI being driven by cost and tax competitiveness as well as by market size and firm-specific competitive advantages. There are significant effects from both host region output and patents, in line with the results in Pain (1997). The tax competitiveness term is also well determined. We also obtain a significant effect from relative unit labour costs, although the coefficient is somewhat smaller than for the tax competitiveness term. The relative user cost of capital term is not significant, but has a coefficient close to that on the relative labour cost term, and the restriction that the two have a common coefficient can readily be imposed [Chi(1)=0.01].

The corporate gearing measure appears to have a significant impact on the investment decisions of UK firms, as in Pain (1997), with a rise in interest gearing leading to a reduction in investment. Over our sample period the main variation in this measure occurred at the end of the 1980s, when domestic interest rates rose sharply. This term should be seen primarily as an indicator of the extent to which changes in domestic financial conditions affect the timing and the size of the flow of direct investment. As the gearing ratio would not be expected to trend permanently over time, it cannot be the primary factor behind the continuing upward trend in the stock of investment.[15]

The interest gearing measure is better determined than an alternative measure based on the net debt of UK industrial and commercial companies. This is shown in (5.2), denoted ND. Whilst this variable also has a negative effect, it is not significant. There is a rise in the coefficients on the output and innovation terms, possibly because some of the drop in expenditure that occurred during the cyclical downturn in the (world) economy is now being captured by these terms. There is little change in the size and significance of the remaining terms in tax competitiveness and relative costs.

We impose equal coefficients on relative labour and capital costs in (5.3). The resulting term is significant, with an implied long-run elasticity of 0.95 per cent, suggesting that investment

[15] The interest gearing term may also partially reflect the choice as to the means by which foreign investment is financed. Foreign investment financed by borrowing from third parties overseas will not be included in the FDI data. Hence a rise in interest gearing arising from high domestic interest rates may lead to a reduction in the share of foreign investment undertaken by means of FDI.

is partly driven by a desire to relocate to lower-cost sites and is influenced by bilateral differences in national taxes on both labour and capital. Competition with third countries also appears to be of importance for potential hosts, with the tax competitiveness term having a long-run elasticity of 2.5 per cent. We discuss the interpretation of these results in greater detail below. In contrast, a separate, equivalent term in unit labour costs was not significant when added to (5.3), with an estimated coefficient of -0.08 (standard error 0.15). An additional term in the relative factor price in the host economy was also found to be insignificant when added to (5.3), with an estimated coefficient of 0.08 (standard error 0.15). This suggests that factor substitution within the host country is not a particularly important determinant of the investment decisions of manufacturing firms. Output and the 'stock' of firm-specific assets appear to be the main factors accounting for the rising level of FDI over time, with respective long-run elasticities of 2.87 per cent (standard error 0.78 per cent) and 1.13 per cent (standard error 0.57 per cent).

The test statistics at the foot of the table indicate that the imposition of common intercepts is rejected by the data, implying the existence of significant country-specific fixed effects. The test denoted S1 indicates the absence of first-order serial correlation over time. The included variables appear to capture time effects as separate time dummies were jointly insignificant.[16]

Finally, the statistical adequacy of (5.3) was investigated by computing 'mean-group' parameter estimates. It is well-known that biases may arise in dynamic panels with slope homogeneity if there is significant, unmodelled, heterogeneity across sectors (Pesaran and Smith, 1995). If sufficient observations are available consistent estimates of the long-run parameters can be obtained from an average of the parameters from separate regressions for each panel member. Such an estimator is consistent under both the null of parameter homogeneity as well as the alternative of heterogeneity, whereas the fixed effects estimator is only consistent under the null. It proved possible to impose jointly the long-run mean-group parameters for output, innovation, costs, taxes and interest gearing in the panel regression (5.3), suggesting that there is little evidence of significant bias from heterogeneity in the reported long-run elasticities.

The results for German investment are reported in Table 6. The basic pattern of the results is in line with those for the UK, with FDI found to be affected by output, innovation, relative costs and a measure of financial constraints. Again it proved possible to impose a common parameter on relative labour and capital costs [Chi(1)=0.23], with the relative user cost of capital being insignificant when freely estimated. There are two important differences with the estimates obtained for the UK; the tax competitiveness term is insignificant, although correctly signed, and financial constraints appear to be better captured by the net corporate

[16] As we allow for fixed effects and have included two variables that vary over time, but not across panel members, we could only include (n-3=12) separate time dummies.

debt measure than by interest gearing. In both cases, the magnitude of the estimated effects is smaller than for UK investment.

The dummy variable for host country membership of the EU is not a significant determinant of German investment, although a positive coefficient is obtained. This variable is set to one if a particular host country is an EU member. Over our sample period all countries have either been continuously in the EU or outside it, with the exception of Spain, which joined in 1986. Hence one interpretation of our findings is that the level of manufacturing investment in Spain was raised, but not significantly so, by accession into the EU. A similar picture is apparent from Table 5 for UK investment.

Our preferred model for German FDI is shown as (6.3), with output and innovation elasticities close to unity and a labour cost elasticity of 0.25 per cent. These results are broadly in line with the findings reported in Barrell and Pain (1997), suggesting that the separate tax competitiveness term, which was excluded from their model, is orthogonal to the remaining regressors. The tax term is not significant, and the implied long-run effect is considerably smaller than for the UK, with an elasticity of 0.37 per cent. A separate term in the labour cost of the host economy relative to other potential hosts was not significant when added to (6.3), with an incorrectly signed coefficient of 0.04 (standard error 0.08). As we found for the UK a separate term in the relative factor price within the host economy was also insignificant, with a coefficient of -0.001 (standard error 0.05).

The tests reported at the foot of (6.3) indicate that the imposition of common intercepts is rejected by the data, implying the existence of significant country-specific fixed effects. There is no significant evidence of first-order serial correlation and separate time dummies were jointly insignificant when added to the equation. However attempts at imposing the non-linear restrictions required to yield the long-run parameters from the mean-group estimates were marginally rejected, with the principle difference arising between the estimates of the long-run output elasticity.

