



# FDI, transfer pricing and the measurement of R&D intensity

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## Abstract

An important determinant of a region's attractiveness to foreign investors is its rate of corporation tax. Besides stimulating real economic activity, low corporation tax rates also induce multinational corporations to shift profits into the jurisdiction, frequently through the manipulation of transfer prices. This practice can lead to a substantial distortion of output figures. Since national or sectoral R&D intensities are usually measured relative to output, transfer pricing also therefore distorts these measurements. The present paper proposes a simple alternative measure of R&D intensity. Implementation on Irish data shows that the two approaches yield substantially different results.

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## 1. Introduction

Gropp and Kostial (2000), Altshuler et al. (2001), Slaughter (2003) and others have demonstrated the negative impact of the rate of corporation tax on a jurisdiction's ability to attract foreign direct investment. Ireland's low rate relative to the rest of Western Europe, for example, is arguably the principal reason why the country has proved so successful in the FDI stakes.<sup>1</sup>

Most of Ireland's inward investment comes from the US. Low-tax environments remain attractive to US firms even though the US authorities levy taxes on such

firms' global profits. This arises for two reasons, as Hines and Rice (1994) explain. The first is because companies are not eligible for a tax rebate when foreign taxes in excess of the US rate are levied. Since all foreign income and foreign taxes paid are added together in the computation of the foreign tax credit issued by the US authorities, low-tax environments allow US firms operate in other foreign high-tax environments without penalty. The second reason arises because foreign profits are taxed in the US only upon repatriation. Firms with tax-haven profits can therefore earn interest on their residual US tax liabilities for as long as they defer repatriation of these profits.

These considerations exert a powerful influence on the behaviour of US corporations, and arguably on those of other countries as well. Hines and Rice (1994)

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<sup>1</sup> See Barry (2004).

identify 41 countries and regions as tax havens for the purposes of US businesses. Though these havens account for only 3% of the West's GDP, and an equivalent share of US affiliates' employment as well as property, plant and equipment, they account for 31% of US firms' total foreign-source income.

This suggests that corporations are engaged in profit shifting to these tax haven locations. One of the ways in which they do so is through the manipulation of 'transfer prices', the prices charged for the transfer of goods and services between a parent company and its foreign affiliates. These prices are supposed to reflect those that would apply to arm's-length transactions between unrelated parties. As Hines and Rice (1994) point out however, there are many goods for which arm's-length prices do not exist – most notably intangible assets – so that enforcement of the law is very difficult.<sup>2</sup>

Intangible assets are particularly prevalent in sectors characterised by high advertising and R&D expenditures, making it difficult in these cases to locate the precise stages of production at which value is added. Both of the world's major soft drinks companies, for example, produce their valuable cola concentrates to secret recipes in Ireland – presumably from quite basic ingredients – and a similar procedure is followed in the pharmaceuticals sector, in which Ireland plays host to nine of the world's 10 largest corporations. In Ireland, almost 90% of foreign-company employment is found to be in advertising-intensive and/or R&D-intensive sectors, compared to a figure of less than 30% for indigenous industry.<sup>3</sup>

Manipulation of transfer prices distorts measured output levels and balance of payments statistics in tax

haven locations. Among the European regions which Hines and Rice classified as such in 1994 were the Channel Islands, Cyprus, Gibraltar, Ireland, the Isle of Man, Liechtenstein, Luxembourg and Switzerland. Since that time, however, many of the new EU member states of Central and Eastern Europe, in seeking to emulate the 'Celtic Tiger' experience, have followed Ireland down the route of low corporation taxes. These data distortions might therefore be expected to become more prevalent in the future.<sup>4</sup>

The present paper focuses on attempting to correct one such distortion that bedevils the comparison of the R&D (research and development) intensity of industries across countries. The R&D intensity of a sector is typically measured by sectoral R&D expenditures expressed as a share of industry output. For low corporation tax economies, however, the arguments above suggest that this denominator is likely to be artificially inflated, obscuring possible comparisons with other countries.

A simple correction to how these indicators are measured is proposed here. The correction is then applied to the Irish data, allowing a comparison of the original and transformed indicators. The relative R&D intensity of indigenous and foreign-owned industry in Ireland is changed substantially, as is Ireland's R&D intensity compared to that of other countries. The comparison group of countries chosen includes Sweden, Finland, Denmark and Spain. The first three are taken as representative small high-tech economies, while Spain is included as another 'cohesion country'—the grouping of historically less-well-off EU15 economies that comprised Greece and Portugal as well as Ireland and Spain.

The paper is structured as follows. Section 2 presents the standard measure of R&D intensity in each of our five economies, and in indigenous and foreign industry in Ireland, with a discussion of the perceived implications. Section 3 follows with an illustration of the extent to which transfer pricing behaviour may be distorting Irish output data. Section 4 then presents our adjusted measure of R&D intensity and analyses the differences in the results yielded by the two measures.

<sup>2</sup> See Clausing (2001) and Swenson (2001) for further discussion of the extent and implications of the manipulation of transfer prices.

<sup>3</sup> This calculation employs the classification system proposed by Davies and Lyons (1996). They classify a sector as advertising-intensive if advertising expenditures in the UK exceed 1% of national consumption of the product. (The UK is the only EU country with appropriately comprehensive sectoral advertising-intensity data). Of the roughly 100 NACE 3-digit sectors 13 are classified as of this type. R&D data from both Italy and the UK are used in the determination of R&D intensive sectors. Relatively high R&D expenditures are required in both countries if a sector is to be classified as such. Twenty-two of the NACE 3-digit sectors are classified as of this type, and 9 as intensive along both dimensions. Eight percent of foreign manufacturing employment in Ireland is found to be in advertising-intensive sectors, 44 percent in R&D-intensive sectors and 34% in sectors intensive in both types of expenditures.

<sup>4</sup> Halpern and Koren (2003) present evidence on transfer pricing-induced distortions to Hungarian export prices.

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