

Azémar, Céline; Dharmapala, Dhammika

Working Paper

Tax Sparing, FDI, and Foreign Aid: Evidence from Territorial Tax Reforms

CESifo Working Paper, No. 5874

Provided in Cooperation with:

Ifo Institute – Leibniz Institute for Economic Research at the University of Munich

Suggested Citation: Azémar, Céline; Dharmapala, Dhammika (2016) : Tax Sparing, FDI, and Foreign Aid: Evidence from Territorial Tax Reforms, CESifo Working Paper, No. 5874, Center for Economic Studies and ifo Institute (CESifo), Munich

This Version is available at:

<https://hdl.handle.net/10419/141851>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



Working Papers

www.cesifo.org/wp

Tax Sparing, FDI, and Foreign Aid: Evidence from Territorial Tax Reforms

Céline Azémar
Dhammika Dharmapala

CESIFO WORKING PAPER NO. 5874
CATEGORY 1: PUBLIC FINANCE
APRIL 2016

An electronic version of the paper may be downloaded

- *from the SSRN website:* www.SSRN.com
- *from the RePEc website:* www.RePEc.org
- *from the CESifo website:* www.CESifo-group.org/wp

ISSN 2364-1428

Tax Sparing, FDI, and Foreign Aid: Evidence from Territorial Tax Reforms

Abstract

The governments of many developing countries seek to attract inbound foreign direct investment (FDI) through the use of tax incentives for multinational corporations (MNCs). The effectiveness of these tax incentives depends crucially on MNCs' residence country tax regime, especially where the residence country imposes worldwide taxation on foreign income. Tax sparing provisions are included in many bilateral tax treaties to prevent host country tax incentives being nullified by residence country taxation. We analyse the impact of tax sparing provisions using panel data on bilateral FDI stocks from 23 OECD countries in 113 developing and transition economies over the period 2002-2012, coding tax sparing provisions in all bilateral tax treaties among these countries. We find that tax sparing agreements are associated with 30 percent to 123 percent higher FDI. The estimated effect is concentrated in the year that tax sparing comes into force and the subsequent years, with no effects in prior years, and is thus consistent with a causal interpretation. Four countries - Norway in 2004, and the U.K., Japan, and New Zealand in 2009 - enacted tax reforms that moved them from worldwide to territorial taxation, potentially changing the value of their preexisting tax sparing agreements. However, there is no detectable effect of these reforms on bilateral FDI in tax sparing countries, relative to nonsparing countries. These results are consistent with tax sparing being an important determinant of FDI in developing countries for MNCs from both worldwide and territorial home countries. We also find that these territorial reforms are associated with increases in certain forms of bilateral foreign aid from residence countries to sparing countries, relative to nonsparing countries. This suggests that tax sparing and foreign aid may function as substitutes.

JEL-Codes: H250, F210, F350.

Keywords: FDI, international tax, development, foreign aid, tax sparing.

Céline Azémar
Adam Smith Business School
University of Glasgow / UK
celine.azemar@glasgow.ac.uk

Dhammika Dharmapala
University of Chicago Law School
USA - 60637 Chicago IL
dharmap@uchicago.edu

April 18, 2016

We thank Julia Braun, Mihir Desai, Rodolphe Desbordes, Jane Gravelle, Ruud de Mooij, Shang-Jin Wei, and Jing Xing for helpful comments and discussions, along with seminar participants at the Fiscal Affairs Department of the IMF, the Asian Development Bank, the ninth Annual Symposium of the Oxford University Centre for Business Taxation, the International Institute of Public Finance Annual Congress, and the National Tax Association meetings. Morgen Miller of the Coase-Sandor Institute for Law and Economics at the University of Chicago Law School provided outstanding research assistance. Dharmapala also acknowledges the financial support of the Lee and Brena Freeman Faculty Research Fund at the University of Chicago Law School. Any remaining errors or omissions are, of course, our own.

1 Introduction

Attracting inbound foreign direct investment (FDI) by multinational corporations (MNCs) has long been an important objective of many governments in developing and transition economies. One motivation is the possibility that FDI creates positive spillovers for local firms (e.g. Javorcik (2004)). It may also be the case that FDI results in more efficient patterns of common ownership of assets across jurisdictions, as stressed for instance by Desai and Hines (2003). Thus, the determinants of FDI (both in developing countries and more broadly) have been analysed extensively in the international economics and economic development literatures. At the same time, scholars in public finance have focused on the impact of corporate tax rates and of various features of the international tax regime - including bilateral tax treaties - on the location of FDI (e.g. Blonigen and Davies (2004), and Dharmapala and Hines (2009)).¹ In view of the perceived benefits of FDI and of the sensitivity of FDI to taxes, many governments of developing countries offer tax holidays and other tax incentives for MNCs. The effectiveness of these measures, however, depends in crucial respects on the tax regime prevailing in the MNC's country of residence (where the parent firm is headquartered).

In the terminology of international taxation, the income generated by normal business operations in the source country (in which MNC affiliates undertake business activity) is referred to as "active" business income, whereas other income (such as interest and royalties) is referred to as "passive" income. Residence countries with "worldwide" tax systems impose tax on the active foreign business income of resident MNCs (generally with a credit for taxes paid to the source country). Residence countries with "territorial" (or "exemption") systems exempt the "active" foreign income of their MNCs from residence country taxation (so that this income is only taxed by the source country). However, both worldwide and territorial residence countries typically tax the passive foreign income earned by their resident MNCs.

When a source country institutes a tax holiday for an MNC based in a worldwide residence country, the benefit to the MNC from the tax holiday may be fully or partially undone by higher taxes owed to the residence country. Essentially, the lower tax paid to the source country lowers not only the local affiliate's tax liability, but also the tax credit available to the parent in its residence jurisdiction when the local affiliate pays a dividend to the parent. Note that this offsetting effect applies to both active and passive income. For MNCs based in a territorial residence country, the same effect holds for passive income, but not for active income (which its residence country does not seek to tax, regardless of whether the source country offers a tax holiday). As MNCs care about their combined tax liability to both governments, the source country's aim of attracting more FDI will thus be frustrated, especially when the residence country imposes worldwide taxation.

¹See Hines (1999) and De Mooij and Ederveen (2003) for surveys.

This fundamental problem has been discussed extensively since the 1950's, when the Royal Commission on the Taxation of Profits and Income recommended that the U.K. offer tax relief to its resident firms through its tax treaties in circumstances such as these. Since then, the U.K., Japan and many other residence countries - with the notable exception of the United States - have developed an extensive network of tax sparing agreements, primarily with developing source countries (as documented in Section 3 below). Tax sparing agreements are provisions that form part of bilateral tax treaties. They provide, in essence, that the residence country agrees to provide its resident MNCs with a tax credit for taxes that would ordinarily have been due to the source country, but that are foregone (or "spared") by the source country pursuant to a programme of tax incentives. This ensures that the source country's attempts to provide tax incentives for FDI are not undone by the residence country's taxes (even when the residence country has a worldwide tax system).

There has been fairly extensive discussion among scholars of international tax law and policy of the normative justifications for tax sparing agreements and the related question of whether developing countries should offer tax incentives for FDI (Brooks, 2009). However, the empirical literature on the effects of tax sparing agreements is quite limited. Hines (2001) analyses cross-sectional data for 1990 on the location of FDI by Japanese and U.S. MNCs in 67 source countries. He finds that Japanese FDI is substantially higher, relative to U.S. FDI, in source countries with which Japan has a tax sparing agreement. U.S. FDI serves here as a control, as both Japan and the U.S. had worldwide tax systems, while the U.S. has no tax sparing agreements. The magnitude of the effect is very large: Japanese FDI stocks in sparing countries were found to be 1.4 to 2.4 times larger (i.e. 40 percent to 140 percent larger) than in the absence of tax sparing agreements. Azémar et al. (2007) use panel data on FDI by Japanese MNCs in 29 source countries (of which 13 have tax sparing agreements with Japan) over 1989-2000. There is essentially no within-country variation in tax sparing agreements over this period, and so Azémar et al. (2007) use random effects estimates and examine the impact of the length of time that has elapsed since a tax sparing agreement entered into force. Their results suggest that each additional year subsequent to the signature of a tax sparing provision increases Japanese FDI activity by 2.3-11 percent. In common with Hines (2001), they find a large overall effect, with Japanese FDI flows being 2.8 times larger in tax sparing countries.