Inspection of the individual regressions suggested that a degree of regional heterogeneity might be present, with the higher output coefficient (and elasticity) largely arising from the estimates for countries within the EU. Over our sample period the panel members can be classified as EU member states, other Western European economies (Austria and Sweden) and other developed economies outside the EU region (the US, Japan and Australia). To investigate whether the inclusion of these divergent locations leads to heterogeneity we re-estimated (5.3) and (6.3) allowing for separate parameters on costs, taxes, financial indicators, R&D, output and the lagged dependent variable in each of the three distinct

country blocs. In effect this decouples the three regions within the panel, although this is unavoidable if we are to test for common slope parameters.[17]

In Table 7 we report the results of imposing the restrictions required to give common slope coefficients between the particular regional groups. The restrictions required to return to a single set of slope parameters common to all panel members are accepted at conventional significance levels for the UK, but rejected for Germany. The subsequent pairwise comparisons for German investment are somewhat inconclusive as to where this difference arises from, although the sharpest differences appear to be between locations within the EU and locations elsewhere in Europe.[18] This finding is consistent with the notion that membership of a customs union has differential effects from membership of a free trade area, although the differences between the EU members and the other European countries are only significant at the 10 per cent level. A related finding is also obtained by Barrell, Pain and Young (1996) in a study of the determinants of labour demand in a number of European economies. Their results indicate that demand within the OECD is the key determinant of UK employment, whereas demand within Europe is the driving factor for employment in Germany. Taken together these results suggest that the greater importance of the European market for German producers has a significant effect on the determinants of expenditure by German firms.

An illustrative regression allowing for differential parameters between EU and all non-EU locations yielded some results of interest. The lower panel of Table 7, reports the coefficients obtained on the tax competitiveness terms. For both the UK and Germany, the tax competitiveness terms were significant for the EU locations, but insignificant for locations outside the EU. This suggests that European firms seeking to invest within the EU may be more concerned with the competitiveness of different locations within the EU than with the relative competitiveness of locations within the EU and outside it. However it is important to note that it is also not possible to reject the restrictions required to impose equal coefficients in both sets of locations. Nonetheless it would obviously be of interest to explore this finding in greater detail in any subsequent work, as it suggests that tax harmonisation may be a more pressing issue within Europe than outside it.

[17] With only 15 or 16 annual observations per country, the use of panel estimation techniques could still be expected to result in more efficient parameter estimates than the alternative of estimating separate single country or regional equations.

[18] One extension of this approach would be to test for the presence of heterogeniety within the EU member states. However with only 16 observations per location and the need to estimate 7 or 8 parameters for each, the power of the subsequent hypothesis tests would not be particularly high.

V.2 How Important Are Tax Effects?

The estimated equations may be used to evaluate the effect of changes in tax rates on the amount of FDI by UK and German firms in other countries. This provides an estimate of the return to these countries, in terms of extra FDI, of changing their tax system. Our estimates suggest that there are two routes by which FDI in a country is potentially affected by rates of tax in that country: through tax competitiveness and through the effects of tax on the user cost of capital. Focusing on the long run relationship between FDI and tax we have:

$$\ln FDI_i^j = k + \alpha_i \ln \frac{(1-\tau_i^j)}{(1-\tau_i^a)} + \beta_i \ln \frac{(1-\gamma_i \tau_i^r)/(1-\tau_i^r)}{(1-\gamma_j \tau_j^r)/(1-\tau_j^r)} \quad i = UK, GERMANY \qquad \textbf{(11)}$$

where *k* includes all the influences on FDI from **(10)** not explicitly identified here, and the *TAX* and *RELC* variables are now written out in full. The parameter α_i is the estimated long run elasticity of FDI with respect to tax competitiveness [a_{2i} / (1-a_{8i})] and β_i is the elasticity with respect to relative user costs [a_{3i} / (1-a_{8i})].

By differentiation, it is possible to show the response of FDI by UK and German firms to various parameters of the host country tax system. We consider changes in the rate of capital allowances and the corporate tax rate on retentions and distributions separately as if all countries operated a split rate system. The (semi) elasticities are:

$$\frac{\partial \log FDI_i^j}{\partial \tau_j^r} \approx -\alpha_i \frac{\partial \tau_i^j}{\partial \tau_j^r} - \beta_i (1-\gamma_j) \qquad \textbf{(12a)}$$

$$\frac{\partial \log FDI_i^j}{\partial \tau_j^d} \approx -\alpha_i \frac{\partial \tau_i^j}{\partial \tau_j^d} \qquad \textbf{(12b)}$$

$$\frac{\partial \log FDI_i^j}{\partial \gamma_j} \approx \beta_i \tau_j^r \qquad \textbf{(12c)}$$

Changes in the present value of capital allowances affect FDI through their effect on the user cost of capital. Their influence (by **(12c)**) depends on the level of the corporate tax rate: a given change in allowances has less influence on the user cost of capital at low rates than it does at high rates. A one percentage point increase in the value of allowances in a country where tax rates are about 40 per cent would raise the stock of FDI in that country from the UK by about 0.38 per cent (0.4×0.95) and from Germany by about 0.1 per cent (0.4×0.25).

The effect of changes in the tax rate on retentions and distributions depends on the extent to which the overall tax rate on profits to UK and German firms is affected by these changes. For simplicity, suppose that there are no withholding taxes and foreign firms are not eligible for imputation credits. Then by equations **(7)** to **(9)**:

$$\tau^{j}_{GER} = \tau^{jd}$$

$$\tau^{j}_{UK} = \tau^{jd} \quad if \quad \tau^{jd} \geq \tau^{UKr}$$

$$= \tau^{UKr} \quad otherwise.$$

Thus a country which operates a split rate system and reduces its tax rate on distributions by one percentage point will succeed in reducing the overall rate paid by German firms by the same amount but will not affect the rate paid by UK firms unless the initial tax rate is greater than the UK corporate tax rate. Supposing that this is the case, then a one percentage point reduction in the tax rate on distributions raises the stock of FDI in that country from the UK by about 2.5 per cent and from Germany by about 0.4 per cent.

