

TAXATION AND BUSINESS ENVIRONMENT AS DRIVERS OF FOREIGN DIRECT INVESTMENT IN OECD COUNTRIES

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INTRODUCTION

How important are differences in corporate taxation for the investment decisions of multinational enterprises (MNEs)? Over the past decade, interest in this issue has been growing in parallel with the increasing mobility of capital and internationalisation of businesses. Standard models of the MNEs predict that corporate taxation can influence foreign direct investment (FDI) by creating a wedge between the pre- and post-tax returns on investment. The relevant tax wedge, however, depends on whether MNEs' investment is incremental or involves the creation of entirely new plants. Moreover, the size of the wedge depends on the whole set of tax policies implemented by the home and host countries – including, for instance, exemption or credit regimes for foreign source income, withholding taxes on repatriated profits or dividends and FDI-specific tax incentives. Recent studies have also shown that MNEs may *de facto* close the wedge implied by international corporate taxation by implementing “triangular” strategies that exploit cross-country differences in tax policies to defer or avoid tax obligations (Grubert, 2004; Altshuler and Grubert, 2003). Given the uncertainty surrounding the relevant tax wedges and the response of MNEs to them, a large number of studies have explored the issue empirically.¹

While empirical studies generally find that FDI choices are significantly affected by various measures of corporate taxation, many of them focus on just a few countries (often bilateral relations between the United States and its partners),² use tax variables that do not cover important dimensions of bilateral tax regimes (such as the tax treatment of foreign income) and, most importantly, omit to control explicitly for other policies that are likely to be relevant for MNEs' choices – such as border barriers and the domestic business environment. Omission of these variables is likely to bias the estimated tax elasticities because taxation regimes and other domestic policies are often correlated over time and across countries.

This paper looks at the effects of corporate taxation on bilateral FDI stocks in 28 investing countries and their partners, focusing on the OECD area over the 1990s, contributing to previous panel data analyses of the tax/FDI nexus in two main ways. First, the paper relates bilateral FDI with new estimates of tax wedges that include many relevant aspects of FDI-specific taxation. These estimates are based on tax codes and provide marginal effective tax rates (METRs) and average effective tax rates (AETRs) on FDI for each OECD country pair. Second, the paper controls for a large set of additional factors that may affect the attractiveness of a

country for international investors. These include openness to foreign trade and investment, the cost and regulation of labour, and policies that affect the degree of domestic market competition. Both tax and other policy indicators have a time-series dimension, covering changes that occurred over the sample period. This would seem to be the first analysis of the tax and FDI issue that embodies such a large set of countries and policies over a decade during which many changes were observed both in taxation and other policy regimes. The wide variation over time and across country pairs allows for a better identification of the elasticities of FDI to corporate taxation arrangements.

The empirical approach is novel also in other respects. It is based on Markusen's (2002) "unified approach" to the analysis of MNEs' cross-border investment, in which market size, distance, comparative advantage and scale factors may all drive FDI location choices. This accounts for both market access ("horizontal") and production fragmentation ("vertical") motives for creating or extending foreign affiliates in host countries. Moreover, following Erkel-Rousse and Mirza (2002), the paper is based on a semi-parametric estimation approach that allows to control for a number of unobserved effects (such as cultural or historical linkages between country pairs) possibly impinging on the choice of investment location by MNEs.

Consistent with previous findings, the regressions suggest that corporate taxation has a significant impact on FDI location choices, and that forward-looking measures based on tax codes – including bilateral arrangements and features of foreign income taxation – capture this impact more effectively than simple statutory rates. In keeping with the literature, the largest impact is recorded for AETRs, which account for taxation in infra-marginal investment. While a home country with an exemption system tends to encourage outward FDI, the impact of taxation on FDI is not affected by an exemption or credit system, *i.e.* the estimated elasticities are similar for both exemption and credit system countries.

The results indicate that omission of other policies that shape the business environment of host countries may lead to serious upward bias in tax elasticity estimates. Moving from a simple model specification including only tax policies to a wider one covering also other factors and policies affecting rates of return on FDI significantly lowers the estimated tax elasticities. As a result, the elasticity estimates are on the low side of the range covered by recent surveys of the empirical literature. Moreover, the impact of tax regimes on bilateral FDI appears to be quantitatively limited. On the whole, taxation would seem to be a relatively minor factor affecting the location choices of MNEs as compared with policies affecting the ease of entry for foreign firms, their labour costs and the functioning of product markets in the host country. These results appear to be robust to changes in model specification and estimation methods as well as to accounting for the possibility of FDI diversion from third countries.

The remainder of the paper is organised as follows. First, the tax elasticities found in previous studies are reviewed. Then, the data and the empirical methodology are described, with a special focus on the indicators used to proxy for FDI taxation and other policies. The following section presents the regression results. Finally, policy implications and directions for future research are discussed.

TAXATION AND FDI: ISSUES AND PAST FINDINGS

Most theoretical and empirical models of MNEs' behaviour or FDI implicitly or explicitly draw upon the so-called OLI approach pioneered by Dunning (1977, 1981), which relates cross-border investment to three main motives – ownership, location and internalisation. In principle, taxation can affect each of them. For example, taxation may influence the incentive of MNEs to establish a foreign subsidiary by increasing or reducing the advantage associated with ownership (*e.g.* tax treatment of royalties, dividend repatriation). At the same time, the host-country corporate tax rate contributes to determine the comparative location advantage that it can offer to international investors relative to other destination countries. More generally, corporate taxation and the tax treatment of foreign corporate income are likely to affect the wedge between the pre-tax and post-tax rates of return on FDI. This will affect the extent to which MNEs can enjoy internalisation advantages relative to the alternatives of exporting or licensing their products in host countries.

A sizeable literature has been devoted to measuring the response of FDI to taxation since the mid-1980s. In their thorough review, de Mooij and Ederveen (2005) provide a useful analysis of these empirical studies that differ mainly by the type of FDI data, the type of sample, the type of tax indicators and the specification of the empirical models.³ Their analysis explores how these differences in study characteristics affect the magnitude of the tax elasticities. The following subsections summarise their main findings. Table 1 reproduces the “typical” tax elasticities (and semi-elasticities) that they derive in their meta-analysis of studies that use different data and empirical approaches.⁴ The general conclusion is that the magnitude of these elasticities varies considerably depending on the characteristics of the studies.

FDI data

FDI data are obviously crucial for the estimated tax elasticities. They can be based on cross-border financial flows (or stocks), real activity of foreign affiliates (*e.g.* property, plant and equipment) and count data on the location of subsidiaries. Data on real activity are considered to be more reliable than both count data and financial data for proxying the amount of real capital invested. Count data cannot account for the possible impact of taxation on the amount of investment in foreign

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Table 1. Comparison of semi-elasticities and elasticities by de Mooij and Ederveen¹

	Panel A – Average semi-elasticities						
	Country STR ²	State STR ³	METR ⁴	AETR ⁵	Micro ITR ⁶	Macro ITR ⁷	Mean
Time Series	-0.8	-6.7	-2.2	-4.6	-0.8	-3.0	-3.0
Discrete choice	2.3	-3.6	0.9	-1.5	2.3	0.1	0.1
Panel data	-1.9	-7.9	-3.4	-5.8	-1.9	-4.1	-4.2
Cross section	-7.8	-13.8	-9.2	-11.7	-7.8	-10.0	-10.0
Mean	-2.1	-8.0	-3.5	-5.9	-2.0	-4.2	-4.3
	Panel B – Average elasticities						
	Country STR ²	State STR ³	METR ⁴	AETR ⁵	Micro ITR ⁶	Macro ITR ⁷	Mean
Time Series	-1.1	-1.1	-1.1	-1.8	-1.3	-1.3	-1.3
Discrete choice	-0.2	-0.2	-0.2	-0.9	-0.4	-0.4	-0.4
Panel data	-0.7	-0.6	-0.6	-1.3	-0.9	-0.9	-0.8
Cross section	-1.8	-1.8	-1.8	-2.5	-2.1	-2.1	-2.0
Mean	-1.0	-0.9	-0.9	-1.6	-1.2	-1.2	-1.1

1. Elasticities are obtained from a meta-analysis by de Mooij and Ederveen (2005) and are evaluated at the sample mean of tax indicators. The meta-analysis is based on elasticity estimates from studies using firm-level, sectoral and national data.