These studies suggest that tax sparing is an important determinant of FDI, and cast some doubt on the OECD's (1998, p. 5) claim that: "Investment decisions taken by international investors resident in credit [worldwide] countries are rarely dependent on or even influenced by the existence or absence of tax sparing provisions in treaties". However, these studies are based on studying FDI from one residence country - Japan - that had a worldwide system prior to 2009, and so are unable to measure the impact of tax sparing for MNCs from a wider set of residence countries (including those with territorial systems). Moreover, they are unable to use longitudinal variation in tax sparing agreements to address potential unobserved

heterogeneity at the level of the residence-source-country-pair, and have no source of quasi-experimental variation in the existence or value of tax sparing agreements.

This paper analyses the effects of tax sparing agreements on FDI using a large panel dataset on bilateral FDI from the OECD's database. The data consists of stocks of FDI from 23 OECD-member residence countries to 113 developing and transition source countries over the period 2002-2012. The dataset is identified at the country-pair-year level, and the baseline estimating sample includes 8,189 observations on 1,103 country-pairs. We code tax sparing agreements by searching the text of all existing bilateral tax treaties between any of the 23 residence countries and any of the 113 source countries for language specifying a tax sparing provision. While most tax sparing agreements entered into force prior to 2002, we identify 34 instances in which new tax sparing agreements entered into force or in which existing tax sparing agreements were terminated over 2002-2012; 32 of these changes that occurred after 2002 provide usable longitudinal variation.

We analyse both the impact of tax sparing agreements and that of the residence country tax system, using two sources of identification. The first is the longitudinal variation generated by the signing or termination of tax sparing agreements. The second source is based on tax reforms in some of the residence countries that moved them from worldwide to territorial taxation of the foreign income of their resident MNCs. Among our residence countries, Norway implemented such a reform in 2004, while the U.K., Japan and New Zealand all implemented this type of reform in 2009. These territorial reforms might be expected to have reduced the importance of tax sparing agreements with developing countries (recall from our earlier discussion that tax sparing applies to both passive and active income under a worldwide regime, while it only applies to the former under a territorial regime). Arguably, these territorial reforms were motivated by concerns about the competitiveness of resident MNCs in making foreign acquisitions (primarily in other developed countries) and by the possibility of changes in residence by MNCs, rather than by concerns related to the promotion of economic development in developing countries. To that extent, the reforms provide a source of arguably quasi-exogenous variation in the value of preexisting tax sparing provisions.²

In our dataset, a substantial number - close to half - of the observations are zeros (indicating the absence of any FDI from the residence to the source country in that year). In order to address the econometric issues that arise from the large number of zeros, we use a Poisson pseudo-maximum likelihood (PML) fixed effects specification (with country-pair fixed effects and year effects). However, the results are broadly similar when using an OLS fixed effects specification. Using a standard set of control variables, we find that tax sparing agreements are associated with a 30 percent higher stock of bilateral FDI. This estimate is statistically significant and substantial in magnitude (albeit somewhat smaller than those in the existing

²These reforms have been studied, for instance, by Matheson et al. (2013), who analyse whether the territorial reforms spurred greater tax competition among developing host countries.

literature reviewed above). However, tax sparing agreements are of course potentially endogenous. For instance, an unobservable increase in a source country's salience in the U.K. may both lead to the U.K. signing a tax sparing agreement with that source country and British MNCs investing more heavily in that country.

Unfortunately, there is no quasi-experimental variation in the signing or termination of tax sparing agreements that can fully address this concern. However, following Autor (2003), we add to our specification an extensive set of leads and lags of the tax sparing variable in order to analyse the dynamic pattern of the effect. We find that there is no anticipation of the tax sparing agreement - the "effects" prior to the tax sparing agreement entering into force are statistically insignificant and very small. Rather, the estimated effect is concentrated in the year that the agreement enters into force (and to a lesser extent in the following years). This pattern is inconsistent with a preexisting trend of increasing FDI between countries that sign tax sparing agreements. Instead, this pattern appears consistent with a causal interpretation of the estimated effect of tax sparing agreements. In addition, we also use an instrumental variables (IV) strategy based on instrumenting for tax sparing agreements using the average number of such agreements signed between the residence country and countries that are in the same region as the source country. While there are some caveats about the exclusion restriction, the IV analysis is also consistent with a causal interpretation and suggests a higher effect of tax sparing on FDI, as tax sparing agreements are associated with a 123 percent higher stock of bilateral FDI.

The previous literature has not investigated the question of whether the effect of tax sparing agreements differs across worldwide and territorial residence countries. We find no significant difference in the estimated effect. While this may appear surprising, it is consistent with a scenario in which the ability of worldwide MNCs to defer the payment ("repatriation") of dividends out of active income from their foreign affiliates to their parent substantially mitigates the burden of residence country taxation. In such a scenario, the value of tax sparing for worldwide MNCs (where it applies to both active and passive income) would tend to converge to that for territorial MNCs (where it applies only to passive income). In support of this interpretation, there is substantial evidence of worldwide MNCs utilising the potential for deferral of residence country taxation (see for instance Dharmapala et al. (2011) for U.S. MNCs; Egger et al. (2015) find that following the U.K.'s territorial tax reform in 2009, U.K.-owned affiliates significantly increased repatriations, relative to a control group of non-U.K.-owned affiliates).

Consistent with this interpretation, we also find that the territorial tax reforms in Norway, the U.K., Japan and New Zealand did not substantially reduce FDI from those countries to source countries with which they have tax sparing agreements, relative to source countries with which they do not have tax sparing agreements. If tax sparing is differentially valuable for worldwide MNCs, we would expect that these territorial reforms would induce (in relative terms) a reallocation of FDI from sparing to nonsparing coun-

tries. A difference-in-differences estimate of this effect can arguably be given a causal interpretation, as the value of preexisting tax sparing agreements would be exogenously reduced. However, the estimated effect is statistically indistinguishable from zero. This suggests that much of the benefit from tax sparing is available to territorial MNCs, an interpretation supported by an additional finding that withholding tax rates on interest and royalties are strong determinants of FDI, especially when we consider global effective withholding tax rates adjusted for the tax sparing provision. This reinforces the continuing relevance of tax sparing in a world in which most residence countries are territorial.

The apparent effect of tax sparing provisions may be due instead to a more general effect of bilateral tax treaties (BTTs) on FDI (although the prior literature on BTTs finds little support for an effect of tax treaties on FDI (Davies, 2004)). We thus construct an indicator for the existence of a BTT for each country-pair in each year. On average, OECD countries include a tax sparing provision in 31 percent of their BTTs with developing countries. Thus, it is feasible to disentangle the general effect of BTTs from the specific impact of tax sparing. We find that in the absence of tax sparing, BTTs are not associated with significant increases in FDI, while BTTs with tax sparing have a large positive effect as in our baseline specification. The basic result is also robust to controlling for treaty shopping. An investor from a third country might attempt to benefit from the existence of tax sparing in the tax treaty between the resident and the source countries. We consider the potential effect of "past" tax treaty shopping which can increase the apparent effect of tax sparing on bilateral FDI, when FDI is no longer diverted via a third country. This analysis uses a variable measuring total FDI from the home country to potential conduit countries, i.e. countries having a tax sparing provision with the host country. The results indicate that the effect of tax sparing on bilateral FDI originating from the home country is not overestimated by past treaty shopping practices.

We also shed light on the incidence of territorial tax reforms on FDI in both tax sparing and nonsparing countries, by allowing for a different intercept for each of the four countries experiencing a shift to territoriality. These reforms have been accompanied by decreases in the statutory tax rates to stimulate domestic investments and to mitigate the increase of outbound FDI. The magnitude of the decline in statutory tax rates varies substantially from one country to another - ranging from 24 percent for the U.K. to 38 percent for Japan - suggesting that heterogeneity can be expected depending on the tax rate of the home country. We find that the territorial tax reforms only have a positive effect on Japanese and New Zealand FDI in developing countries. In nonsparing countries, the effect on FDI is higher, the higher the corporate tax differential between the country-pair. In contrast, the U.K. and Norwegian territorial tax reforms are not associated with changes in FDI in developing countries.