A change in the tax rate on retentions affects FDI through its impact on the user cost of capital and through any effect it has on international tax competitiveness. For countries which operate a split rate system and change the rate on retentions at a given rate on distributions, the former effect only is operative. Its effectiveness (by **(12a)**) depends on the present value of capital allowances. Under a neutral corporate tax system ($\gamma = 1$), changes in the retention rate have no effect on the user cost of capital and therefore no influence on FDI through this channel. But at more common values of the present value of allowances on a unit of capital, of say 0.75, our estimates indicate that a one percentage point reduction in the tax rate on retentions would raise the stock of FDI in that country from the UK by about 0.2 per cent (0.25×0.95) and from Germany by under 0.1 per cent (0.25×0.25).

For countries which do not operate a split rate system, a change in the corporate tax rate has an additional effect on tax competitiveness provided that it affects the overall tax rate on profits. The cut in the foreign rate will feed through to all German firms, but will only do so for UK firms if the rate is initially higher than that in the UK. Assuming this to be the case, the overall effect of a one percentage point cut in the corporate tax rate would be to raise the stock of FDI by UK firms by 2.7 per cent (2.5+0.25×0.95) and by German firms by 0.5 per cent (0.4+0.25×0.25).

Thus our estimates suggest the effect of changes in the tax system on FDI will differ from country to country, with potentially a larger response from UK firms than German firms. But the effects will also depend on a number of features of the tax system. In particular, it is possible that UK firms will not respond at all. The closer the tax system is to neutrality, the smaller is the response of the user cost of capital to changes in tax rates. In a neutral tax system there will be no response. Further, while changes in host country tax rates affect the incentives of firms from countries which exempt foreign source income from domestic taxes, this may not be the case with respect to firms from countries like the UK who operate a credit system. In that case, cuts in host country tax rates below that prevailing at home will have no

effect on the incentives of those firms, since the benefits of those lower rates will accrue to the home tax authorities rather than the firms themselves.

It is also possible to evaluate the effects of changes in home country taxation on outward FDI by the UK and Germany. The effects of changes in the tax rate on retained profits and capital allowances which work through the relative user cost of capital are symmetric to the effects of these changes by the host country. But the effects of changes in the tax rate on distributed profits, working through the tax competitiveness terms, are more complex. For German firms this improves the competitiveness of Germany as a location for investment, but the effect on German FDI to any one country will be weighted by Germany's importance as an alternative location for such investments. As a consequence, the effect of a tax change by the home country is expected to be considerably smaller then the effect of a tax change by the host. A similar effect is also true of changes in tax rates by the UK government, except that a reduction in the UK corporate tax rate will also improve the attraction of locations which have corporate tax rates below those prevailing in the UK. Because of the credit system, the rate paid by UK firms on profits earned in those countries which have tax rates below that in the UK will fall as the UK rate falls. Depending on the number of countries so affected, this could lead to a rise in UK FDI to them as the UK corporate tax rate falls. The example of Italy is discussed below. This effect emphasises the importance of taking account of the complications present in the international tax system in evaluating the effects of tax changes.

V.3 Assessing The Impact Of Changes In Costs On Inward Investment

The estimated equations can also be used to calculate the effects of actual changes in costs and taxes on the level of outward investment from the UK and Germany over the sample period. Taking the tax competitiveness terms as an example, the reported regressions for both UK and Germany can be expressed as:

$$\ln(FDI)_{ijt} = K + \alpha_8 \ln(FDI)_{ijt-1} + \alpha_4 \ln(TAX)_{ijt-1} \qquad \textbf{(13)}$$

Any quantitative evaluation of the estimated impact of the impact of changes in the competitiveness of particular host countries has to take account of the presence of the lagged dependent variable (Pain, 1997). At any given period the overall implied direct effect of tax competitiveness on the stock of direct investment in a particular location can be calculated from the regression coefficients using:

$$TAX\ EFFECT = \alpha_4 \sum_{k=1}^{n} \alpha_8^{(k-1)} \qquad \textbf{(14)}$$

where *n* denotes the number of periods over which the impact of taxes are assessed. Our illustrative calculations shown below set n=5, and use coefficients from equations (5.3) and (6.3). We compute the extent to which changes in tax competitiveness, and relative labour and capital costs changed the stock of inward FDI between 1984 and 1988 and between 1988

and 1992. Because of the use of a distributed lag, our estimates for changes between, say, 1984 and 1988 reflect the extent to which a weighted average of changes in tax competitiveness from 1983 to 1987 changed the stock of direct investment between 1984 and 1988.

Results for UK investment are summarised in the upper panel of Table 8, with results for Germany in the lower panel. Taking the Netherlands as an example, our calculations show that movements in relative labour costs between 1984 and 1988 reduced the stock of inward investment from the UK by 2.2 per cent. This was more than offset by movements in the relative user cost of capital, which raised the stock of inward investment by 9.4 per cent. A further boost arose from an improvement in tax competitiveness, which acted to raise the stock of inward investment by 6 per cent. Over the second sub-sample, all three factors acted to raise the level of investment in the Netherlands by UK firms. We also include changes in employers tax rates as a memorandum item in the final column of Table 8. This allows us to assess the extent to which observed changes in unit labour costs between the host and the home country can be accounted for by changes in the relative (average) employers tax rates.[19] For the Netherlands it can be seen that around half of the turnaround in the pattern of relative unit labour costs in the two subsamples can be accounted for by changes in the relative rate of employers' non wage and salary payments. This largely reflects the reforms made to the social security system in the Netherlands from 1990.

For the UK, movements in relative labour costs acted as a disincentive to foreign investment in most of the countries over the two sub-samples. This is particularly true of Germany and Italy. In contrast, movements in relative labour costs acted to stimulate investment in the United States, particularly between 1988 and 1992. This partially reflects the extent to which the sterling-dollar real exchange rate rose during UK membership of the ERM from 1990 to 1992.

For the user cost of capital, tax changes largely served to stimulate outward investment from the UK in both sub-samples, reflecting the decline in the relative value of capital allowances in the UK after the 1984 reform of corporation tax. In contrast mixed results are obtained from movements in tax competitiveness, with a significant stimulus arising in Italy in the first sub-sample and in Sweden and the United States in the second sub-sample. The Italian figures reflect the extent to which the tax competitiveness of Italy improved, from the perspective of a UK firm, following the UK tax changes in 1984. This is because Italy already had a relatively low rate of tax, whereas many other locations became uncompetitive once the UK lowered its own rate. Developments in Sweden and the US reflect the improvements in competitiveness arising from their own tax reforms in 1989 and 1986 respectively. In contrast

[19] These are defined as $(1+t_e) = 1 + [(\text{Compensation - Wages and salaries})/\text{Wages and salaries}]$.

the tax competitiveness of Germany, and to a lesser extent France, declined over both sub-samples.