2. Country statutory tax rate.

3. State statutory tax rate.

4. Marginal effective tax rate.

5. Average effective tax rate.

6. Implicit tax rate computed using micro-level data.

7. Implicit tax rate computed using macro-level data.

Source: De Mooij and Ederveen (2005).

affiliates, while financial data mix real investments with mergers and acquisitions that are likely to respond quite differently to taxation.⁵ Existing studies show that both tend to underestimate tax elasticities relative to real activity data. Nonetheless, financial flows are the only widely available data for cross-country (or cross-industry) and time-series analyses of bilateral FDI. Moreover, the available evidence suggests that the potential downward bias on elasticity estimates implied by these data is substantially smaller than the one implied by the use of count data.⁶

Type of sample

Sample types encompass analyses that are purely time-series, purely cross sectional and panel (either industry/time or bilateral/time). The majority of purely time-series and cross-sectional analyses focus on the United States and look at either aggregate FDI or the distribution of bilateral FDI from the United States to foreign countries or from foreign countries to the United States, in some cases distinguishing among destination states. A few similar studies have also looked at

investments of German MNEs in the European Union. All these analyses have been made using data on real activity. By contrast, panel analyses generally use financial flows (or stock) data that are either aggregated by industry or by bilateral country pairs at the national level (often for relatively small subsets of OECD countries). Meta-analysis results suggest that the “typical” elasticities estimated using panel data are close to the mean elasticity values obtained from a survey of studies covering all data sources and sample types. Table 2, also drawn from de Mooij and Ederveen (2005), shows however that tax elasticity estimates obtained from panel data analyses vary widely across individual studies depending on precise model specifications.

Table 2. **Summary of results from panel data studies¹**

	Semi-elasticity			Elasticity		
	Mean	Median	Std. dev.	Mean	Median	Std. dev.
Swenson, 1994	1.3	2.7	4.3	0.4	0.8	1.0
Jun, 1994	-0.5	-1.3	3.2	-0.2	-0.4	1.1
Devereux and Freeman, 1995	-1.6	-1.6	0.1	-0.4	-0.4	0.0
Pain and Young, 1996	-1.5	-1.4	1.2	-0.8	-0.7	0.6
Shang-jin Wei, 1997	-5.2	-5.0	0.6	-1.5	-1.5	0.2
Billington, 1999	-0.1	-0.1	0.0	0.0	0.0	0.0
Gorter and Parikh, 2000	-4.6	-4.6	4.3	-1.3	-1.3	1.2
Broekman and Vliet, 2001	-3.4	-3.5	0.8	-1.0	-1.1	0.2
Benassy-Quere <i>et al.</i> , 2001	-5.0	-5.0	3.0	-0.4	-0.4	0.2
Buettner, 2002	-1.5	-1.6	0.6	-0.4	-0.4	0.2
Benassy-Quere <i>et al.</i> , 2003	-5.4	-4.2	3.2	-1.6	-1.3	1.0
Desai <i>et al.</i> , 2004	-0.6	-0.6	0.0	-0.2	-0.2	0.0
Stöwhase, 2005	-5.3	-4.3	2.7	-1.5	-1.3	0.8
All	-2.9	-2.5	3.5	-0.8	-0.7	1.0

1. The table includes studies using both FDI flows and stock.

Source: De Mooij and Ederveen (2005).

Empirical specification

Model specification issues involve the choice of both non-policy factors and policy factors (other than tax rates) that are included in the regression models. Concerning the former, recent analyses often tend to account for factors related to market size and distance (so-called gravity factors), factor proportions, and firm and/or plant-specific economies of scale; other controls include proxies for agglomeration and openness. Few studies, however, estimate specifications covering all these factors, as would be suggested by Markusen's (2002) “knowledge capital” or “unified” approach that formalises and extends the earlier OLI framework. Turning to tax policy factors, a widely debated empirical issue is whether home countries' different tax treatment concerning foreign-source income (exemption or credit systems) affects investors' responses to changes in host countries'

taxation.⁷ Most studies, however, do not find significant differences in the elasticity of FDI to host-country taxation under alternative foreign source income taxation regimes. Thus, the distinction between credit and exemption countries may not be important in practice, due among other things to excess foreign credit, tax deferral and other tax planning strategies of MNEs (see below).

Inclusion of policy influences other than tax rates or bilateral tax agreements is much less common. Yet, the range of policy controls accounted for in regressions may have an important bearing on the estimated tax elasticities, due to potential omitted-variable bias. This is of course particularly important for policies that are likely to be correlated with the FDI taxation variable, such as border barriers, labour income taxation and product market regulation. The meta-analysis of de Mooij and Ederveen (2005) shows for instance that omission of openness factors can artificially increase tax elasticity estimates.

Tax indicators

A major unresolved issue in this strand of research is the choice of the best indicator for measuring the tax burden on FDI. Three main measures have been proposed: the statutory corporate tax rate in the host country; the implicit tax rate computed using either macro data on corporate tax revenues or firm-level data on corporate tax payments; and the effective tax rate based on host and home country tax codes, bilateral arrangements concerning taxation of foreign income and economic assumptions (*e.g.* about the firm's typical financing and asset structure). As illustrated in the next section, effective tax rates can refer to either marginal or infra-marginal foreign investments.⁸

Apart from the degree of detail contained in these tax measures, they differ mainly in that those based on tax codes are *ex ante* or "forward looking", while those based on tax payments are *ex post*. From an empirical point of view, *ex post* measures have the advantage of reflecting the actual impact of tax codes on the FDI tax wedge. However, they are also likely to reflect other factors, possibly unrelated to taxes (*e.g.* economic conditions). Moreover, they are also likely to be endogenous to the amount and the location of FDI itself. Alternative, "forward looking" measures have opposite properties: they are less exposed to the endogeneity problem and identify mostly tax influences, but they may omit important features of the tax system.⁹ These measures are derived from modelling firms' profit maximisation behaviour based on several assumptions on their investment decisions, such as types of assets and forms of financing FDI, which are unlikely to be uniform across countries and over time. However, these assumptions do not usually incorporate MNEs' business and/or fiscal strategies aimed at minimising their tax burden by taking advantage of the possibility to arbitrage among different tax regimes (so-called "tax planning" strategies, see Box 1).

Box 1. Tax planning

Numerous studies have pointed out that tax planning has become an increasingly common phenomenon among the MNEs. International investors have access to alternative methods of financing FDI, arranging transactions between related parties located in different countries and changing the timing of repatriation of income to a parent company. The financial incentives of the MNEs to resort to these strategies are strong. For example, Weichentieder (1996) and Grubert (1998) confirmed a frequent reliance on intra-company loans for financing foreign affiliates in high corporate tax countries in order to exploit a favourable tax treatment for debt-financing. The phenomenon that firms manipulate prices used in intra-firm transactions with a view to reducing total tax liabilities has been confirmed by Grubert and Mutti (1991). Hines and Rice (1994), Harris (1993), Rousssang (1997) and Clausing (1998). Hines and Hubbard (1990) showed that multinationals also adjust the timing of their dividend repatriation from foreign subsidiaries.

While not accounting for these strategies would clearly tend to overstate the tax burden for MNEs (biasing upwards the forward-looking measures), further research in this area is needed to assess the precise way in which tax planning operates to lower home and host country tax burdens on FDI and the extent of measurement bias from omitting these strategies.^{*} Recently Desai, Foley and Hines (2002), after reviewing affiliate-level data on the behaviour of US companies, suggested that the previous US evidence on the impact of taxation may underestimate the effect of taxation on the behaviour of multinationals. This was based on their empirical finding that the investment pattern of indirectly-owned affiliates of US multinationals was considerably more sensitive to local tax rates than was the investment pattern of directly-owned foreign affiliates.

At the same time, efforts have been made to curb aggressive tax planning activities of MNEs – such as the practice of allocating taxable profits to low-tax countries by manipulating prices in intra-firm transactions (transfer-pricing) and the practice of allocating company debt and the associated reduction for interest payments to subsidiaries in high-tax countries (thin capitalisation). In addition, many countries also responded to these issues by formulating very complex tax codes. Those include deferral of taxes on foreign-source income, apportionment rules of a parent's expenses and special rules on foreign sales corporations. See Gresik (2001) for details.

* See OECD (2007) for further discussion on the forward-looking tax measures and tax planning by MNEs.

Given the various factors at work, the potential bias on tax elasticity estimates implied by the use of the different indicators of tax burden on FDI is unclear *a priori*. Available evidence suggests that, independent of the FDI data and sample type used, estimated elasticities tend to be higher for average effective tax rates on

infra-marginal investments (AETRs) and macro-based implicit tax rates than for statutory tax rates, effective tax rates on marginal investments (METRs) and micro-based implicit tax rates (Table 1).