Finally, we also analyse how tax sparing agreements and territorial reforms affect bilateral foreign aid, or Official Development Assistance (ODA) from residence countries to source countries. Tax sparing credits represent a transfer from the residence country treasury to the source country treasury (relative to a

scenario in which the same economic activity occurs but there is no tax sparing agreement). Thus, there is a sense in which tax sparing may serve as a substitute for ODA. We use data on bilateral ODA to test for this possibility. Tax sparing agreements are associated with decreases in ODA, but the relationship is not statistically significant (and is in any event difficult to interpret due to the potential endogeneity of tax sparing agreements). Territorial reforms provide quasi-exogenous variation in the value of tax sparing credits granted by the residence country. While there is no significant effect of these reforms on overall bilateral ODA, the component of ODA that consists of grants increases at the time of a territorial reform. This is consistent with an impure altruism framework in which residence countries care about the (weighted) sum of tax sparing credits and ODA, and provides some evidence that tax sparing may serve as a substitute for ODA.

The paper is organised as follows. The next section presents some background information on tax sparing under territorial and worldwide tax systems. Section 3 introduces the data and estimation strategy, while Section 4 presents the results of the empirical analysis. Finally, Section 5 concludes the paper.

2 Tax Sparing under Territorial and Worldwide Tax Systems

The international tax regime is in large measure defined by a network of thousands of bilateral tax treaties between countries. These have the stated purpose of avoiding double taxation or nontaxation of income earned in one jurisdiction by entities resident in another jurisdiction. Thus, treaties seek to regulate the claims of source and residence jurisdictions to tax the same income. As discussed previously, tax sparing agreements are implemented by means of specific provisions in bilateral tax treaties with developing countries. These provisions are traditionally considered as part of the foreign aid policy of developed countries (OECD, 1998). They are designed to promote economic development (via industrial, commercial, scientific, or educational development) by ensuring that special fiscal incentive measures, used by the host country to attract FDI, are not nullified by the home country tax system. An example is the Article 21 (on the “Elimination of Double Taxation”) of the tax treaty between the U.K. and Sri Lanka, which states in part that:

“For the purposes of [the calculation of the U.K. tax credit], the term “Sri Lanka tax payable” shall be deemed to include any amount which would have been payable as Sri Lanka tax for any year but for an exemption or reduction of tax granted for that year or any part thereof under [various specified provisions of Sri Lankan law] ... [or] any other provision which may subsequently be made granting an exemption or reduction of tax which is agreed by the competent authorities to be of a substantially similar character...”.³

³Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/412292/sri-lanka-consol.pdf

The crucial element of a tax sparing provision is thus that the tax credit permitted by the residence country to its MNCs “shall be deemed to include” tax “spared” by the source country as well as taxes actually paid to the source country.

While most major OECD countries have signed tax sparing agreements of this kind with developing countries since the 1960's, the United States remains a notable exception. In 1957, a tax sparing agreement appeared for the first time in a treaty negotiated between the United States and Pakistan. However, this treaty has never been ratified by the U.S. Senate because of legislators' opposition to the inclusion of a tax sparing provision, and the United States has subsequently not concluded any tax treaties containing sparing provisions. This position was significantly influenced by the prominent tax law scholar and official Stanley Surrey of Harvard Law School, who argued that tax sparing compromises the principle of capital export neutrality and that “ tax sparing irrationally granted credit for phantom taxes and that the attendant explanations for non-payment of U.S. taxes were illogical” (as quoted in Toaze (2001), p 884).⁴ On the other hand, from the perspective of developing countries, tax sparing is argued to represent an important tool to exercise control over their tax incentive programs, as it would be much more difficult to attract foreign investment without tax incentives that can be protected via tax sparing. Other important arguments put forward by developing countries are that tax sparing allows them to target tax incentives to specific sectors of the economy and to exert greater control over their development programme (Mitchell, 1997; Tillinghast, 1996).

The implications of tax sparing provisions are somewhat different for MNCs resident in territorial countries and those resident in worldwide countries. The following discussion presents simple expressions capturing the global tax costs faced by different types of income - earnings and profits, dividends, royalties and interest - affected by tax sparing provisions. While there are substantial differences in the tax laws of different countries, this discussion uses stylised characterisations of worldwide and territorial systems to provide a simple account that applies in general terms to most countries.

2.1 Tax Costs Without Tax Sparing

Territorial tax system

A territorial (or "exemption") tax system exempts dividends paid by foreign subsidiaries to their parents. Consequently, profits made by domestic enterprises operating abroad are not subject to the home country

⁴Recently, the United States has experienced a growing trend towards “inversion” transactions - mergers in which U.S.-resident MNCs become the subsidiaries of MNC parents resident elsewhere, such as Canada. While there are many different tax and nontax motivations for these inversions, a practitioner has recently argued that: “Another tax benefit offered by a Canadian parent corporation is the ability to utilize the “tax sparing” provisions contained in many Canadian income tax treaties”, Bilzin-Sumberg (2014). Available at: <http://www.bilzin.com/publications/Detail.aspx?publication=1098>

corporation tax, even if dividends are repatriated to the parent company. Other forms of income such as royalties and interest receipts do not benefit from this exemption treatment. To avoid double taxation, the parent company is eligible to claim a foreign tax credit up to the value of the home tax liability, for the withholding taxes paid abroad by its affiliates.

Thus, under a territorial tax system, income earned abroad is taxed at the foreign country effective tax rate t'_f . Depending on the amount of equity and debt injected by the parent company and licenses for intellectual property used by the affiliate, the income earned will be repatriated as dividends, paid as interest or royalties, or reinvested. The taxes paid abroad on a dividend payment of D_f are $t'_f D_f + w_f'^d (D_f - t'_f D_f)$, where $w_f'^d$ denotes the host country effective withholding tax rate on dividends. Consequently, the global tax rate on a dividend payment from the affiliate to the parent is: $t'_f + w_f'^d (1 - t'_f)$.

The tax costs associated with interest and royalties depend on both host country and home country tax liabilities. Host country income taxes are deductible from interest and royalties, but effective withholding taxes on interest, $w_f'^i$, and on royalties, $w_f'^r$, have to be paid when they are repatriated. Interest and royalties received by companies are taxed in the home country at the statutory tax rate, t_h , with a credit for the withholding taxes paid. Because withholding taxes on interest and royalties are generally lower than statutory tax rates, they are fully creditable against the home country statutory tax rate. Thus the global tax rate on interest and royalty payments is generally, t_h .

Worldwide tax system

Under a worldwide tax system, taxes are levied on the worldwide income of resident corporations. In order to avoid double taxation of the foreign income, investors are allowed to claim a foreign tax credit for income taxes paid in the host country, up to the home country's statutory tax rate, t_h . The income earned abroad is taxed at rate t'_f . The taxes paid abroad on a dividend payment of D_f are $t'_f D_f + w_f'^d (D_f - t'_f D_f)$. Tax liabilities are calculated on the grossed-up dividend payment D_f . Allowing a tax credit for the foreign tax paid abroad, the global tax on a dividend payment is thus t_h when $t_h > t'_f + w_f'^d (1 - t'_f)$ and $t'_f + w_f'^d (1 - t'_f)$ when $t_h < t'_f + w_f'^d (1 - t'_f)$.

Generally, firms can defer home taxes until the moment when the profit is repatriated in the form of dividends. This deferral is available on the active business profits of affiliates that are separately incorporated as subsidiaries in foreign countries.⁵ In addition, most worldwide tax systems uses the total worldwide foreign income of the taxpayer to calculate the foreign tax-credit limit. When the foreign taxes paid exceed the source tax liability on foreign source income, the investor is in an 'excess credit' position. Cross-crediting allows any excess credits from high-tax countries to be applied to income from low-tax countries. Firms

⁵Profits of a foreign branch of a corporation are generally subject to corporate taxation at home even if not repatriated.

using deferral and/or being in an excess credit position have a global tax rate on active income which converges with the one of firms coming from a territorial tax system, as it mainly depends on the level of foreign taxes, t'_f .