For Germany the calculated effects are generally smaller than for the UK, reflecting both the lower elasticities in the model as well as the fact that developments in many continental European locations were similar to those in Germany. Looking at incentives to invest in the UK, a sharp positive stimulus was initially provided by the improvement in the tax competitiveness of the UK after 1984. However this was subsequently offset after 1988 as a number of other countries lowered their tax rates. The UK also benefited considerably from an improvement in labour costs over the first sub-sample, but less so between 1988 and 1992 when sterling and the D-mark were more closely linked. The impact of the depreciation of the US after 1985 is also readily apparent in the table. The impact of changes in relative rates of employers social security taxes appears small, although it is of interest to note that this affect stimulated inward investment in the UK and the Netherlands.

Changes in tax competitiveness generally have a small impact on German investment and this may reflect the relatively high rate of taxation in Germany itself. In contrast to the UK results, German investment in Italy appears to have been reduced as a result of movements in tax competitiveness. This arises because the reductions in UK taxes in 1984 reduced the relative competitiveness of Italy from the perspective of German investors.

Section VI. Conclusions

The main finding of this paper is that there is some evidence of a statistically significant relationship between the amount and destination of FDI undertaken by UK and German firms and a measure of tax competitiveness which takes account of corporate taxes, withholding taxes and the taxation of foreign source income. This evidence is obtained using a model which also allows for the effect of market size, relative production costs, corporate financial constraints and the influence of firm-specific assets. The significance of relative unit labour costs implies that the relative level of national social security taxes may also affect location choice.

These results raise the possibility that individual countries might be tempted to try and compete with other countries to attract foreign firms to their own country, and suggests that further work on the potential for deleterious tax competition within the European single market is called for. However, the extent to which they might be able to benefit from domestic tax changes is dependent on the extent of their influence on the taxes paid by overseas firms.

The German approach to the corporate taxation of foreign source income (exemption) is such that tax reductions by foreign governments have a one-for-one effect on the tax rate paid by German firms who are located in those countries. In contrast, the UK approach (partial credit) means that reductions in foreign tax rates only affect the rate paid by UK firms to the extent that the foreign rate (including withholding taxes) is higher initially than the UK rate. If this were not the case, then the reduction in overseas rates would have no effect on the rate of tax paid by UK firms there as the UK tax rate on foreign source income would adjust to ensure that UK firms paid the same rate of tax on profits as they pay at home.

The implication is that while there does seem to be a significant effect of tax competitiveness on the location of FDI, it may not be straightforward for governments to influence their national tax competitiveness. This may restrict their attempts to undercut their neighbours and therefore limit the extent of corporate tax competition. However similar considerations do not necessarily apply to other forms of business taxation, notably the burdens imposed by social security taxes. What matters here is the extent to which changes in non-wage costs are offset by changes in wage costs in the wage bargain between employers and employees. For some governments, particularly in continental Europe, it may prove more efficacious to pursue competitiveness by lowering the costs imposed to finance their welfare systems.

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Table 1 Overall Tax Rates on Profits Earned by UK Manufacturing Firms (per cent)

Country:	*1970*	*1974*	*1978*	*1982*	*1986*	*1990*
Australia	54	52	53	53	53	47
Austria	44	53	53	53	43	43
Belgium	42	52	52	52	48	44
France	52	52	52	52	48	45
Germany	46	53	54	54	54	53
Ireland	58	52	52	52	35	34
Italy	39	54	54	54	35	34
Japan	49	52	52	52	52	54
Netherlands	49	52	52	52	45	38
Spain	39	50	51	50	41	41
Sweden	52	54	55	57	57	34
UK	40	52	52	52	35	34
US	54	54	54	53	53	42
Overall Average	*50*	*53*	*53*	*53*	*50*	*44*

Table 2 Overall Tax Rates on Profits Earned by German Manufacturing Firms

per cent

Country:	*1970*	*1974*	*1978*	*1982*	*1986*	*1990*
Australia	54	52	53	53	53	47
Austria	57	56	56	56	56	52
Belgium	47	50	55	52	52	49
France	50	50	50	50	45	42
Germany	59	59	62	62	62	57
Ireland	58	50	45	10	10	10
Italy	58	58	52	52	59	59
Japan	49	50	50	52	52	55
Netherlands	46	48	48	48	42	35
Spain	39	39	44	42	43	43
Sweden	54	57	57	59	59	33
UK	40	52	52	52	35	34
US	56	56	56	55	55	45
Overall Average	*53*	*54*	*54*	*54*	*53*	*47*

Table 3. The Geographical Pattern of UK Manufacturing Foreign Direct Investment

(per cent of total stock)

	1978	1981	1984	1987	1991	1992
EU	**25.7**	**21.6**	**17.8**	**27.3**	**32.0**	**33.2**
Belgium	2.5	1.2	1.2	1.4	2.2	3.0
France	3.6	3.6	2.9	3.7	4.6	3.9
Germany	9.4	7.4	4.9	6.0	5.8	5.5
Ireland	3.3	3.0	1.8	2.0	2.7	2.5
Italy	1.7	1.7	1.6	2.8	3.6	2.9
Netherlands	3.0	2.9	3.6	7.7	8.5	11.1
Spain	1.1	1.0	1.2	2.1	3.3	2.6
EFTA	**2.2**	**1.6**	**2.6**	**1.8**	**1.7**	**1.9**
North America	**30.7**	**39.3**	**44.6**	**43.5**	**46.0**	**42.8**
United States	23.8	32.2	35.1	37.9	41.7	37.4
Other Developed(1)	**24.0**	**20.9**	**20.5**	**14.8**	**8.7**	**9.1**
Rest of the World	**17.5**	**16.5**	**14.4**	**12.6**	**11.5**	**13.1**

Notes: (1) South Africa, Australia, New Zealand and Japan
Source: Business Monitor MA4, various issues.