Summing up

The results of previous studies provide insights that have several useful implications for the estimation strategy used in this paper. First, there is a consensus that data on real activity of foreign affiliates are ideally the most appropriate to gauge the effects of taxation on FDI. However, such data simply do not exist on a bilateral basis for a sufficiently large set of country pairs and periods. Moreover, the bias implied by the use of more widely available data on financial flows and stocks does not seem to be substantial. Second, within the spectrum of empirical approaches used in this kind of analysis, panel data studies seem to provide tax elasticities that are in the median range of available estimates. Third, from the point of view of obtaining unbiased estimates of tax elasticities, use of “forward-looking” measures would appear to be safer because they reflect only tax factors and reduce the potential endogeneity problems of other measures.¹⁰ The inherent limitations of these measures suggest however to experiment also with other tax indicators. Finally, to obtain unbiased elasticity estimates, it is crucial to control not only for gravity and other factors but also for non-tax policies that influence comparative location advantages by shaping after-tax rates of return on FDI and the more general business environment in which foreign affiliates operate.

DATA, MODEL SPECIFICATION AND EMPIRICAL METHODOLOGY

Tax indicators

The choice of METR and AETR

The two most common forward-looking bilateral tax burden indicators for FDI are the marginal effective tax rate (METR) and the average effective tax rate (AETR). These indicators measure the wedge between the pre-tax rate of return on investment earned by a company and the post-tax rate of return earned by its foreign parent, taking into account three dimensions of tax policies: the domestic corporate tax systems of home and host countries, the taxation of cross-border flows of income, and the interaction of tax systems of home and host countries. The main difference between the two rates is that the METR applies to a marginal investment project that earns the minimum required rate of return after tax, whereas the AETR applies to an *infra-marginal* investment project that earns some economic rent, *i.e.* a project that earns after-tax pure profits. The AETR is determined as the difference between the pre- and post-tax economic rent per unit of investment for a *given pre-tax rate* of return divided by the net present value of pre-tax income. The METR is determined as the percentage difference between the

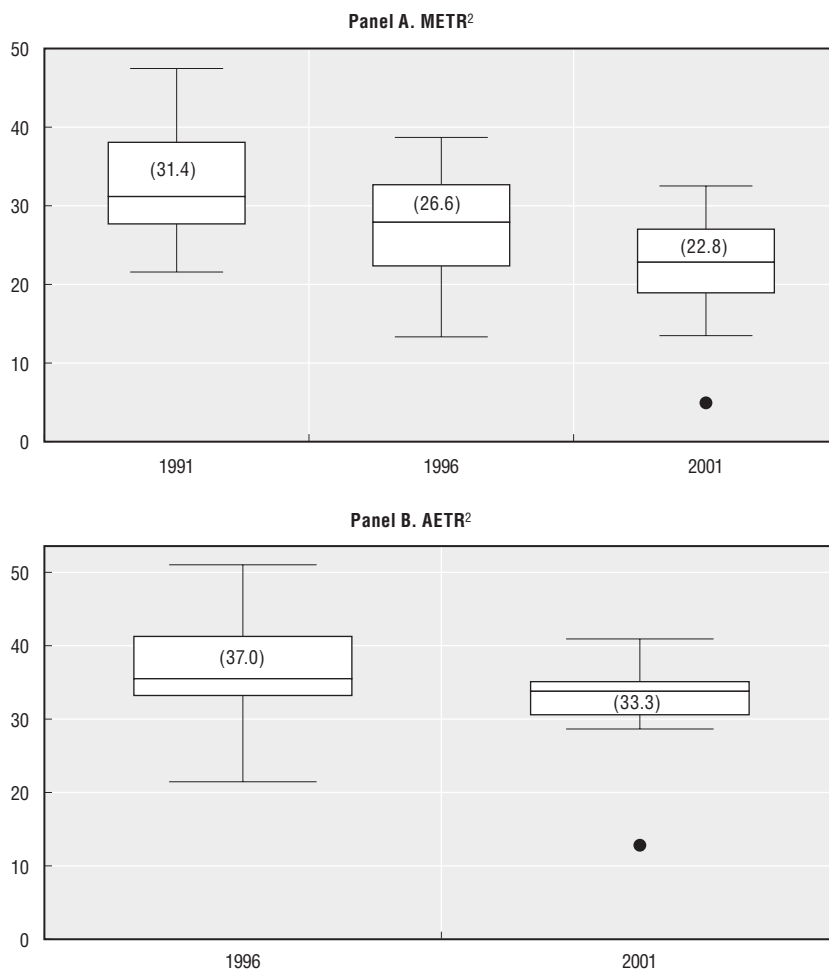
cost of capital producing zero post-tax economic profit and the post-tax rate of return of an alternative investment as a proportion of the cost of capital.¹¹

This paper uses recent estimates of these forward-looking indicators by Yoo (2003), who extended previous measures computed by OECD (1991) and the European Commission (2001). Yoo (2003) constructed METR and AETR for 1996 and 2001, and then used detailed information on tax reforms in individual OECD countries in various years to create time-series that change with the evolution of tax codes and bilateral or multilateral agreements. The two measures cover the 1991-2001 and 1996-2001 periods, respectively.¹² As noted by Devereux and Griffith (2002), the AETR tends to be a better measure of the tax burden on FDI than the METR, because the AETR is relevant for decisions regarding lumpy investment, investment in the presence of imperfect competition, or for location decisions of MNEs, which are the most common drivers of FDI.¹³ However, both measures are used to test the robustness of the results and also because a longer time-series is available for the METR.

There has been significant change in the effective tax rates on FDI over the 1990s, reflecting tax reforms in many OECD countries. When measured by the METR on *inward* FDI (*i.e.* the METR faced in each host country by a foreign investor from the average OECD country), the tax burden on average fell by 8 percentage points (Figure 1, Panel A). The AETR followed a similar pattern over the second half of the past decade at the same time as tax wedges tended to converge across host countries (Figure 1, Panel B). Nonetheless, substantial variation in tax rates faced by the average investor in different host countries remained, with an approximate 30 (20) percentage points spread between the highest and lowest METR (AETR) in 2001. At the same time, the tax burden faced in each host country by investors from different home countries also varied considerably (Figure 2). For example, the spread between the highest and lowest AETR applying to foreign investors in a given host country (including outliers) ranged from around 10 (France and Belgium) to around 30 (Ireland and Iceland) percentage points. This is partly due to the cross-country differences in withholding tax rates on cross-border flows of dividends and interest income *vis-à-vis* partner countries and the interaction of home and host countries' tax systems.

It bears repeating that these tax indicators do not take into account the possibility of a multinational to reallocate taxable income across different countries with a view to minimising its tax burden. To the extent that tax-planning by MNEs reduces the tax wedges across host countries, the tax indicators will tend to overestimate the cross-country difference in tax burdens. Moreover, these indicators do not incorporate fiscal incentives to foreign investment that are specific to certain regions or spending categories (such as R&D or spending by SMEs). This can be another source of overestimation of the actual tax burden on FDI, especially in countries where entitlements to these incentives are widespread. Finally, the

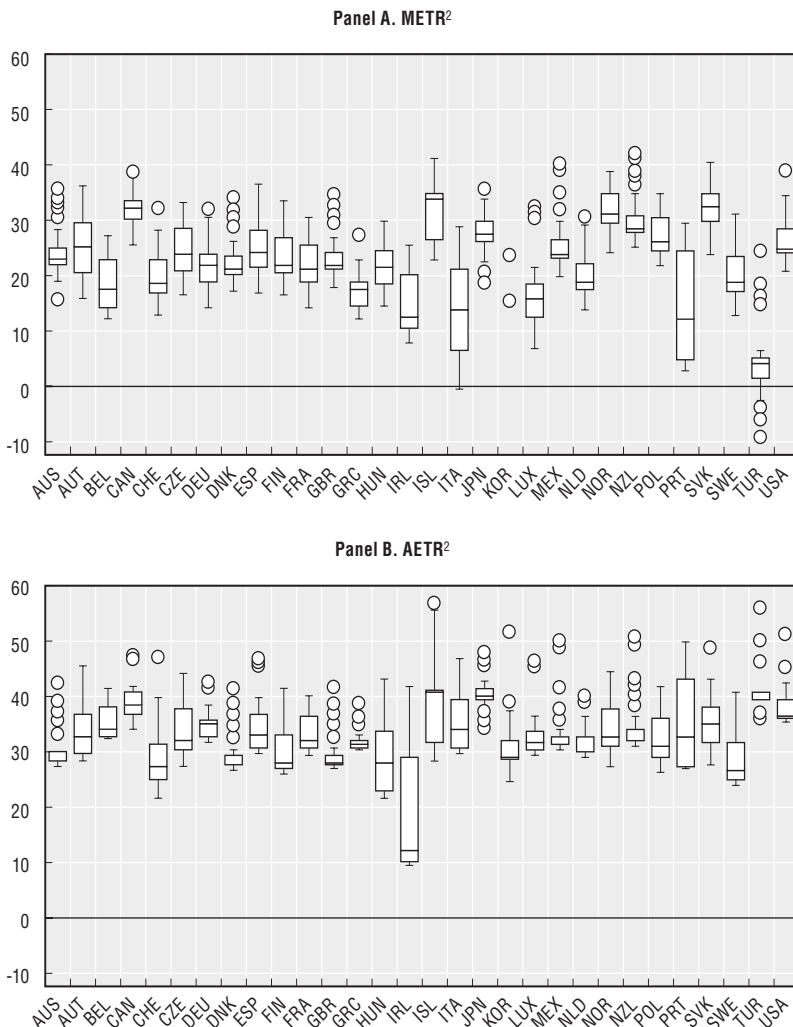
Figure 1. The effective tax rates on inward FDI: Evolution over time of mean and variance across host countries¹