As in a territorial tax system, interest and royalty payments from a foreign affiliate are included in resident companies' taxable income, although a foreign tax credit is available. The global tax cost of an interest or royalty payment is generally t_h , since withholding taxes on interest and royalties are generally lower than t_h .

2.2 The Benefits of Tax Sparing

From the previous discussion, it is apparent that a fiscal incentive provided by the host country with regard to the corporate tax rate and the dividend withholding tax rate - applied to an investor from a worldwide tax system - simply lowers the amount of foreign tax credit which the investor can claim in its home country. Similarly, a fiscal incentive with regard to interest and royalty withholding tax rates - applied to an investor from either a worldwide or a territorial tax system - also reduces its foreign tax credit, leaving unchanged the global tax paid. To address this problem, many tax treaties include tax sparing provisions of the type described above, allowing investors to obtain foreign tax credit for taxes spared and *not actually paid* in the host country. Thus under tax sparing, foreign income that has benefited from a tax incentive program in the host country is treated by the home country as if it has been fully taxed in the host country.

Table 1: Impact of the interaction of resident country and source country tax systems on foreign investors' corporate income taxes, with and without tax sparing

	Without tax holiday (source country)		With tax holiday (source country)	
	Territorial system	Worldwide system	Territorial system	Worldwide system with tax sparing
Source country taxation				
Profit of subsidiary		100		100
Corporate income tax : 33.33%		33.33		0
After-tax profit		66.67		100
Dividend		66.67		100
Withholding tax : 10%		6.67		0
Residence country taxation				
Dividend received	60	60	100	100
Grossed-up dividend	n.a	100	n.a	100
Corporate income tax : 40% (a)	n.a	40	n.a	40
Creditable foreign tax (b)	n.a	40	n.a	0
Foreign tax credit (min (a, b))	n.a	40	n.a	0
Net corporate income tax (CIT)	0	0	0	40
<i>Source country tax</i>	40	40	0	0
<i>Residence country tax</i>	0	0	0	40
<i>Total</i>	40	40	0	40
After-tax profit	60	60	100	60
				100

Note : CIT = Corporate income tax. Source: OECD (2001)

Table 2: Impact of the interaction of resident country and source country tax systems on foreign investors' interest taxes, with and without tax sparing

	Base case 15% withholding	5% withholding without tax sparing	5% withholding with tax sparing
Interest payment	100	100	100
Source country tax	15	5	5
Resident country tax rate %	40	40	40
Resident country tax	40	40	40
<i>Foreign tax credit</i>	<i>15</i>	<i>5</i>	<i>15</i>
<i>Source country tax</i>	<i>15</i>	<i>5</i>	<i>5</i>
<i>Resident country tax</i>	<i>25</i>	<i>35</i>	<i>25</i>
<i>Total</i>	<i>40</i>	<i>40</i>	<i>30</i>
After tax interest payment	60	60	70

Source: OECD (2001)

The benefits of tax sparing for active income, applied to "worldwide" investors, are illustrated in Table 1. The first column considers a situation with a corporate tax rate of 33% in the host country and a non-resident withholding tax rate of 10%. The "territorial" investor only pays taxes abroad, 40. The "worldwide" investor is taxed on its worldwide income at a 40% corporate tax rate and can claim a foreign tax credit corresponding to 40 (taxes paid abroad). In that case, the "worldwide" investor is not subject to an additional tax in its resident country. Both "territorial" and "worldwide" investors have an after-tax profit of 60. When the host country grants tax holidays, and without tax sparing, the foreign tax credit of the "worldwide" investor is zero. Thus the investor pays a 40% tax rate to its residential country and its after-tax profit is still 60. Without tax sparing, no tax benefits remain in the hands of the investor, as the spared amount is transferred to the treasury of the developed country. In contrast, when a tax sparing provision is signed between a developed and a developing country, the home country provides a foreign tax credit equal to the amount of tax that would have been paid without such incentives. The after-tax profit of the "worldwide" investor corresponds to 100.

A similar illustration can be given to explain the benefits of tax sparing for passive income (for both territorial and worldwide investors). In Table 2, we assume that the tax treaty between the home country and the host country provides for a withholding tax rate of up to 15% on interest. To improve its attractiveness, the host country decreases the tax on interest to 5%. Both "territorial" and "worldwide" investors can claim

a foreign tax credit equal to the foreign tax paid and if a tax sparing provision exists, the tax credit will be deemed to be equal to 15% of the gross amount of the interest. For an interest payment received by a parent company, the home country tax rate is 40%. We characterise the investor's total taxes under three different situations. In the first column the host country imposes interest tax at the maximum treaty rate of 15%. In this case, the total paid to the home country is diminished by a foreign tax credit equal to 15% of the interest payment. In Column (2), with a 5% withholding tax and no tax sparing, the total taxes paid by the investor are the same as in the first column, with a tax base of 15%. The difference between situations 1 and 2 is that when the rate of withholding tax is reduced, the tax forgone by the host country is paid to the home country. Finally, when the 5% withholding is accompanied by tax sparing (Column (3)), the benefit of the foreign tax incentives is preserved and less tax is paid in total.

2.3 Tax Costs With Tax Sparing

Territorial tax system

When a tax sparing provision is signed between a territorial home country and a developing country, the tax costs associated with active income earned abroad and on dividend repatriations do not change. However, for interest and royalty payments, the foreign tax credit that investors can claim is not reduced by host country fiscal incentives, since it is equal to the notional tax rate. At this stage of the reasoning, we distinguish the host country notional withholding tax rate on interest w_f^i from the effective one $w_f'^i$, which can be expected to be lower than the notional one whenever tax incentives are offered. The global tax cost of an interest payment is thus: $t_h - w_f^i + w_f'^i$, allowing the investor to benefit from the difference between w_f^i and $w_f'^i$. Similarly, the tax cost of a royalty payment is $t_h - w_f^r + w_f'^r$.

Worldwide tax system

Under tax sparing the investor can claim a foreign tax credit equal to the host country statutory tax rate and notional withholding tax rates, even if the taxes actually paid abroad are lower. The tax costs of a dividend payment are $t_h - [t_f + w_f^d(1 - t_f)] + [t_f' + w_f'^d(1 - t_f')]$, when $t_h > [t_f + w_f^d(1 - t_f)]$. When foreign taxes exceed the home country tax liability, there is no home country tax on the dividend remittance. In that case, the tax cost of dividend payments corresponds to $t_f' + w_f'^d(1 - t_f')$. For interest and royalties their global tax costs (which are the same as those of "territorial" investors) are $t_h - w_f^i + w_f'^i$, and $t_h - w_f^r + w_f'^r$, respectively. The global tax costs are summarised in Table 3.

This discussion of the taxation of worldwide and territorial multinational firms illustrates the fiscal advantages provided by the tax sparing provision. As summarised by Table 3, under a territorial tax system, tax sparing has no effect on the tax costs associated with the active income earned abroad but it decreases

the tax costs associated with the passive income earned abroad (as long as fiscal incentives are provided). Under a worldwide tax system, tax sparing decreases both the tax costs associated with the active and the passive income earned abroad (again, as long as fiscal incentives are provided). Based on this comparison of global tax costs, tax sparing can be expected to have a higher effect on FDI coming from worldwide tax systems as the tax burden is decreased on both the active and the passive income of investors (when it only affects the passive income of investors from territorial tax systems). However, as previously discussed, the use of deferral and cross-crediting by investors from worldwide tax systems can mitigate the burden of residence country taxation on active income. In that case, the effect of tax sparing on worldwide and territorial investors could be similar, by mainly affecting the tax burden on passive income.