Table 4. The Geographical Pattern of German Manufacturing Foreign Direct Investment

(per cent of total stock)

	1978	1981	1984	1987	1991	1992
EU	**32.2**	**29.9**	**28.8**	**34.5**	**41.6**	**39.7**
Belgium	6.8	5.0	5.0	5.4	6.7	6.8
France	9.5	8.4	6.9	8.2	9.0	9.5
Italy	2.7	2.5	3.0	4.2	4.9	4.4
Netherlands	3.3	2.8	2.9	3.1	3.1	2.9
Spain	5.4	6.5	5.7	7.7	9.2	7.7
United Kingdom	2.2	2.2	3.0	3.6	5.9	5.3
EFTA	**10.0**	**8.4**	**7.8**	**9.1**	**8.6**	**9.1**
Austria	4.7	3.8	3.5	4.3	4.8	5.1
North America	**28.3**	**32.8**	**36.4**	**33.4**	**29.3**	**28.5**
United States	27.0	31.3	34.5	31.9	26.8	25.7
Other Developed	**4.3**	**5.3**	**5.3**	**4.8**	**4.6**	**4.5**
Rest of the World	**25.2**	**23.6**	**21.7**	**18.2**	**15.9**	**18.2**

Source: Deutsche Bundesbank

Table 5. The Determinants of UK FDI

Dependent Variable: $\ln(FDI)_{j,t}$ **Sample Period:** 1978-1992

	(5.1)	**(5.2)**	**(5.3)**
$\ln(FDI)_{j,t-1}$	0.7661 (12.7)	0.7444 (12.1)	0.7655 (12.4)
$\ln(Y)_{j,t}$	0.6797 (4.0)	0.8378 (3.4)	0.6744 (4.0)
$\ln(REL)_{j,t}$	0.2246 (2.3)	0.2027 (2.0)	
$\ln(RELC)_{j,t-1}$	0.2045 (1.2)	0.2327 (1.4)	
$\ln(REL)_{j,t} + \ln(RELC)_{j,t-1}$			0.2218 (2.4)
$\ln(TAX)_{j,t-1}$	0.5955 (3.3)	0.5352 (2.7)	0.5931 (3.2)
$\ln(INN)_{t-1}$	0.2689 (2.0)	0.3957 (2.0)	0.2647 (2.1)
INT_{t-1}	-0.8582 (3.3)		-0.8519 (3.2)
$\ln(ND)_{t-1}$		-0.1703 (1.4)	
$DEU_{j,t}$	0.0991 (1.6)	0.1191 (2.0)	0.0990 (1.6)
$\bar{R}^2$	0.9817	0.9811	0.9818
Standard Error	0.1566	0.1593	0.1560
Fixed Effects	Chi(10)=31.00*	Chi(10)=32.44*	Chi(10)=31.54*
S1	Chi(1)=0.25	Chi(1)=1.93	Chi(1)=0.27
Time Dummies			Chi(12)=10.51
Mean Group			Chi(5)=9.19
Elasticities (standard errors in parentheses)			
Output			2.87 (0.78)
Relative Costs			0.95 (0.42)
Tax			2.53 (0.87)
Innovation			1.13 (0.57)

Notes: Fixed Effects, S1 and Time Dummies are tests for fixed effects, first-order serial correlation and time dummies respectively. Heteroscedastic consistent t-statistics in parentheses.

Table 6. The Determinants of German FDI

Dependent Variable: $\ln(FDI)_{j,t}$ **Sample Period:** 1977-1992

	(6.1)	**(6.2)**	**(6.3)**
$\ln(FDI)_{j,t-1}$	0.4284 (4.2)	0.4287 (4.1)	0.4333 (4.7)
$\ln(Y)_{j,t}$	0.7503 (1.8)	0.7540 (2.0)	0.7438 (2.1)
$\ln(REL)_{j,t}$	0.1428 (4.2)	0.1429 (4.2)	
$\ln(RELC)_{j,t-1}$	-0.0308 (0.1)	0.0676 (0.1)	
$\ln(REL)_{j,t} + \ln(RELC)_{j,t-1}$			0.1444 (4.6)
$\ln(TAX)_{j,t-1}$	0.2294 (1.5)	0.2174 (1.4)	0.2110 (1.5)
$\ln(INN)_{t-1}$	0.5251 (2.5)	0.5244 (2.6)	0.5327 (2.7)
INT_{t-1}	-0.1781 (1.5)		
$\ln(ND)_{t-1}$		-0.1224 (2.0)	-0.1211 (2.0)
$DEU_{j,t}$	0.0590 (1.6)	0.0636 (1.3)	0.0619 (1.0)
$\bar{R}^2$	0.9870	0.9870	0.9870
Standard Error	0.1187	0.1184	0.1183
Fixed Effects	Chi(10)=63.46*	Chi(10)=61.02*	Chi(10)=67.15*
S1	Chi(1)=2.46	Chi(1)=3.15	Chi(1)=1.90
Time Dummies			Chi(13)=17.13
Mean Group			Chi(5)=12.02*
Elasticities (standard errors in parentheses)			
Output			1.31 (0.58)
Relative Costs			0.25 (0.10)
Tax			0.37 (0.26)
Innovation			0.94 (0.34)

Notes: Fixed Effects, S1 and Time Dummies are tests for fixed effects, first-order serial correlation and time dummies respectively. Heteroscedastic consistent t-statistics in parentheses.

Table 7 Testing For Differential Regional Effects

Regions With Common Parameters	**Test Of Restrictions**	
	UK	**Germany**
EU Other Europe Non-Europe	Chi(12)=14.07	Chi(12)=22.06*
EU Other Europe	Chi(6)=8.45	Chi(6)=12.28
EU Non-Europe	Chi(6)=7.00	Chi(6)=11.01
Other Europe Non-Europe	Chi(6)=2.78	Chi(6)=8.29
Tax Competitiveness Effects: EU and Non-EU		
Impact: EU Non-EU Test of Equal coefficients	0.78 (2.6) 0.48 (1.7) Chi(1)=0.98	0.37 (2.1) 0.29 (0.9) Chi(1)=0.07
Long-run: EU Non-EU Test of equal coefficients	3.71 (2.6) 1.63 (1.8) Chi(1)=1.47	0.55 (2.3) 0.42 (0.9) Chi(1)=0.08