1. An effective tax rate on inward FDI refers to the rate applied to investors of the average investor country on income earned in a host country. A marginal effective tax rate applies to a marginal investment that earns the minimum rate of return after tax, while an average effective tax rate applies to an infra-marginal investment that earns some economic rent, *i.e.* a project that earns more than the minimum required after tax rate of return.
2. The box plot shows in each year the median OECD value of the effective tax rate imposed on inward FDI (the horizontal line in the box), the third and second quantiles of the cross-country distribution (the edges of each box) and the extreme values (the two whiskers extending from the box). Averages provided in parentheses. Dots identify outlier observations. 2001 figures are based on 4.5% inflation to ensure the consistency.

Source: Yoo (2003).

Figure 2. Variation across foreign investors of the effective tax rates on inward FDI applied by each host country, 2001¹



1. Effective tax rates on inward FDI refer to the rates applied to investors from different home countries on income earned in a host country. A marginal effective tax rate applies to a marginal investment that earns the minimum rate of return after tax, while an average effective tax rate applies to an infra-marginal investment that earns some economic rent, i.e. a project that earns more than the minimum required after tax rate of return.
2. The box plot shows for each host country the variation of METR or AETR imposed on the investment from other countries. The median value of the effective tax rate is depicted by the horizontal line in the box, the third and second quantiles of the cross-country distribution by the edges of each box and the extreme values by the two whiskers extending from the box. Dots identify outlier observations.

Source: Yoo (2003).

tax burden indicators are based on economic assumptions that are tailored to manufacturing, though a large and increasing share of FDI actually concerns non-manufacturing industries.

Nonetheless, these forward-looking indicators are preferred over the measures of the implicit tax rate (ITR) for several reasons. The ITR is calculated as aggregate taxes paid to the host country relative to the pre-tax earning and profits earned in the host country, both of which are available from tax return or accounting data. While the micro-level ITR accounts to some extent for MNEs' "tax-planning" activities, recent evidence indicates that various tax-reducing alternatives to dividend repatriation, such as royalty payments to the parent and "triangular" or "multiple-tier" transactions between the parent and related foreign affiliates, cannot be captured in simple ITR measures.¹⁴ In addition, the ITR reflects a wide range of investments of varying age, duration, asset composition and financing sources by construction. Moreover, international comparisons based on the ITR are made difficult by differences in accounting definitions and the timing of tax payments.

Diversion effects triggered by changes in tax policies in alternative investment locations

In a bilateral setting, FDI from an investor country to a given host country can be affected by changes in tax policies in other countries, which may divert investment to these other locations even though tax policy in the host country has remained unchanged. For this FDI "diversion" to occur, these other locations should be at least as attractive as the host country, abstracting from differences in tax policies. To account for this potential diversion effect, a variable summarising bilateral taxation regimes of the home country with other host countries that are sufficiently "similar" to induce potential crowding out (or crowding in) of FDI from the host country to those other countries (or *vice versa*) was constructed. A similarity index was computed taking into account all non-policy characteristics of host and home country pairs (over sample period averages). For each country pair, similar country pairs were defined as those whose similarity index deviates by no more than one standard error. For each country pair, the diversion variable was then computed as the (simple) average of bilateral METRs or AETRs over this subset of similar country pairs.

Model specification

Regressions are based on a specification derived from Markusen's (2002) reformulation of the OLI model of the MNEs. In this model decisions to export or invest abroad are taken jointly. Moreover, foreign investment decisions can be of the horizontal or vertical type, depending on whether the MNE wishes to access foreign markets or fragment production into different stages. Horizontal investment is usually undertaken to exploit firm-specific knowledge capital of the parent

firm and plant-specific scale economies of duplicating production in host countries. Vertical investment is usually motivated by the wish to exploit the comparative advantages of the host country. The empirical implementation of Markusen's framework builds on the analysis in Nicoletti *et al.* (2003) but extends the model specification as regards tax indicators discussed above.

Policy and non-policy influences

To subsume both the trade *versus* investment choice by the MNEs and the horizontal *versus* vertical investment motives, the estimated model specification relates bilateral FDI to an array of non-policy factors. These reflect the effects of *i*) gravity and economies of scale (combined market size, distance and transport costs); *ii*) factor proportions (dissimilarity in capital-labour ratios and human capital endowments); and *iii*) plant-specific economies of scale (market size similarity). In constructing gravity variables, market size is proxied by the sum of home and host country GDP and transport costs are computed as the moving average of the difference between the value of imports in the host country and value of exports by the home country.¹⁵ Due to data limitations, the difference between the log per capita GDP in home and host countries is used to construct the factor dissimilarity index proxying the relative differences in the factor endowments of the two countries. Differences in factor proportions are also measured using a dissimilarity index of human capital endowments taking into account the share in population by different education levels and average years of schooling in each level. The size similarity of the two countries is described by an index built in Nicoletti *et al.* (2003). This index captures the relative size of the countries.¹⁶

Particular care was taken in identifying and measuring policy factors other than bilateral taxation that may have a bearing on FDI by affecting the host-country's business environment and rates of return on investment in foreign affiliates. These factors cover three broad areas: border barriers, domestic product market regulation and labour market arrangements. Border barriers are proxied by the indicator of FDI restrictions of Golub (2003) and by a dummy for participation (of both home and host countries) in any free trade area. Labour market arrangements are captured by two indicators: tax wedges on labour income (from OECD's *Taxing Wages*) and the OECD indicator of employment protection legislation, EPL (OECD, 2004). Product market settings are described by the product of two sets of OECD indicators of anti-competitive regulation: the simple average of the time-series indicators of regulation in seven non-manufacturing industries (Conway and Nicoletti, 2006) and the economy-wide indicator of product market regulation for 1998 (Conway *et al.*, 2005). These indicators measure in complementary ways the extent of barriers to entry and regulatory hurdles faced by firms in the host (or home) country domestic markets. Combining the two indicators allows for a full

use of available information on product market regulation over the sample period.¹⁷

Most of these policy variables can be thought to affect the MNE's choice between trade and FDI as well as the type and location of FDI. For example, FDI restrictions can twist decisions towards exporting goods or services, while participation in free trade areas can encourage horizontal FDI that takes advantage of ease of access to and economies of scale of a larger market. Domestic restrictions to competition, regulatory hurdles or high labour costs (as implied by tax wedges or strict employment protection) can deter FDI in a particular location.¹⁸ Given that the MNEs' decision to invest abroad is often driven by a relative location advantage of the host country *vis-à-vis* the home country (*e.g.* in comparing the costs of producing at home and export to local markets *versus* the costs of producing in the local market, or in comparing costs in the home and host country for the purpose of fragmenting production), the variables proxying for domestic product and labour market arrangements in host countries were expressed as a ratio to the corresponding variables in the home country.

FDI

The FDI data used in regressions are drawn from OECD's *International Direct Investment Statistics Yearbook* and covers 28 OECD countries over the 1991-2000 period.¹⁹ Regressions are semi-logarithmic and focus on bilateral stocks of FDI between country pairs. Regressions for FDI flows were also run for robustness purposes and yielded similar results.

Empirical approach

Denoting by y the log of the FDI stock, by X a vector of non-policy controls, by P a vector of (non tax) policy indicators, by T the indicator for the relevant tax rate, by α an unobserved component and by u the error term, the general empirical specification of the bilateral FDI model is as follows:

$$y_{ijt} = \sum_x \beta_x X_{ijt} + \sum_P \beta_P P_{ijt} + \beta T_{ijt} + \alpha_i + \alpha_j + \alpha_t + \alpha_{it} + \alpha_{ij} + \alpha_{jt} + u_{ijt}$$

where i indexes the home country, j indexes the host country and t is the time period. It should be noted that some variables will be specific either to the home or to the host country (*e.g.* FDI restrictions) and will lack the bilateral dimension.