Table 3: Global Tax Costs on Active and Passive Income With and Without Tax Sparing

	Without tax sparing		With tax sparing	
	If:	Global tax cost:	If:	Global tax cost:
<i>Active income</i>				
Dividend payment (territorial)	n.a.	$t'_f + w_f^d(1 - t'_f)$.	n.a.	$t'_f + w_f^d(1 - t'_f)$.
Dividend payment (worldwide)	$t_h > t'_f + w_f^d(1 - t'_f)$ $t_h < t'_f + w_f^d(1 - t'_f)$	t_h $t'_f + w_f^d(1 - t'_f)$	$t_h > [t_f + w_f^d(1 - t_f)]$ $t_h < [t_f + w_f^d(1 - t_f)]$	$t_h - [t_f + w_f^d(1 - t_f)] + [t'_f + w_f^d(1 - t'_f)]$ $t'_f + w_f^d(1 - t'_f)$
<i>Passive income</i>				
Interest (territorial and worldwide)	$t_h > w_f^i$ $t_h < w_f^i$	t_h w_f^i	$t_h > w_f^i$ $t_h < w_f^i$	$t_h - w_f^i + w_f^i$ w_f^i
Royalties (territorial and worldwide)	$t_h > w_f^r$ $t_h < w_f^r$	t_h w_f^r	$t_h > w_f^r$ $t_h < w_f^r$	$t_h - w_f^r + w_f^r$ w_f^r

Note: With t_h : home statutory tax rate, t_f : foreign effective tax rate, t'_f : foreign effective tax rate, w_f^d : nominal dividend withholding tax rate, w_f^i : nominal interest withholding tax rate, w_f^r : nominal royalties withholding tax rate, w_f^d : effective dividend withholding tax rate, w_f^i : effective interest withholding tax rate, w_f^r : effective royalties withholding tax rate.

3 Data and Empirical Specification

Our dataset includes data on bilateral FDI stocks from 23 OECD residence countries in 113 destination developing countries. The FDI data are obtained from the OECD's database on FDI stocks (OECD International Direct Investment Database). There are 34 member countries of the OECD, but we only use a subset of 23 of these (listed in Table 4) as our residence countries, omitting those OECD members that are themselves developing or transition economies. This omission is unlikely to affect the findings, as the 11 omitted OECD residence countries have very limited outbound FDI, and very few tax sparing agreements with other developing or transition countries. Following the World Bank's classification, destination countries are considered to be developing countries if their GDP per capita is lower than US\$12,616. Note that none of the 23 OECD residence countries appear as destination countries in our dataset, although the 11 omitted OECD members may appear as destinations where they satisfy this income threshold.

The 23 residence countries are coded as having either worldwide or territorial tax systems, based on the classification in Markle (2012), as shown in Table 4. This variable is in principle time-varying (although it is fixed over our sample period for most of the residence countries). Four of the residence countries - Norway, the U.K., Japan and New Zealand - experienced reforms that moved them from worldwide to territorial taxation over our sample period. These countries are shown in Table 4 as having undergone a transition in their tax system, and the year of reform is also noted.

We code tax sparing agreements by searching the text of all existing bilateral tax treaties between any of the 23 residence countries and any of the 113 source countries for language specifying a tax sparing provision. Tax treaties are publicly available documents, and are provided in searchable form by the International Bureau of Fiscal Documentation (IBFD). We search in particular for the "shall be deemed to include" language quoted earlier, and for language that is similar in function. Most tax treaties follow a common format, based on the OECD or UN Model Treaties. It is thus readily apparent in most cases whether or not the treaty includes a tax sparing provision. As can be seen in Table 4, all major OECD members, except the United States, have negotiated tax sparing provisions with tax treaty partners. The number of tax sparing provisions signed by OECD countries ranges between zero for the United States and 47 for the United Kingdom. Table 5 presents the number of tax sparing provisions signed between the 23 OECD countries considered in this analysis and the host countries of the sample. A large number of developing countries have signed one or more tax sparing provisions with OECD countries. China, India, Brazil, Bangladesh, Malaysia, Thailand, Morocco and Vietnam are among the developing countries with the largest number of tax sparing provisions. On the other hand, countries such as Colombia, Costa Rica, Gabon, Suriname, Nicaragua or Zimbabwe do not have a single tax sparing provision with the 23 OECD residence countries in our sample. While most tax sparing agreements entered into force prior to 2002, we identify 34 instances in which new tax sparing agreements entered into force or in which existing tax sparing agreements were terminated over

2002-2012. Among these 34 changes, 32 occurred after 2002, providing usable longitudinal variation for our analysis. These changes in tax sparing agreements are listed in Table 6.

The dataset is identified at the country-pair-year level - i.e. each observation represents the FDI stock held by investors from residence country i in source country j in year t . In principle, the same country could appear as both a residence and a source country, and FDI from residence country i in source country j in year t would represent a separate observation from FDI from residence country j in source country i in year t . However, this does not occur in our data because residence countries are restricted to be developed and source countries to be developing (using the criterion described above). These restrictions yield 13,021 observations at the country-pair-year level on 1,950 country-pairs. With country-pair fixed effects, the baseline estimating sample includes 8,189 observations on 1,103 country-pairs over 2002-2012.⁶

These bilateral FDI stocks contain a substantial number of zero values, indicating the absence of any FDI from the residence to the source country in that year. Indeed, close to half of the observations - 5,376 out of 13,021 observations - are zeros. A conventional method for estimating the determinants of FDI is to use an OLS specification with the log of FDI as the dependent variable. However, when there are large numbers of zero observations, a fundamental problem with the log function is that observations for which the FDI value is equal to zero are dropped from the sample. These observations can be retained in the sample by adding an appropriate constant to these values. However, this introduces some degree of arbitrariness in the interpretation of magnitudes, depending on the choice of units. Ideally, the high frequency of zeros with bilateral FDI stocks requires a model that accommodates zeros and which allows for consistent estimators in the presence of a large number of zeros. With this type of data, Santos Silva and Tenreyro (2006) suggests the use of a Poisson pseudo-maximum-likelihood (PML) estimator, as it accommodates zero values of the dependent variable, is well behaved in the presence of a large number of zeros, and is consistent in the presence of heteroskedasticity. Poisson models are most familiar in the context of count data. However, this estimator remains consistent with a continuous dependent variable such as ours (Winkelmann, 2008; Wooldridge, 2010). Monte Carlo simulations suggest that the Poisson approach is superior to other methods used in the FDI and trade literatures as alternative estimators to the Poisson PML, such as OLS in the log linear specification or Tobit, which are severely biased in the presence of heteroskedasticity and zero values in the dependent variable (Santos Silva and Tenreyro, 2006; Westerlund and Wilhelmsson, 2011; Head and Mayer, 2013).

Thus, in order to address the econometric issues that arise from the large number of zeros, we use a Poisson pseudo-maximum likelihood (PML) fixed effects specification (with country-pair fixed effects and

⁶With a Poisson fixed effects estimator, if there is only one observation for a country-pair, or if all the observations are zeros, there is no within country-pair variation and those observations are dropped from the sample. Hence, with fixed effects, the sample consists of 8189 observations although the full sample includes 13021 observations.

year effects).⁷ Standard errors are clustered at the country-pair level to address potential correlation of errors. Our baseline equation is:

$$FDI_{ijt} = \exp(\beta TS_{ijt} + \gamma X_{ijt} + \mu_{ij} + \delta_t) \epsilon_{ijt}, \quad (1)$$

where FDI_{ijt} is the stock of FDI from home (residence) country i in host (source) country j in year t . TS_{ijt} is a dummy variable which takes the value one if the home country i has a tax sparing agreement with the host country j in year t . X_{ijt} is a vector of time-varying residence country, source country, and bilateral characteristics. Time-invariant country-pair characteristics enter the model through the country-pair fixed effects μ_{ij} , δ_t is a vector of time fixed effects, and ϵ_{ijt} is the error term.

Table 4: Tax System and Tax Sparing in the OECD

Country	Tax system	Number of Tax Sparing Agreements
Australia	Territorial	14
Austria	Territorial	17
Belgium	Territorial	21
Canada	Territorial	39
Denmark	Territorial	25
Finland	Territorial	28
France	Territorial	27
Germany	Territorial	22
Greece	Worldwide	9
Iceland	Territorial	0
Ireland	Worldwide	3
Italy	Territorial	36
Japan	Reform (2009)	18
Luxembourg	Territorial	14
Netherlands	Territorial	6
New Zealand	Reform (2009)	10
Norway	Reform (2004)	36
Portugal	Territorial	7
Spain	Territorial	13
Sweden	Territorial	43
Switzerland	Territorial	8
United Kingdom	Reform (2009)	47
United States	Worldwide	0

Notes: Reform corresponds to a tax reform from a worldwide tax system to a territorial tax system.

⁷The results are broadly similar when using an OLS fixed effects specification.