Table 8. Assessing The Impact of Costs And Taxes On Inward FDI

(percentage change in FDI stock)

		Contributory Factor, UK FDI			*Memorandum*
		Labour Costs	Capital Costs	Relative Taxes	*Labour Taxes*
Netherlands	1988/1984	-2.2	9.4	6.0	*-0.5*
	1992/1988	0.7	5.1	6.5	*1.0*
Belgium	1988/1984	2.0	8.1	0.1	*-3.7*
	1992/1988	-2.9	-2.0	-5.9	*-2.5*
France	1988/1984	-4.7	9.6	-2.1	*-2.0*
	1992/1988	0.8	7.1	-0.9	*-0.9*
Germany	1988/1984	-10.8	10.3	-12.1	*-1.3*
	1992/1988	-6.0	3.2	-17.3	*-0.8*
Italy	1988/1984	-6.8	2.9	39.9	*-1.5*
	1992/1988	-5.2	0.4	2.7	*-2.2*
Sweden	1988/1984	-3.9	8.2	-14.6	*-0.4*
	1992/1988	-6.3	9.5	27.0	*-1.6*
USA	1988/1984	2.2	7.0	-6.0	*-0.6*
	1992/1988	15.3	5.5	11.9	*-1.2*

		Contributory Factors, German FDI			*Memorandum*
		Labour Costs	Capital Costs	Relative Taxes	*Labour Taxes*
Netherlands	1988/1984	2.7	-0.1	-0.1	*0.3*
	1992/1988	2.1	0.6	0.6	*0.6*
Belgium	1988/1984	2.9	-0.5	-1.3	*-1.1*
	1992/1988	1.4	-2.4	-0.2	*-0.2*
France	1988/1984	3.0	0.0	1.3	*-0.2*
	1992/1988	2.7	1.0	-0.7	*0.1*
UK	1988/1984	6.1	-1.7	7.8	*0.5*
	1992/1988	1.4	0.3	-1.8	*0.2*
Italy	1988/1984	3.6	-1.1	-5.8	*-0.2*
	1992/1988	-0.7	-0.5	-3.7	*-0.5*
Sweden	1988/1984	1.9	0.0	-1.7	*0.3*
	1992/1988	0.3	1.6	11.9	*-0.4*
USA	1988/1984	11.2	-2.5	0.7	*0.3*
	1992/1988	5.5	-0.2	2.4	*-0.3*

Appendix

This appendix describes the way in which corporate and other taxes impinge on company behaviour. We assume that all companies which set up businesses outside their own countries do so by means of wholly-owned subsidiaries[20] and that the objective of the firm is to maximise the wealth of its shareholders, assumed to be resident in the same country as the firm, by maximising the value of its equity. We make the additional simplifying assumptions that there is complete certainty about the future and that the equilibrium value of equity is determined by the arbitraging activities of the marginal investor, *m*. Thus the equity valuation formula is:

$$E_t = \frac{(1-\tau^p) D^h_{t+1} + E_{t+1} - E^N_{t+1}}{1+R_t} \qquad \textbf{(A.1)}$$

where E_t is the total value of the equity of the firm at time *t*, D^h is the total dividend paid by the parent *gross* of any imputation credits, E^N is the value of new equity issued after date *t*. The superscript '*h*' refers to payments in the home country and the superscript '*a*' refers to payments from the subsidiary established abroad. The equity valuation formula is similar to that in the absence of taxes except that dividends are weighted by a term reflecting the relative taxation of dividend income and capital gains. The weight on dividends is

$$\left(1-\tau^p\right) = \frac{\left(1-\tau^m\right)}{\left(1-g^m\right)} \qquad \textbf{(A.2)}$$

where τ^m is the personal tax rate on interest and dividend income, g^m is the rate of capital gains tax, which is assumed to be levied on an indexed base, and the discount rate is given by

$$R_t = \frac{(1-\tau^m) r_t - g^m \pi_t}{(1-g^m)} \qquad \textbf{(A.3)}$$

where r_t is the nominal interest rate, and π_t is the rate of inflation allowed for indexation purposes.

Dividend distributions from the parent company to shareholders (including any imputation credits) can be written as:

$$D^h_{t+1} = Z^h_{t+1} + L^h_{t+1} - (1+r_t) L^h_t - P^{Ih}_{t+1} I^h_{t+1} + E^N_{t+1} - E^{Na}_{t+1} + (1-\tau^*) D^a_{t+1} - T^h_{t+1} \qquad \textbf{(A.4)}$$

[20] The alternative is to establish overseas branches. The tax treatment of the two types of establishment is not the same and may encourage a preference for one form or the other. The reason for focussing on subsidiaries is that this is the predominant means of establishing a business overseas, see Alworth (1988).

where Z^h is the gross revenue generated by the parent company net of labour and other non-capital costs, L^h is the stock of debt owed by the parent, I^h is gross investment, P^{Ih} is the gross price of investment goods and T^h is the total tax paid by the parent on domestic source income. There are assumed to be two possible financial flows between the parent and subsidiary: purchases of all new equity issued by the subsidiary and dividend payments from the subsidiary to the parent. All financial flows are evaluated in a common currency. D^a represents dividend payments by the subsidiary and τ^* is the domestic tax rate on foreign source income.

Tax payments on domestic source income are given by:

$$T_t^h = \tau^{hr}(\phi_t^h - G_t^h) + \tau^{hd} G_t^h + \omega^h D_t^h - i^h D_t^h \qquad \textbf{(A.5)}$$

where ϕ_t^h is taxable income (net revenue, less interest charges and some fraction γ^h of current period investment expenditure), τ^{hr} is the tax rate on retained profits, τ^{hd} is the tax rate on dividend distributions, ω^h is the withholding tax rate on dividend payments and i^h is the rate of imputation credit on dividends. G^h is the dividend payment, grossed up at the corporation tax rate on dividends, D^h, is the dividend payment gross of any imputation credit.