Panel data methods allow controlling for unobserved heterogeneity that is specific to each home and host country, home-host country pair, as well as, for time-varying factors that are common to all countries and specific to home and host countries. The presence of these unobserved influences is particularly likely in bilateral FDI models because country interactions can be affected by institu-

tions, culture, language, cyclical synchronicity, financial market linkages, *etc.* However, estimating a model capturing all these unobserved effects with a standard fixed effects approach may be problematic due to the extensive number of parameters to be estimated and the associated loss of degrees of freedom. To address this problem, two complementary estimation approaches are used. First, a simplified fixed effect model is estimated, in which the bilateral unobserved components are dropped:

$$y_{ijt} = \sum_x \beta_x X_{ijt} + \sum_z \beta_z P_{ijt} + \beta T_{ijt} + \alpha_i + \alpha_j + \alpha_t + u_{ijt} \quad \text{FE}$$

Recognising that estimates of this simplified model may suffer from omitted-variable bias, the analysis adopts the “transformed least square” (TLS) methodology introduced by Erkel-Rousse and Mirza (2002) in the context of empirical trade modelling. This approach expresses all variables in terms of deviations from an average home or host country. Thus, for any given variable Z_{ijt} at time t the operators Δ_i and Δ_j are defined such that:

$$\Delta_i Z_{ijt} = Z_{ijt} - \frac{1}{I} \sum_i Z_{ijt}$$

$$\Delta_j Z_{ijt} = Z_{ijt} - \frac{1}{J} \sum_j Z_{ijt}$$

Using this approach the two following (home country and host country, respectively) equations can be derived from the general model above:

$$\Delta_i y_{ijt} = \sum_x \beta_x \Delta_i X_{ijt} + \sum_P \beta_P \Delta_i P_{ijt} + \beta \Delta_i T_{ijt} + \Delta_i \alpha_i + \Delta_i \alpha_{it} + v_{ijt} \quad \begin{array}{l} \text{TLS} \\ \text{home country} \end{array}$$

$$\Delta_j y_{ijt} = \sum_x \beta_x \Delta_j X_{ijt} + \sum_p \beta_p \Delta_j P_{ijt} + \beta \Delta_j T_{ijt} + \Delta_j \alpha_j + \Delta_j \alpha_{jt} + v'_{ijt} \quad \begin{array}{l} \text{TLS} \\ \text{host country} \end{array}$$

where $\Delta_i \alpha_i$ and $\Delta_j \alpha_j$ represent deviations from the mean (home and host country) fixed effects, $\Delta_i \alpha_{it}$ and $\Delta_j \alpha_{jt}$ indicate home and host country specific deviations that vary over time (proxied in empirical analysis by trends that are specific to the home or host country). Note that the residuals are now re-defined to include both the random errors *and* the deviations of bilateral fixed effects from their means, which are assumed to be i.i.d. random errors.²⁰

In the TLS home country specification bilateral FDI stocks and all the explanatory variables are expressed as deviations from the mean of home countries whereas in the TLS host country specification FDI stocks and the explanatory variables are expressed as deviations from the mean of host countries. The advantage

²²

of the TLS specifications and related assumptions is that in the home (host) country equation all unobserved host (home) country-specific effects as well as common time trends are captured in a non-parametric way before estimating the equation. Thus, only home (host)-specific country effects and home (host)-specific trends need to be estimated. This greatly reduces the number of parameters to be estimated, while leaving the properties of the relevant coefficient estimates unchanged. Thus, the advantage of the TLS home country and TLS host country equations is that the estimated parameters (β_x , β_p , β) are the same as in the general specification and (under the null of i.i.d. random errors) their estimates should also be similar in the two regressions.

REGRESSION RESULTS

In this section regression results are reported for several model specifications that vary mostly according to the number of policy variables used to describe the business environment in the home and host countries. Tax elasticities are estimated, using both the AETR and METR indicators, as well as the host country corporate tax rate. The time period for the panel regressions is restricted to either 1991-99 (METR and corporate tax rate) or 1996-99 (AETR) because the AETR were not available for the whole period. Hence, estimates for the METR and AETR indicators are not strictly comparable because the number of observations differs substantially across regressions. Following the discussion in de Mooij and Ederveen (2005) and Bénassy-Quéré *et al.* (2003), some regressions include a dummy variable describing alternative (exemption or credit) tax schemes in the home country to test whether tax elasticity estimates are influenced by these tax regimes. This variable takes a value of one if an exemption scheme is in operation in a home country and zero if a credit scheme is in operation. Finally, some regressions also include the tax variable expressing bilateral tax policies in other potential investment locations to account for possible FDI “diversion” effects. These effects are usually ignored in empirical studies of tax and FDI and this omission could be a possible source of bias in tax elasticity estimates. In all regression specifications, results are shown for the TLS home country, TLS host country and FE estimation approaches to check the robustness of the estimates to different estimation methods.

Before discussing tax elasticity estimates in the various model specifications reported in Tables 3-6, it is useful to comment on regression results for the basic non-policy variables whose coefficients are remarkably stable across most equations. As already found in Nicoletti *et al.* (2003), coefficient estimates for variables reflecting market size, transport costs, economies of scale (size similarity) and factor proportions are generally significant and signed according to priors. Taken together, the findings of a positive effect of market size similarity and a negative effect of factor dissimilarity support the conjecture that FDI is driven mainly by horizontal (market access) motives among the OECD countries covered by the

sample. It is also worth noting that, in all specifications, the null of no country or time effects is strongly rejected by the data, pointing to a significant influence of unobserved factors on the intensity of bilateral FDI among country pairs.

Tables 3-5 focus on tax elasticity estimates in the simple model in which no other policies shaping the business environment are included. The results for the AETR and METR computed by Yoo (2003) suggest that effective corporate tax rates have a significant negative effect on FDI decisions by MNEs (Tables 3-4). Depending on the estimation approach, the estimated semi-elasticities suggest that, on average, a one percentage point increase in the METR leads to a 2 to 4.5% fall in the stock of FDI invested in a host country. As expected, the semi-elasticities computed for AETR are larger, with one percentage point increase leading to a 3.5 to 5.5% fall in FDI. The corresponding elasticities are 0.6-1.2 for the METR and

Table 3. **The effect of the AETRs on FDI stocks – years 1996-1999¹**

	Outward FDI outstock-taxation						
	TLS		FE	TLS		FE	
	Home	Host		Home	Home		
	A	B	C	D	E	F	G
Total GDP	4.508 [4.22]***	1.776 [1.72]*	0.697 [0.85]	4.532 [4.26]***	4.552 [4.29]***	0.690 [0.85]	0.679 [0.83]
Size similarity	2.505 [4.76]***	1.053 [2.09]**	0.549 [1.33]	2.521 [4.80]***	2.530 [4.83]***	0.551 [1.34]	0.544 [1.32]
Factor dissimilarity	-0.245 [2.95]***	-0.335 [4.20]***	-0.314 [3.69]***	-0.253 [3.05]***	-0.250 [3.01]***	-0.322 [3.78]***	-0.318 [3.73]***
Human capital dissimilarity	-3.213 [6.72]***	-3.685 [7.83]***	-3.256 [7.08]***	-3.130 [6.54]***	-3.120 [6.54]***	-3.149 [6.89]***	-3.151 [6.89]***
Transport costs	-0.422 [2.27]**	-0.170 [0.77]	-0.363 [1.63]*	-0.418 [2.26]**	-0.416 [2.26]**	-0.359 [1.62]*	-0.357 [1.62]*
AETR ²	-0.057 [5.38]***	-0.036 [3.52]***	-0.042 [4.81]***	-0.053 [4.76]***		-0.038 [4.18]***	
TAX exempt				0.418 [1.35]		0.465 [1.81]*	
TAX exempt*AETR					-0.051 [4.52]***		-0.036 [3.90]***
TAX credit*AETR					-0.061 [5.55]***		-0.046 [5.14]***
Constant	0.082 [0.02]	-0.901 [0.40]	3.797 [0.16]	-0.168 [0.04]	-0.300 [0.07]	3.333 [0.14]	3.907 [0.17]
Observations	1 609	1 624	1 607	1 609	1 609	1 607	1 607
R-squared	0.774	0.624	0.8471	0.774	0.774	0.848	0.848

Notes: * significant at 10% level; ** significant at 5% level; *** significant at 1% level.

28 home and host countries included.

1. Absolute value of t-statistics in brackets.

2. Average effective tax rate on FDI.

Source: Authors' calculations.