Table 5: Number of Tax Sparring (TS) Provisions Signed with the 23 OECD countries (per Host Country)

Host country	TS	Host country	TS	Host country	TS
Afghanistan	0	Guatemala	0	Peru	0
Albania	5	Guinea	0	Philippines	12
Algeria	3	Guyana	2	Poland	3
Angola	0	Honduras	0	Russian Federation	0
Antigua and Barbuda	0	Hungary	0	Rwanda	1
Argentina	10	India	16	Samoa	0
Armenia	1	Indonesia	10	Saudi Arabia	1
Azerbaijan	0	Iran, Islamic Rep.	1	Senegal	0
Bangladesh	8	Iraq	0	Seychelles	0
Barbados	4	Jamaica	8	Sierra Leone	0
Belarus	1	Jordan	0	Slovak Republic	1
Belize	1	Kazakhstan	0	Slovenia	6
Bolivia	1	Kenya	6	South Africa	1
Bosnia and Herzegovina	6	Kyrgyz Republic	0	Sri Lanka	11
Botswana	2	Lao PDR	0	St. Lucia	0
Brazil	11	Latvia	6	Sudan	1
Bulgaria	6	Lebanon	0	Suriname	0
Cambodia	0	Lesotho	1	Swaziland	0
Cameroon	1	Liberia	2	Syrian Arab Republic	0
Chile	0	Lithuania	6	Tanzania	3
China	17	Macedonia, FYR	4	Thailand	11
Colombia	0	Madagascar	0	Trinidad and Tobago	8
Congo, Rep.	0	Malawi	0	Tunisia	10
Costa Rica	0	Malaysia	14	Turkey	14
Cote d'Ivoire	5	Maldives	0	Uganda	1
Croatia	5	Malta	12	Ukraine	2
Cyprus	6	Mauritania	0	Uruguay	0
Czech Republic	2	Mauritius	3	Uzbekistan	0
Dominica	0	Mexico	9	Vanuatu	0
Dominican Republic	1	Moldova	0	Venezuela, RB	6
Ecuador	0	Morocco	12	Vietnam	14
Egypt, Arab Rep.	7	Mozambique	2	Zambia	6
El Salvador	0	Namibia	1	Zimbabwe	0
Equatorial Guinea	0	Nicaragua	0		
Estonia	5	Nigeria	5		
Ethiopia	1	Oman	0		
Fiji	3	Pakistan	10		
Gabon	0	Panama	0		
Georgia	0	Papua New Guinea	4		
Ghana	2	Paraguay	0		

Table 6: Tax Sparing Agreements and Terminations, 2002-2012

Home country	Host country	Tax Sparing Entry into Force	Home Country	Host Country	Tax Sparing Termination
Portugal	Malta	2002	Finland	Macedonia, FYR	2002
Luxembourg	Trinidad and Tobago	2003	Denmark	Poland	2003
Spain	Turkey	2003	Denmark	Slovenia	2003
Belgium	Albania	2004	United Kingdom	Malaysia	2005
Italy	Mozambique	2004	Austria	Poland	2006
Luxembourg	Malaysia	2004	Austria	Czech Republic	2008
Greece	Latvia	2005	Finland	Poland	2010
Greece	Lithuania	2005	Finland	India	2010
Spain	Vietnam	2005	Norway	Slovenia	2010
Austria	Morocco	2006	Finland	China	2010
Italy	Ethiopia	2006	Norway	Turkey	2012
Spain	Malaysia	2007	Finland	Morocco	2012
Greece	Estonia	2008			
Spain	Jamaica	2008			
Italy	Saudi Arabia	2009			
Belgium	Rwanda	2010			
Greece	Morocco	2010			
Greece	Tunisia	2010			
Canada	Turkey	2011			
Sweden	Mauritius	2012			
Switzerland	Turkey	2012			
United Kingdom	Barbados	2012			

3.1 Control Variables

The choice of control variables is based on a gravity equation which includes the usual main determinants of both horizontal and vertical FDI (Markusen, 1984; Helpman, 1984; Brainard, 1997; Yeaple, 2003). Source and destination GDP are included as standard proxies for the size of the partners' markets. Population size controls for the effect of host country wealth on FDI since for a given GDP, a higher population decreases GDP per capita. These variables are from the World Bank World Development Indicators (WDI) database. Bilateral trade costs, which correspond to symmetric country-pair trade costs computed by the World Bank using the Inverse Gravity Framework of Novy (2009), are also included.⁸ We control for the corporate tax rate by a measure of the statutory tax rate differential between the home country i and the host country j . The statutory corporate tax rate has a number of advantages over alternative measures. As emphasised by Overesch and Rincke (2011), it is the simplest indicator of expected tax payments for firms and it is readily available across countries and years. Statutory tax rates were compiled primarily from the World Tax Database (University of Michigan) and were supplemented by the OECD, KPMG, and Ernst and Young Tax Databases when overlapping data was consistent. Finally, to isolate the effects of the territorial tax reforms from those of the financial crisis (as three out of four tax reforms took place in 2009), we add a home financial crisis dummy variable which takes the value one if the home country experiences a systemic banking crisis and the value zero otherwise.⁹ This variable is from Laeven and Valencia (2012).¹⁰ Descriptions and summary statistics for all variables are available in Tables 7 and 8.

⁸Trade costs can affect FDI either way. The proximity-concentration trade off implies a positive effect of trade costs on horizontal FDI while vertical FDI is discouraged by higher trade costs which increase the costs of trading components between production units. Trade costs can also proxy for physical distance between country-pairs which can hinder FDI as it is correlated with transaction and information costs (Portes and Rey, 2005; Egger, 2008).

⁹Most of the 23 OECD countries experienced a financial crisis from 2008 which is ongoing in 2012. For the U.K. and the U.S. the financial crisis starts in 2007. Australia, Canada, Finland, Japan, New Zealand, and Norway did not experience a financial crisis for the period 2002-2012.

¹⁰An alternative dummy for financial crisis has been tested: a dummy for host financial crisis taking the value one if the host country experiences a financial crisis between 2002 and 2012, and the value zero otherwise. In our sample of 113 destination countries, only Latvia, Hungary, Mongolia, Ukraine and Slovenia experience the ongoing financial crisis. Argentina, Dominican Republic, Ecuador, Uruguay and Slovak Republic experienced a financial crisis at some point between 2002 and 2005. The remaining countries do not experience a crisis during the period of investigation. This dummy is not statistically significant and it does not alter the results of the analysis.

Table 7: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
FDI stocks	8,189	1640.844	5669.61	0	101030
Ln home GDP	8,189	27.6261	1.4084	22.9101	30.4185
Ln host GDP	8,189	24.8416	1.8687	19.3862	29.7387
Ln bilateral trade costs	8,189	4.9937	0.4366	3.2021	6.9945
Home financial crisis	8,189	0.3656	0.4816	0	1
Ln host population	8,189	16.8819	1.7879	11.2902	21.0239
Tax differential	8,189	0.03815	0.0911	-0.26	0.4
Tax sparing	8,189	0.2627	0.4401	0	1
Ln distance	8,189	8.5662	0.8252	4.0879	9.7809
Colony	8,189	0.0694	0.2541	0	1
Common language	8,189	0.1109	0.314	0	1
Bilateral investment treaty	8,189	0.5896	0.4919	0	1
Correlation of UN votes	8,189	0.6929	0.1872	0	1
Bilateral tax treaties	8,189	0.6184	0.4858	0	1
Sum of democracy indices	7,717	14.2198	5.7777	-1	20
Ln FDI conduit	8,167	7.2258	5.2647	-1.0217	14.7073
WTR interest	7,851	0.1122	0.0832	0	0.40
WTR royalties	7,851	0.1228	0.0859	0	0.40
GTR interest	8,181	0.2852	0.0763	0	0.42
GTR royalties	8,189	0.2806	0.0818	0	0.42
AETR (for U.S. firms)	3,182	0.3654	0.1890	0.0184	0.9196
Extended AETR	8,189	0.3016	0.1435	0	0.9196
Net ODA	6,041	19.3920	83.5420	0	3749.34
Grants	6,372	17.6929	76.6884	0	3749.34
Telephone Lines	6,372	13.8435	9.8346	0.1572	39.5361
Poverty Gap at \$1.25/day	6,372	5.2126	7.7353	0	48.55