Substituting **(A.5)** into **(A.4)** and rearranging gives the following expression for the budget constraint:

$$D_t^h = \theta^h \{(1-\tau^{hr}) Z_{t+1}^h + L_{t+1}^h - (1+(1-\tau^{hr}) r_t^h) L_t^h - (1-\tau^{hr}\gamma_{t+1}^h) P_{t+1}^{Ih} I_{t+1}^h + E_{t+1}^N - E_{t+1}^{Na} + (1-\tau^*) D_{t+1}^a\} \qquad \textbf{(A.6)}$$

where:

$$\theta^h = \frac{1}{\frac{1-\tau^{hr}}{1-\tau^{hd}}(1-i^h) + \omega^h}.$$

The variable θ^h reflects the degree of discrimination between retentions and gross dividends in the domestic tax system and measures the additional dividends, gross of imputation credits, which shareholders would receive if one unit of profits were distributed.

An analogous expression can be written for the dividend payments of the subsidiary:

$$D_t^a = \theta^a \{(1-\tau^{ar}) Z_{t+1}^a + L_{t+1}^a - (1+(1-\tau^{ar}) r_t^a) L_t^a - (1-\tau^{ar}\gamma_{t+1}^a) P_{t+1}^{ah} I_{t+1}^a + E_{t+1}^{Na}\} \qquad \textbf{(A.7)}$$

where:

$$\theta^{a} = \frac{1}{\frac{1-\tau^{ar}}{1-\tau^{ad}}(1-i^{a}) + \omega^{a}}$$

It is assumed that the net revenue of the company in each location is related to the net stock of capital which cumulates investment with a one period lag and depreciates at the constant exponential rate δ in both locations.

The managers of the firm are assumed to maximise **(A.1)** subject to the constraints described above. It is also assumed that the stocks of capital and debt at date *t* are pre-determined as is the flow of investment at *t*; this latter assumption means that the capital stock at *t+1* and hence net revenue at *t+1* are also pre-determined. It is usual to impose the legal requirements that dividends must not be negative and that dividends be limited by the extent of shareholders' capital; for present purposes these constraints are ignored and the remaining constraints substituted into the objective function so as to determine the value of equity as a function of its underlying determinants: namely profits and stocks of capital and debt. This generates the following expression:

$$E_{t} = \theta^{h}(1-\tau^{p})\left(\left[\frac{(1-\tau^{hr})}{(1+R_{t})}X^{h}_{t+1} + (1-\tau^{*})\theta^{a}X^{a}_{t+1}\right]\right.$$

$$+\sum_{i=2}^{\infty}\frac{1}{(1+{}_{t}R_{i})^{i}}\left[(1-\tau^{hr})\Pi^{h}_{t+i} + \theta^{a}(1-\tau^{*})(1-\tau^{ar})\Pi^{a}_{t+i}\right] \qquad \textbf{(A.8)}$$

$$\left.+\sum_{i=1}^{\infty}\frac{1}{(1+{}_{t}R_{i})^{i}}\left[\left((1-\tau^{*})\theta^{a}-1\right)E^{Na}_{t+i}\right]\right)$$

$$+\sum_{i=1}^{\infty}\frac{1}{(1+{}_{t}R_{i})^{i}}\left[\left((1-\tau^{p})\theta^{h}-1\right)E^{N}_{t+i}\right]$$

where:

$$X^{j}_{t+1} = Z^{j}_{t+1} - \frac{(1+(1-\tau^{jr})r_{t})}{(1-\tau^{jr})}L^{j}_{t} + \frac{(1-\tau^{jr}\gamma^{j}_{t+1})}{(1-\tau^{jr})}(1-\delta)P^{Ij}_{t+1}K^{j}_{t+1}, \quad j = h,a$$

$$\Pi^{j}_{t+i} = Z^{j}_{t+i} - c^{j}_{t+i}P^{Ij}_{t+i}K^{j}_{t+i} + l^{j}_{t+i-1}L^{j}_{t+i-1}, \quad j = h,a$$

$$c^{j}_{t+i} = \frac{(1-\tau^{jr}\gamma^{j}_{t+1})}{(1-\tau^{jr})}(q^{j}_{t+i} + \delta), \quad j = h,a$$

$$q^{j}_{t+i} = \frac{{}_{t+i-1}R_{1} - {}_{t+i-1}\pi^{Ij}_{1}}{(1+{}_{t+i-1}\pi^{Ij}_{1})}, \quad j = h,a$$

$$l^{j}_{t+i} = \frac{1}{(1-\tau^{jr})}\left[\left(\frac{(1-\tau^{m})}{(1-g^{m})} - (1-\tau^{jr})\right) r^{j}_{t+i} - \frac{g^{m}}{(1-g^{m})}\pi_{t+i}\right], \quad j = h, a$$

The expression **(A.8)** provides a foundation for much of the analysis in this paper, indicating how the objective of the firm is related to the various choices under its control. the first line indicates how the value of equity is related to the various pre-determined variables and so is not especially germane to describing the firm's behaviour. This is zero for a new firm starting up at *t+1*. The second line shows how the value of equity is related to future values of profits in both the parent and the subsidiary. The third line shows how the value of equity is related to issues of equity by the subsidiary (which are assumed to be purchased by the parent) and the fourth line shows how issues of equity by the parent affect the value of equity.

Interjurisdictional differences in tax rates are reflected in a number of the terms included in **(A.8).** Of particular interest is the user cost of capital in each country, c^j, which is affected by both the tax rate on retentions and the value of capital allowances, γ, and the overall tax rates on profits earned in both the parent and the subsidiary.

Following King and Fullerton (1984) and Jorgenson (1993), the tax exclusive effective tax rate may be defined as the ratio of the corporate tax wedge (the before corporate tax rate of return net of depreciation and the after corporate tax rate of return) to the after tax rate of return:

$$\tau^{ej}_{t+i} = \frac{(c^{j}_{t+i} - \delta) - q^{j}_{t+i}}{q^{j}_{t+i}} \qquad \textbf{(A.9)}$$

Using this definition of the effective tax rate, the capital costs component of profits in **(A.8)** may be written as

$$c^{j}_{t+i} P^{Ij}_{t+i} K^{j}_{t+i} = ((q^{j}_{t+i} + \delta) + \tau^{ej}_{t+j} q^{j}_{t+i}) P^{Ij}_{t+i} K^{j}_{t+i} \qquad \textbf{(A.10)}$$

Thus capital costs are split into two terms. The first of these represents the cost of capital that would be incurred in country *j* if the corporate tax system there were neutral (this is achieved if $\gamma^{j} = 1$ or $\tau^{jr} = 0$). The second represents the additional capital costs that result from a positive effective corporate tax rate.