Table 4. The effect of the METRs on FDI stocks – years 1991-1999¹

	Outward FDI outstock-taxation											
	TLS		FE	TLS				FE			TLS	FE
	Home	Host		Home	Home	Home	Host	H	I	J	Home	
	A	B	C	D	E	F	G	H	I	J	K	L
Total GDP	4.344	1.891	0.885	4.413	4.366	3.829	2.317	0.893	0.885	0.861	3.832	0.861
	[7.18]***	[3.36]***	[2.66]***	[7.30]***	7.22]***	[6.29]***	[4.20]***	[2.68]***	[2.66]***	[2.65]***	[6.29]***	[2.65]***
Size similarity	2.542	1.194	0.681	2.580	2.554	2.238	1.357	0.689	0.682	0.616	2.240	0.616
	[8.62]***	[4.36]***	[4.02]***	[8.76]***	[8.67]***	[7.54]***	[5.01]***	[4.06]***	[4.02]***	[3.72]***	[7.54]***	[3.72]***
Factor dissimilarity	-0.266	-0.358	-0.258	-0.275	-0.267	-0.309	-0.389	-0.265	-0.259	-0.328	-0.311	-0.328
	[4.02]***	[5.35]***	[3.70]	[4.16]***	[4.05]***	[4.67]***	[5.95]***	[3.79]***	[3.70]***	[4.64]***	[4.70]***	[4.64]***
Human capital dissimilarity	-2.463	-2.691	-2.723	-2.372	-2.425	-2.318	-2.600	-2.617	-2.704	-2.411	-2.282	-2.407
	[8.69]***	[9.66]***	[9.38]***	[8.39]***	[8.59]***	[8.27]***	[9.13]	[9.04]***	[9.36]***	[8.66]***	[8.19]***	[8.68]***
Transport costs	-0.603	-0.585	-0.801	-0.596	-0.595	-0.808	-0.823	-0.794	-0.798	-0.959	-0.797	-0.958
	[4.24]***	[3.85]***	[5.88]***	[4.20]***	[4.21]***	[6.04]***	[6.13]***	[5.85]***	[5.86]***	[7.84]***	[5.96]***	[7.82]***
METR ²	-0.046	-0.027	-0.022	-0.044		-0.038	-0.022	-0.020		-0.017		
	[7.01]***	[5.36]***	[5.37]***	[6.54]***		[5.79]***	[4.39]***	[4.91]***		[4.21]***		
TAX exempt				0.412				0.411				
				[2.25]**				[2.61]***				
TAX exempt*METR					-0.043				-0.021		-0.035	-0.016
					[6.06]***				[4.63]***		[4.93]***	[3.73]***
TAX credit*METR					-0.048				-0.023		-0.041	-0.017
					[7.15]***				[5.17]***		[5.89]***	[3.83]***
EMTR elsewhere						0.015	0.014			0.009	0.016	0.009
						[2.20]**	[2.31]**			[1.49]	[2.38]**	[1.51]
Constant	-1.032	0.885	-2.712	-1.279	-1.159	0.021	0.803	-3.378	-2.739	-1.819	-0.111	-1.827
	[1.10]	[1.41]	[0.30]	[1.35]	[1.23]	[1.35]	[1.30]	[0.38]	[0.43]	[0.21]	[0.12]	[0.21]
Observations	3 099	3 103	3 083	3 099	3 099	2 960	2 960	3 083	3 083	2 935	2 960	2 935
R-squared	0.743	0.639	0.840	0.743	0.743	0.759	0.617	0.840	0.840	0.851	0.759	0.851

Notes: * significant at 10% level; ** significant at 5% level; *** significant at 1% level.

28 home and host countries included.

1. Absolute value of t-statistics in brackets.

2. Marginal effective tax rate on FDI.

Source: Authors' calculations.

Table 5. The effect of corporate tax rates on FDI stocks – years 1991-1999¹

	Outward FDI outstock-taxation				
	TLS Host		FE		
	A	B	C	D	E
Total GDP	1.716 [3.03]***	0.848 [2.53]***	0.861 [2.57]***	0.850 [2.54]***	0.859 [2.39]**
Size similarity	1.111 [4.03]***	0.676 [3.96]***	0.687 [4.02]***	0.685 [4.01]***	0.681 [3.73]***
Factor dissimilarity	-0.369 [5.48]***	-0.275 [3.91]***	-0.282 [4.01]***	-0.271 [3.84]***	-0.275 [3.89]***
Human capital dissimilarity	-2.848 [10.26]***	-2.884 [9.96]***	-2.736 [9.49]***	-2.781 [9.65]***	-2.885 [9.96]***
Transport costs	-0.585 [3.84]***	-0.791 [5.80]***	-0.782 [5.77]***	-0.792 [5.90]***	-0.791 [5.80]***
Corporate tax rate ²	-0.000 [0.02]	-0.004 [0.40]	-0.004 [0.40]		-0.003 [0.38]
TAX exempt			0.523 [3.38]***		
TAX exempt*Corporate tax				0.001 [0.07]	
TAX credit*Corporate tax				-0.010 [1.07]	
Tax elsewhere					0.007 [0.10]
Constant	0.682 [1.09]	-2.424 [0.27]	-3.296 [0.36]	-2.653 [0.29]	-3.014 [0.27]
Observations	3103	3083	3083	3083	3083
R-squared	0.635	0.838	0.839	0.839	0.838

Notes: * significant at 10% level; ** significant at 5% level; *** significant at 1% level.

1. Absolute value of t-statistics in brackets.

2. Statutory corporate tax rate.

Source: Authors' calculations.

0.9-1.5 for the AETR. Comparison with the results reported in Tables 1 and 2 suggests that these estimated elasticities are in line with recent studies using a range of indicators of the tax burden on FDI.

Tables 3 and 4 also explore the impact of credit or exemption systems and the possibility of FDI diversion due to changes in tax regimes in similar host countries (from the point of view of the home country).²¹ Consistent with priors, results suggest that *ceteris paribus* moving to an exemption system tends to increase the stock of bilateral FDI. However, in line with previous findings by Slemrod (1990) and Bénassy-Quéré *et al.* (2003), there is no evidence that the response of FDI to changes in either METR or AETR differs across countries that enjoy credit or exemption systems.²² As to diversion effects, a significant positive coefficient is found for the variable that proxies for taxation in alternative but similar host countries, suggesting that increases in the METR in these countries will tend to divert

FDI towards the host country (and *vice versa*).²³ Interestingly, taking diversion into account reduces the value of the estimated tax elasticities. Hence, omission of this variable in previous studies may have led to overestimates of tax elasticities.

As previously discussed, one criticism of studies using AETRs and METRs is that they may lead to biased elasticity estimates because these indicators are unable to account for MNEs' strategies aimed at minimising tax burdens (Swenson, 1994). For instance, MNEs can rely on thin capitalisation of high-taxed subsidiaries, defer tax payment in various ways and rely on triangular structures that provide multiple tax advantages.²⁴ These features are very difficult to model within standard AETR or METR frameworks. An alternative way to capture the importance of tax planning is to assess the direct impact of statutory tax rates on FDI. If tax planning strategies are effective, then these tax rates become more relevant tax indicators for MNEs than the bilateral measures of the tax burden.²⁵ This conjecture is tested in Table 5, by replacing the METR and AETR with the host country corporate tax rate in the regressions. The results show that the estimated effect of the statutory tax rate is statistically insignificant, suggesting either that this procedure is not capturing the potential impact of tax planning or that tax planning is not so extensive as to fully eliminate the impact of home country taxation and the impact of interaction between the tax systems of both home and host country.

As already mentioned, host country tax rates and bilateral tax arrangements are only two of the policy factors that may affect the attractiveness of a host country for international investors. The regressions in Table 6 extend the basic tax and FDI model to cover a number of other policies that are potentially important for MNEs' location choices, focusing on border barriers, product market regulation and labour market arrangements. Regression results show that the estimated effects of these policies correspond to priors. Increasing openness by participating in a free trade area tends to increase FDI stocks in the host country. The effect of easing FDI restrictions is less clear-cut and lacks robustness across estimation approaches and model specifications, perhaps reflecting insufficient in sample variability of this indicator, especially in AETR regressions. Both relatively high employment protection and labour tax wedges tend to curb FDI stocks and the same is true for anticompetitive regulations. Most of these effects are significant at very high levels and are robust across estimation methods and model specifications. The exception is employment protection, which loses significance in the AETR equations, probably reflecting the fact that very few changes in the indicator have occurred over the 1996-99 period.