Table 8: Description of Variables

Variable	Description	Source
Bilateral FDI stocks	Bilateral FDI stocks	OECD
Ln home GDP	GDP	World Bank - World Development Indicators
Ln host GDP	GDP	World Bank - World Development Indicators
Ln population	Population size	World Bank
Ln bilateral trade costs	Symmetric country-pair trade costs	Statutory Corporate Tax Rates were compiled primary from the World Tax Database (University of Michigan) and were supplemented by the OECD, KPMG, and Ernst and Young Tax Databases when overlapping data was consistent.
Tax differential	Home-country statutory tax rate - host-country statutory tax rate	Statutory Corporate Tax Rates were compiled primary from the World Tax Database (University of Michigan) and were supplemented by the OECD, KPMG, and Ernst and Young Tax Databases when overlapping data was consistent.
Home financial crisis	1 if home country experiencing a systemic banking crisis	Laeven and Valencia (2012)
Tax sparing	1 when a tax sparing (TS) provision is included in a bilateral tax treaty	Authors calculations based on the reading of bilateral tax treaties provided by the International Bureau of Fiscal Documentation.
Tax reform	1 when a territorial tax reform is adopted	Head and Mayer (2010)
Ln distance	Simple distance between capitals (kms)	Head and Mayer (2010)
Colony	1 for pairs ever in colonial relationships	Head and Mayer (2010)
Common language	1 for common official of primary language	UNCTAD
Bilateral investment treaty	1 if a bilateral investment treaty is signed	Gartzke (1999)
Correlation of UN votes	Bilateral correlation in UN votes	Polity IV database
Sum of democracy indices	Country-pair sum of democracy indices	Authors calculations
Tax sparing neighbouring countries	Average number of TS signed between the home country i and the neighbouring countries of host country j	
Bilateral tax treaties	1 if a bilateral tax treaty is signed	International Bureau of Fiscal Documentation
Ln FDI conduit	Sum of FDI from home country i to OECD countries having a TS with host country j	Authors' calculations based on OECD data
WTR interest	Withholding tax rate on interest	Ernst and Young (2012) Worldwide Corporate Tax Guide 2012
WTR royalties	Withholding tax rate on royalties	Ernst and Young (2012) Worldwide Corporate Tax Guide 2012
GTR interest	Global tax rate on interest in the presence of tax holidays (see table 14)	Authors' calculations
GTR royalties	Global tax rate on royalties in the presence of tax holidays (see table 14)	Authors' calculations
AETR (for U.S. firms)	Average effective tax rate paid by U.S. multinational firms	Bureau of Economic Analysis
Extended AETR	AETR paid by U.S. multinational firms completed by the statutory tax rate (STR) when AETR values are missing	Bureau of Economic Analysis
ODA	Official Development Assistance	Bureau of Economic Analysis for the AETR and World Tax Database (University of Michigan), OECD, KPMG, and Ernst and Young Tax Databases for the STR.
Grant	Official Development Assistance: grant	David Roodman: Available at http://davidroodman.com/data/
Poverty gap at \$1.25/day	poverty gap measure	David Roodman: Available at http://davidroodman.com/data/
Telephone lines	Telephone subscriptions per 100 persons	World Bank - World Development Indicators
Governance indicators	Voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption	World Bank - World Development Indicators Kaufmann et al. (2005)

4 Estimation Results

4.1 Tax Sparing, Territorial Tax reforms, and FDI

Table 9 presents our baseline regression results, in which bilateral FDI stock is regressed on a tax sparing dummy variable, a territorial tax reform variable (interacted with the tax sparing dummy), and a set of control variables.¹¹ All estimations report heteroscedasticity-consistent standard errors clustered at the country-pair level, and include (unreported) year effects. Country-pair fixed effects are included in Columns 1-3, and home-country fixed effects and host-country fixed effects are included in Columns 4-6.

There is clear evidence of a positive relationship between the FDI stock and tax sparing. In Column (1), the coefficient of 0.26 is statistically significantly different from zero at the five percent level. As the Poisson specification takes an exponential form, the percentage impact of tax sparing on FDI corresponds to $100[\exp(0.26) - 1]$. Thus, the estimated coefficient implies that tax sparing countries receive 30 percent more FDI than nonsparing countries. This result is comparable to (although somewhat smaller than) the previous results of Hines (2001) and Azémar et al. (2007), who find that the volume of Japanese FDI is 1.4-2.4 times larger, and 2.8 times larger in countries with which Japan has tax sparing provisions, respectively. Given the inclusion of country-pair fixed effects, this estimate is mainly based on the new tax sparing provisions or terminations which occurred within the 2002-2012 sample period.

The previous literature has not investigated the question of whether the effect of tax sparing agreements differs across worldwide and territorial residence countries. In Column (2) of Table 9, we add to the specification an interaction between our tax sparing variable and a (time-varying) indicator for worldwide residence countries (we also include the latter variable separately). We find no significant difference in the estimated effect of tax sparing across worldwide and territorial home countries; the interaction term is statistically insignificant.

The apparent absence of a stronger effect for worldwide home countries is consistent with a scenario in which the ability of worldwide MNCs to average their income and income tax rate¹² (cross-crediting) and to defer the repatriation of dividends out of active income from their foreign affiliates to their parent substantially mitigates the burden of residence country taxation. Suppose that a worldwide MNC in a host country that offers tax incentives reinvests all of its active business earnings. Then, as it does not pay

¹¹These control variables generally have the expected signs. Both home and host GDP have a positive effect on FDI stock. The negative sign of the coefficient estimated on population indicates that higher income per capita in the source country tends to increase FDI. Bilateral trade costs, which impede intra-firm trade, decreases FDI. Home countries affected by the financial crisis experience a decrease in their FDI outflows. Finally, the bilateral difference in the statutory tax rates increases FDI.

¹²As discussed in Section 2, by averaging foreign tax liabilities, this method allows 'excess credit' investors to benefit from the foreign tax incentive provided in other jurisdictions.

Table 9: Tax Sparring, Territorial Tax Reforms, and FDI

	Fixed effects E(FDI _{ijt}) ..) [1]	Fixed effects E(FDI _{ijt}) ..) [2]	Fixed effects E(FDI _{ijt}) ..) [3]	Pooled E(FDI _{ijt}) ..) [4]	Pooled E(FDI _{ijt}) ..) [5]	Pooled E(FDI _{ijt}) ..) [6]
Ln home GDP	0.434 ^a (0.166)	0.422 ^b (0.170)	0.418 ^b (0.171)	0.336 (0.215)	0.382 ^c (0.228)	0.464 ^b (0.221)
Ln host GDP	0.691 ^a (0.085)	0.676 ^a (0.083)	0.675 ^a (0.083)	0.638 ^a (0.110)	0.608 ^a (0.106)	0.624 ^a (0.106)
Ln host population	-1.817 ^a (0.628)	-1.813 ^a (0.625)	-1.798 ^a (0.625)	-1.319 (0.852)	-1.335 (0.866)	-1.244 (0.852)
Bilateral trade costs	-0.592 ^a (0.129)	-0.612 ^a (0.129)	-0.611 ^a (0.129)	-1.431 ^a (0.170)	-1.433 ^a (0.169)	-1.432 ^a (0.169)
Home financial crisis	-0.120 ^b (0.049)	-0.080 ^c (0.048)	-0.077 (0.048)	-0.083 (0.065)	-0.014 (0.064)	-0.038 (0.070)
Tax differential	1.033 ^a (0.339)	0.978 ^a (0.348)	0.970 ^a (0.349)	1.620 ^a (0.424)	1.545 ^a (0.427)	1.656 ^a (0.435)
Tax sparring (TS)	0.260 ^b (0.130)	0.276 ^c (0.141)	0.233 ^c (0.131)	0.221 ^c (0.118)	0.247 ^b (0.119)	0.241 ^b (0.121)
Worldwide tax system x TS		-0.221 (0.166)			-0.264 (0.225)	
Worldwide tax system		0.086 (0.157)			0.027 (0.206)	
Tax reform x TS			0.244 (0.165)			-0.182 (0.196)
Tax reform			-0.102 (0.155)			0.293 ^c (0.175)
Ln distance				-0.392 ^a (0.094)	-0.393 ^a (0.095)	-0.392 ^a (0.094)
Colony				0.475 ^a (0.177)	0.483 ^a (0.179)	0.480 ^a (0.177)
Common language				0.665 ^a (0.188)	0.660 ^a (0.186)	0.661 ^a (0.187)
Country-pair fixed effects	X	X	X			
Home-country fixed effects				X	X	X
Host-country fixed effects				X	X	X
Number of pairs	1,103	1,103	1,103	1,950	1,950	1,950
Observations	8,189	8,189	8,189	13,021	13,021	13,021