For most purposes, the typical multinational firm's objective function can be simplified by the economic profits accruing to shareholders in any given period:

$$V_t = \theta^i (1-\tau^p)[(1-\tau^{ir})(Z_t^i - c_t^i P_t^{Ii} K_t^i) + \sum_j \theta_i^j (1-\tau_{ij}^*)(1-\tau^{jr})(Z_t^j - c_t^j P_t^{Ij} K_t^j)$$

$$+ \sum_j (\theta_i^j (1-\tau_{ij}^*) - 1) E_t^{Nj}] + (\theta^i (1-\tau^p) - 1) E_t^{Ni} \quad \textbf{(A.11)}$$

The term inside the brackets [.] includes the post corporate tax profits of the firm in all of the countries in which it operates. At the domestic level this is given by revenue net of all non capital costs, Z_t^i less the flow charge on capital, $c_t^i P_t^{Ii} K_t^i$ less corporate taxes on retentions which are levied at the rate τ^{ir}. Here K_t^i is the domestic capital stock, P_t^{Ii} is the price of capital goods and c_t^i is the user cost of capital. Profits generated in foreign countries are treated analogously but are also subject to taxation by the foreign government when repatriated, reflected in θ_i^j, and as foreign source income by the home government, reflected in τ_{ij}^*. New share issues at home, E_t^{Ni} and in foreign countries E_t^{Nj}, also affect the value of the firm to the extent that there are tax incentives to selling new shares and distributing the proceeds to shareholders. The incentive to issue new shares domestically depends on θ^i, the opportunity cost of retained profits in terms of domestic dividends foregone and τ^p the effective personal tax rate on domestic dividend distributions.

It is clear from this expression that taxes potentially exert a major influence on the behaviour of companies considering investment in a range of countries. For a domestic company with no foreign connections, the national firm, taxes affect the firm's choice of financing and, through the user cost of capital, the optimum capital stock. The extent to which the user cost of capital, and hence the firm's investment decisions, is affected by different types of taxation depends on the financial constraints impinging on the firm. In the absence of financial constraints, the user cost of capital for the national firm is independent of dividend taxation. This reflects the so-called 'new view' or 'trapped equity model' and arises when retentions are the marginal source of finance. In this case taxes on dividends are inescapable and are in effect incident on the equity of the company. They do not affect investment decisions because they reduce both the cost and return on investments by a proportionate amount.

Even in these circumstances, dividend taxation does affect the financial decisions of the firm in that issues of new equity are encouraged when $(1-\tau^p)\theta^p > 1$.[21] When there are financial constraints, the tax system may provide an incentive for companies to use debt or new issues as the marginal source of finance. King and Fullerton (1984) and others have evaluated the cost of capital in various national economies under different assumptions about the marginal source of finance. Such calculations draw attention to the distortions inherent in different tax systems, but do not necessarily have any behavioural implications, since in equilibrium the

[21]Borrowing, considered in the appendix, is encouraged when the gains to leverage (l) are positive.

more expensive sources of finance are unlikely to be used. In this paper, we assume throughout that retentions are the *marginal* source of finance.

The theoretical insight that dividend taxation might have no effect on the real investment decisions of the national firm has similar implications for the effect of international taxation on the real investment decisions of multinational firms. Consider first the case where the return to investment by the parent company is independent of that undertaken by the subsidiary. This would apply for example to a company producing non-traded goods in each location so that the returns to investments are specific to each location.

In the absence of financial constraints the optimum capital stock in the subsidiary is independent of dividend taxation in the host country (where the subsidiary is established) and the taxation of foreign source income in the home country of the foreign investor (Hartman, 1985). This can be seen by inspection of equation **(A.11)** where it is evident that the only influence of taxation on the investment decision of both the parent and subsidiary is through the effective tax rate. This result is again only relevant when retentions are the marginal source of finance, and arises because these taxes reduce proportionately both the cost and return to investments financed by retentions.

It should also be noted here that the investment decisions of the subsidiary are determined by the same cost of funds (R) as investment decisions in the parent company. This reflects the fact that the decisions of the parent are intended to maximise the welfare of the shareholders who are assumed to be located in the same country as the parent. Hence, under these conditions, the only effect of interjurisdictional differences in tax rates on investment operates through the effective tax rate.

However, corporate *financial* decisions are affected by other transnational taxes. Differences in international tax rates imply that there will be an incentive to borrow in countries with high rates of corporation tax because of the benefit of interest deductibility. The choice as to whether the subsidiary should issue new shares is independent of dividend taxes in the residence country but dependent on dividend taxation in the host country and the taxation of foreign source income in the residence country. This can lead to an effect on investment when there are binding financial constraints and the marginal source of finance is new issues. It is generally the case that the combination of dividend taxes in the host country and the taxation of foreign source income in the residence country create an incentive for deferring dividend distributions and a disincentive for new share issues by the subsidiary. This would raise the cost of capital and thereby reduce investment. When a subsidiary is first established and reliant on new issues of equity for finance, this can mean that its growth is retarded by a high cost of capital (see Sinn, 1990). Devereux and Pearson (1995) have computed the cost of capital for foreign investments relying on alternative sources of finance.

As noted above, these observations are made on the basis that the returns available to the parent company and its subsidiary are independent of each other. In these circumstances the mature subsidiary[22] will continue to invest in the host country even if distributions to the parent are very highly taxed. This is because the tax cannot be avoided. However, there are many activities where such taxes can be avoided, either by carrying out the operations of the subsidiary in a different country or in the home country itself.

In such cases, the optimum behaviour of the company is not simply to maximise profits in each location individually but to do what is best for the group as a whole. As a consequence, international taxes which appear not to affect behaviour in the circumstances described above do have an effect on company investment decisions. There are two levels at which this is important. First, at a cosmetic level, it is possible for vertically integrated companies to raise the overall profits of the group by manipulating transfer prices to ensure that profits are highest in the low tax country. Second, at a more fundamental level, companies might wish to shift the location of production of goods sold internationally to low tax jurisdictions. It is this case which is considered in the main body of the text.

[22] That is one for whom retentions is the marginal source of finance.