These extended regressions can address two questions: What is the effect of including broader measures of the business environment on estimated tax elasticities? What is the relative importance of tax and other policies in determining the FDI attractiveness of a country? The answers they provide are very instructive for tax and FDI analyses and may also have broader policy implications. The results

Table 6. The effect of the METRs and AETRs on FDI stocks¹

	Outward FDI outstock-full model							
	TLS		FE ²	TLS		FE ²	TLS	FE ²
	Home ²	Host ²		Home ²	Host ²		Host ²	
	A	B	C	D	E	F	G	H
Total GDP	5.177 [7.86]***	1.428 [2.40]**	0.688 [2.20]**	8.113 [5.48]***	0.094 [0.07]	1.542 [1.62]	1.332 [2.23]**	0.644 [2.05]**
Size similarity	3.019 [9.50]***	0.956 [3.30]***	0.603 [3.77]***	4.258 [5.94]***	0.119 [0.19]	0.907 [1.90]*	0.910 [3.13]***	0.594 [3.69]***
Factor dissimilarity	-0.068 [0.57]	-0.370 [2.57]***	-0.206 [1.44]	0.374 [1.85]*	-0.104 [0.44]	-0.041 [0.18]	-0.361 [2.50]**	-0.197 [1.37]
Human capital dissimilarity	-1.422 [4.37]***	-2.290 [6.89]***	-2.110 [6.46]***	-3.241 [4.72]***	-4.078 [7.18]***	-3.377 [5.97]***	-2.358 [7.12]***	-2.231 [6.89]***
Transport costs	-0.453 [2.92]***	-0.469 [3.25]***	-0.753 [5.32]***	0.068 [0.32]	-0.294 [1.35]	-0.241 [1.23]	-0.456 [3.14]***	-0.747 [5.20]***
METR ³	-0.020 [2.70]***	-0.011 [2.12]**	-0.015 [3.34]***					
AETR ⁴				-0.028 [2.22]**	-0.007 [0.54]	-0.019 [2.21]**		
Corporate tax rate ⁵							0.012 [1.02]	0.002 [0.19]
Free trade area	0.637 [7.99]***	0.547 [7.47]***	0.536 [7.35]***	0.778 [5.12]***	0.432 [2.75]***	0.759 [5.20]***	0.573 [7.84]***	0.565 [7.66]***
FDI restrictions ⁶		-0.039 [1.75]*	0.008 [0.97]		-0.086 [0.83]	0.069 [1.46]	-0.047 [2.05]**	0.005 [0.61]
EPL ratio ⁷	-0.044 [2.97]***	-0.032 [2.07]**	-0.049 [3.29]***	0.015 [0.62]	-0.009 [0.30]	0.008 [0.28]	-0.029 [1.88]*	-0.045 [3.00]***
Wedge ratio ⁷	-2.598 [12.53]***	-3.842 [14.02]***	-3.109 [14.02]***	-3.828 [8.13]***	-4.618 [9.80]***	-3.767 [8.87]***	-3.923 [14.29]***	-3.180 [14.30]***
Regulation ratio ⁸	-0.098 [5.73]***	-0.078 [4.50]***	-0.081 [4.89]***	-0.074 [3.50]***	-0.055 [2.46]**	-0.070 [2.96]***	-0.076 [4.48]***	-0.079 [4.86]***
Constant	0.633 [0.69]	-3.127 [3.95]***	8.406 [0.99]	1.772 [0.4]	-4.963 [2.53]***	-13.617 [0.52]	-3.462 [4.35]***	9.296 [1.10]
Observations	2 366	2 362	2 349	1 015	1 014	1 008	2 362	2 349
R-squared	0.719	0.683	0.844	0.762	0.680	0.867	0.682	0.843

Notes: * significant at 10% level; ** significant at 5% level; *** significant at 1% level.

1. Absolute value of t-statistics in brackets.

Period 1991-99 for METR and 1996-99 for AETR.

2. 21 home and host countries (excluded: The Czech Republic, Hungary, Iceland, Korea, Mexico, Poland and Turkey).

3. Marginal effective tax rate on FDI.

4. Average effective tax rate on FDI.

5. Statutory corporate tax rate.

6. It increases with the intensity of restrictions.

7. Ratio of the EPL and labour wedge indicators in the host and home countries. The ratios increase as EPL or the labour tax wedge in the host country becomes relatively more restrictive.

8. Ratio of indicators of lack of liberalisation in the host and home countries. The ratio increases as product market regulation in the host country becomes relatively more restrictive.

Source: Authors' calculations.

Table 6. The effect of the METRs and AETRs on FDI stocks¹ (cont.)

	Outward FDI outstock-full model				
	TLS	FE ²	TLS		FE ²
	Home ²		Home ^b	Host ²	
	I	J	K	L	M
Total GDP	5.183 [7.86]***	0.689 [2.20]**	4.818 [7.16]***	1.367 [2.26]**	0.713 [2.27]**
Size similarity	3.025 [9.50]***	0.607 [3.80]***	2.822 [8.69]***	0.923 [3.13]***	0.614 [3.83]***
Factor dissimilarity	-0.075 [0.63]	-0.207 [1.45]	-0.125 [1.05]	-0.429 [2.89]***	-0.196 [1.37]
Human capital dissimilarity	-1.356 [4.20]***	-2.056 [6.30]***	-1.394 [4.23]***	-2.271 [6.70]***	-2.107 [6.45]***
Transport costs	-0.441 [2.85]***	-0.744 [5.27]***	-0.449 [2.93]***	-0.443 [3.07]***	-0.754 [5.33]***
METR ³			-0.018 [2.38]**	-0.010 [1.86]*	-0.015 [3.24]***
TAX exempt*METR	-0.016 [-2.11]**	-0.017 [3.56]***			
TAX credit*METR	-0.022 [2.99]***	-0.013 [2.65]***			
EMTR elsewhere			0.004 [0.45]	0.002 [0.34]	0.035 [1.38]
Free trade area	0.632 [7.95]***	0.534 [7.33]***	0.611 [7.43]***	0.521 [6.89]***	0.534 [7.32]***
FDI restrictions ⁴		0.008 [0.95]		-0.047 [2.07]**	0.007 [0.90]
EPL ratio ⁵	-0.044 [2.93]***	-0.049 [3.24]***	-0.042 [2.88]***	-0.030 [2.00]**	-0.049 [3.28]***
Wedge ratio ⁵	-2.620 [12.63]***	-3.139 [14.09]***	-2.596 [12.51]***	-3.789 [13.94]***	-3.109 [14.00]***
Regulation ratio ⁶	-0.099 [5.75]***	-0.082 [4.91]***	-0.097 [5.72]***	-0.078 [4.50]***	-0.082 [4.94]***
Constant	0.503 [0.54]	8.459 [0.99]	0.949 1.03	-3.337 [4.17]***	6.452 [0.75]
Observations	2 366	2 349	2 315	2 312	2 349
R-squared	0.719	0.844	0.7224	0.6799	0.8445

Notes: * significant at 10% level; ** significant at 5% level; *** significant at 1% level.

1. Absolute value of t-statistics in brackets.

Period 1991-99 for METR.

2. 21 home and host countries (excluded: The Czech Republic, Hungary, Iceland, Korea, Mexico, Poland and Turkey).

3. Marginal effective tax rate on FDI.

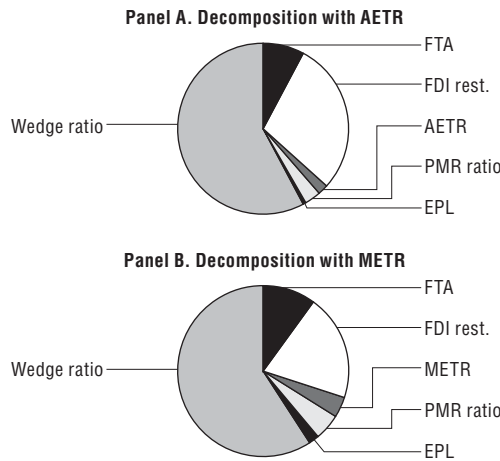
4. It increases with the intensity of restrictions.

5. Ratio of the EPL and labour wedge indicators in the host and home countries. The ratios increase as EPL or the labour tax wedge in the host country becomes relatively more restrictive.

6. Ratio of indicators of lack of liberalisation in the host and home countries. The ratio increases as product market regulation in the host country becomes relatively more restrictive.

Source: Authors' calculations.

Figure 3. Contributions of policy factors to the deviations in FDI¹



1. Figures summarise the contributions of different policies to deviations in FDI. Due to illustrative purposes, the contributions of non-policy related factors, as well as home and host country specific effects and time effects are not shown. Contributions are based on the results of host country equations (B) and (E) in Table 6 and are computed taking the average over the estimation period and investor countries.
Source: Authors' calculations.

show that including other policy variables more than halves tax elasticity estimates, suggesting that most empirical studies of the tax and FDI link suffer from a serious omitted-variable bias that grossly overstates the response of FDI to taxes.²⁶ More importantly, regression results suggest that, while taxation appears to have had a small but significant negative effect on FDI, this effect is dwarfed by the effect of other policies. By way of illustration, Figure 3 shows the average contributions of policy factors to explaining the changes in FDI.²⁷ Taken together, policies seem to have had a substantial effect on FDI: around 40% of the country-specific deviations of FDI from OECD average are explained by policy factors and 60% by non-policy related factors, as well as home and host country-specific effects and time-fixed effects. However, the decomposition of policy influences confirms that taxation contributes relatively little to explaining FDI compared with other policies. These results, if confirmed by further analysis, would tend to tone down the public debate around the relevance of cross-country differences in corporate tax policies for FDI. Incidentally, this would seem to be in line with business surveys that usually do not put host country taxation at the top of MNEs' concerns when choosing locations. Nonetheless, the fact that there is a tendency for both convergence and decline over time of corporate tax rates calls for further research in this area.

CONCLUDING REMARKS

There is a growing consensus that taxation matters for FDI, but the extent to which it does so has been subject to debate, and different studies produce varying tax elasticities of FDI. While these studies use a range of tax indicators, most of them concentrate exclusively on taxation ignoring the potential effect of other policies that affect the business environment in the host country where foreign affiliates operate. Empirical studies also generally ignore the possibility that bilateral FDI responds not only to home and host country tax policies and bilateral arrangements, but also to tax policies of countries that would represent valid alternatives as FDI locations for the home country MNEs, because they are similar in economic structure and in other (non-tax) policies.

In this paper, these issues are addressed using a panel of OECD countries over the 1990s to estimate a fairly general model of bilateral FDI. The model includes new forward-looking tax indicators that subsume home and host country tax policies as well as bilateral arrangements governing the tax treatment of foreign source income. The main results, which are summarised in Table 7, can be stated very simply: focusing only on taxation in home and host countries and omitting other policies or diversion effects may lead to a serious overestimation of tax elasticities and their relevance for policy. The simple model including only the tax

Table 7. Summary table of the estimated semi-elasticities and elasticities of tax rates

	Basic model (only bilateral tax policies)					
	Home country		Host country		FE	
	Semi-elasticity	Elasticity	Semi-elasticity	Elasticity	Semi-elasticity	Elasticity
METR (1991-2000)	-4.6	-1.2	-2.7	-0.7	-2.2	-0.6
AETR (1996-2000)	-5.7	-1.5	-3.6	-0.9	-4.2	-1.1
	Basic model + tax diversion effects					
	Home country		Host country		FE	
	Semi-elasticity	Elasticity	Semi-elasticity	Elasticity	Semi-elasticity	Elasticity
METR (1991-2000)	-3.8	-1.0	-2.2	-0.6	-1.7	-0.4
	Full model (including non-tax policies effecting the business environment)					
	Home country		Host country		FE	
	Semi-elasticity	Elasticity	Semi-elasticity	Elasticity	Semi-elasticity	Elasticity
METR (1991-2000)	-2.0	-0.5	-1.1	-0.3	-1.5	-0.4
AETR (1996-2000)	-2.8	-1.0	-0.7	-0.2	-1.9	-0.5

Notes: Elasticities are evaluated at the sample mean of METR and AETR.

Source: Authors' calculations.

indicators shows tax elasticities and other related results (*e.g.* the lack of sensitivity of elasticity estimates to exemption or credit systems) that are in line with previous studies. However, when proxies are included for a range of border, product and labour market policies or for “tax diversion” of FDI to similar host countries, the results are at variance with the mainstream literature: much smaller tax elasticity estimates were found. Moreover, estimates imply that the effects of taxation on FDI are quantitatively much less relevant than the effects of other policies that contribute to make a location attractive to international investors, such as openness, labour costs and regulatory hurdles. If these results were confirmed using other kinds of data (*e.g.* on activity of foreign affiliates) and tax indicators (*e.g.* backward-looking indicators such as average tax rates), it would mean that empirical analyses that omit these factors are likely to provide a distorted picture of the response of FDI to tax policies and, by grossly overstating such response, would run the risk of misleading the policy debate.

Notes

1. Hines (1999) and de Mooij and Everdeen (2001, 2005) provide comprehensive overviews of these studies.
2. Devereux and Freeman (1995), Hines (1997), Mayer and Mucchielle (1999), Gropp and Kostial (2000) and Bénassy-Quéré *et al.* (2003, 2005) are recent exceptions.
3. Previous surveys include Hines (1997, 1999).
4. The typical elasticities are obtained using the fitted values for elasticities obtained from regressing elasticity estimates of various studies on a set of study characteristics. The elasticities used as dependent variables in the meta-analysis are computed using the coefficients of the studies reviewed and evaluated at the mean value of the FDI variables and tax rates.
5. Moreover, financial flows may be geographically biased due to MNEs' use of strategically-located holdings to intermediate their real investments.
6. In the meta-regressions of de Mooij and Ederveen (2005), which control for other sources of bias, "typical" elasticity estimates based on count data are significantly lower than those estimated using total financial FDI data.
7. Under the exemption scheme repatriated profits from foreign affiliates are exempt from corporate taxation in a home country and are taxed only according to the host-country tax rate whereas under the credit scheme MNEs are allowed to deduct taxes paid abroad by their foreign affiliates from their tax payments in the home country. Hence, *ceteris paribus* under credit and exemption systems, host country taxes exert different incentives for parent companies to undertake FDI. A multinational residing in a credit-system country could in principle offset the increase in the host-country tax burden and leave its net tax burden unaffected by claiming foreign tax credits in the home country, while a multinational residing in an exemption-system country would not be able to avoid the rise in the host-country tax burden, implying a one-to-one rise in the overall tax burden.
8. All these measures focus on the corporate sector and ignore the possible role played by household taxation regimes.
9. An additional advantage of these measures is that they can be used to simulate the effects of changes in single elements of tax regimes on FDI tax wedges, which is clearly impossible with *ex post* measures.
10. Although in the long run even the forward-looking measures of tax burden may be endogenous as tax codes can be affected by international influences in several ways. For example, competitive pressures from foreign investors may strengthen the incentives for domestic firms to seek reform in tax policies that put them at a competitive

disadvantage *vis-à-vis* foreign investors. For further discussion of political economy influences and structural policies, see *e.g.* Høj *et al.* (2006).

11. The METR was originally constructed by King and Fullerton (1984) and OECD (1991) for domestic and cross-border investment respectively. The AETR was developed by Devereux and Griffith (1999) and extended by the European Commission (2001) for cross-country comparisons of tax burdens on FDI. The construction of these indicators also incorporates a number of assumptions concerning the financing and asset structure of firms, asset-specific depreciation rates and inflation rates.
12. See Yoo (2003) for a detailed methodology and a description of the tax data used to estimate the METR and AETR.
13. A common reason for an MNE to create a foreign affiliate is to earn an economic rent by exploiting some firm-specific advantage (Markusen, 2002). Due to economies of scale in production, it will choose to build one plant among alternative locations.
14. See, for example, Grubert (1998), Grubert and Mutti (1991), and Altshuler and Grubert (2003).
15. In the sensitivity analysis, the market size was proxied by the product of both home and host country GDP and the results were robust to this change in variable.
16. Other non-policy variables were included in regressions but were dropped in the final specification due to lack of significance, among these R&D intensity, infrastructure endowments, bilateral exchange rates and exchange rate variability.
17. Other policy variables originally included in regressions but subsequently dropped for lack of significance or multicollinearity includes the Ginarte and Park (1997) indicator of intellectual property rights and an indicator of tariff and non-tariff barriers.
18. Alternatively, MNEs may be attracted by a weakly competitive environment to exploit market power.
19. To construct a balanced panel, some missing data were filled by setting (missing) outward FDI stocks from country *i* to country *j* equal to inward FDI stocks of country *j* from country *i*.
20. In other terms:

$$v_{ijt} = \Delta_i u_{ijt} + \Delta_i \alpha_{ij}$$

$$v'_{ijt} = \Delta_j u_{ijt} + \Delta_j \alpha_{ij}$$
 This is the same assumption made by Erkel-Rousse and Mirza (2002).
21. Specifications assessing the impact of tax exemption *versus* credit system are reported only for home country and fixed-effects specifications since this is a home country characteristic and using the TLS methodology such characteristics are, by definition, captured in a non-parametric way in the host country specification. For further discussion, see the previous section and Erkel-Rousse and Mirza (2002).
22. As suggested by Tanzi and Bovenberg (1990) and Altshuler and Newlon (1993), excess foreign credit positions and tax planning strategies of MNEs may make the distinction between credit and exemption countries unimportant in practice.
23. Unfortunately, the sample period is too short to estimate the corresponding effect on AETR regressions.
24. See OECD (2007) for a long list of such strategies in both exemption and credit systems.

25. Alternatively, if deferral was the main form of tax planning, the relevant tax variables could be AETR and METR of the host country alone (excluding taxation in the home country).
26. The results concerning credit and tax exemption schemes as well as the variable capturing possible FDI diversion are relatively robust to the inclusion of other policy variables, although the statistical significance of the FDI diversion variable is reduced.
27. Contributions are based on the results of host country equations (B) and (E) in Table 6, and are computed taking averages over the estimation period and home countries.

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