Notes: The letters “a”, “b” and “c” indicate respectively a significance level of 1, 5 and 10 percent. Standard errors, which are clustered at the country-pair level, are in parentheses and time dummies are included.

dividends to its parent, the parent does not face a home country tax on this income and conversely does not benefit from the tax credit offered by the home country for taxes spared by the host country. If the repatriation of dividends is deferred forever, the value of tax sparing for worldwide MNCs (where it applies to both active and passive income) would tend to converge to that for territorial MNCs (where it applies only to passive income). Even if the MNC lacks profitable opportunities for reinvestment in its business activities in the host country, Weichenrieder (1996) shows theoretically that it can benefit from deferral by reinvesting its active earnings in passive assets.

There is abundant empirical evidence that worldwide MNCs defer the repatriation of dividends to avoid home country taxation. For example, in 2004 the U.S. Congress enacted a measure that permitted U.S. MNCs to repatriate foreign income at a very low U.S. tax rate for a one-year period. This prompted a massive increase in repatriations (Dharmapala et al., 2011). Egger et al. (2015) find that following the U.K.'s territorial tax reform in 2009, U.K.-owned affiliates significantly increased repatriations, relative to a matched control group of non-U.K.-owned affiliates. This suggests that U.K. MNCs were deferring the repatriation of dividends under the worldwide regime, which would imply that the benefits of tax sparing with regard to active income and dividend payments would be attenuated.¹³

In Column (3), we introduce into the basic specification an interaction between our tax sparing variable and an indicator for tax reforms that transformed four of the residence countries in our sample - Norway in 2004 and the U.K., Japan and New Zealand in 2009 - from worldwide to territorial systems (we also include the tax reform variable separately). Recall that this interaction term captures an arguably quasi-exogenous source of variation as territorial reforms (driven primarily by concerns extraneous to developing countries) change the value of preexisting tax sparing agreements. If tax sparing is differentially valuable for worldwide MNCs, we would expect that these territorial reforms would induce (in relative terms) a reallocation of FDI from sparing to nonsparing countries. As argued above, a difference-in-differences estimate of this effect can reasonably be given a causal interpretation, as the value of pre-existing tax sparing agreements would be exogenously reduced. However, the estimated effect is statistically indistinguishable from zero.

Taken together, the results (or lack thereof) in Columns (2) and (3) point towards a conclusion that much of the benefit from tax sparing is also available to territorial MNCs. There is no strong evidence to

¹³A related comment is that, under a worldwide tax system, the signature of a tax sparing provision is expected to increase the repatriation of dividends of the investors benefiting from the provision. By granting a tax credit for taxes that would ordinarily have been due to the home country, tax sparing reduces the tax faced at home when the income is repatriated. Since OECD FDI statistics corresponds to all cross-border transactions between firms which belong to the same group, such as equity capital, intra-company loans, interest income, and reinvested earnings, an increase in the repatriation of dividends might lead to a decrease in the reinvested earnings component of FDI. The potential increase in equity and intra-company loans in response to the signature of tax sparing might thus be mitigated by the repatriation of dividends for investors subject to a worldwide tax system. Since tax sparing is not expected to influence the repatriation of dividends of territorial investors, this could also explain why a similar elasticity is estimated between worldwide and territorial FDI with respect to tax sparing.

suggest that the effect on FDI of signing tax sparing agreements is greater for worldwide home countries. In the same vein, the territorial tax reforms of Japan, the U.K., New Zealand and Norway did not substantially reduce FDI from those countries to source countries with which they have tax sparing agreements, relative to source countries with which they do not have tax sparing agreements. In other words, these reforms, which exempt the foreign income of their multinational firms from taxation at home, do not seem to have reduced the importance of tax sparing agreements with developing countries. These results are consistent with each other, as a territorial tax reform corresponds to a within-residence-country change from a worldwide to a territorial tax system. This reinforces the continuing relevance of tax sparing in a world in which most residence countries are territorial.

As emphasised earlier, the fixed effects Poisson model uses only within-country-pair longitudinal variation to identify its effects. To exploit variation between country-pairs (as most of the tax sparing agreements have been signed before the period of investigation), Columns (4)-(6) of Table 9 report pooled Poisson models. Country-pair fixed effects are removed from the estimation while home-country and host-country fixed effects are included. This creates the possibility of bias due to unobserved heterogeneity at the country-pair level. This can be somewhat mitigated by adding time-invariant bilateral-specific determinants of FDI (the logarithm of the distance, the existence of a common official language, and the past colonial relationship of the home and host countries). As shown in Columns (4)-(6), the results from this pooled estimation closely mirror those from the fixed effects model.

4.2 Endogenous Tax Sparing Provisions

Simultaneity Bias

The signing and termination of tax sparing agreements is potentially endogenous. The first potential source of endogeneity is simultaneity. Home countries may be negotiating tax sparing provisions only with countries having large or increasing amount of FDI. If the decision to select into tax sparing is influenced by the level of FDI, the coefficient estimated on tax sparing would be biased upwards or even spurious. Unfortunately, there is no quasi-experimental variation in the signing or termination of tax sparing agreements that can fully address this concern. However, we use a number of different strategies to seek to rule out possible alternative explanations of this nature and to move (albeit cautiously) towards a causal interpretation of the baseline result.

Following Autor (2003), we use the difference-in-differences framework of this study to test for causality *a la* Granger (1969).¹⁴ Tax sparing provisions are signed at different times in different countries, allowing

¹⁴Such a Granger test is implemented by Autor (2003) in the context of the effect of employment protection on temporary help employment.

us to test whether there is a contemporaneous or lagged effect of a tax sparing agreement on FDI. Most importantly, we can test whether future tax sparing agreements (i.e. those not yet in force) seem to drive the result, possibly indicating that some other factor is actually causing the increased FDI. Thus, we add to our specification an extensive set of leads and lags of the tax sparing variable in order to analyse the time pattern of the effect.

$$FDI_{ijt} = \exp(\Sigma\beta_{-\tau}(TS_{ijt-\tau}) + \beta(TS_{ijt}) + \Sigma\beta_{+\tau}(TS_{ijt+\tau}) + \gamma X_{ijt} + \mu_{ij} + \delta_t)\epsilon_{ijt}, \quad (2)$$

where $\Sigma\beta_{-\tau}(TS_{ijt-\tau})$ corresponds to three lags ($\beta_{-1}, \beta_{-2}, \beta_{-3}$), and $\Sigma\beta_{+\tau}(TS_{ijt+\tau})$, corresponds to three leads ($\beta_{+1}, \beta_{+2}, \beta_{+3}$). If tax sparing causes FDI but not vice versa, the leads should not be statistically different from zero.

Equation (2) is estimated in Column (1) of Table 10, where the baseline Equation (1) is augmented with tax sparing variables for 1, 2 and 3 years before the entry into force of the provision, and 1, 2 and 3 years after the entry into force. The coefficients estimated on the tax sparing leads are not statistically different from zero and they are not either jointly statistically significant (joint-significance is reported at the bottom of Table 10). Moreover, they are small (essentially zero) in magnitude, indicating that there is no anticipatory response of FDI to the adoption of the provision. In the year of adoption, FDI increases substantially (indeed, it doubles in size).¹⁵ After the entry into force of the provision, FDI increases by 19 to 21 percent over the three following years, although this is statistically significant only in the year after adoption. Note that the coefficients estimated on the second and third lags of tax sparing are estimated imprecisely, and this for at least two reasons. First, the period of analysis corresponds to ten years and thus, it restricts the number of lags that can be used when a change is close to 2002. In addition, these coefficients are strongly correlated and this multicollinearity makes it difficult to estimate the incidence of corporate taxes at each lag. Their joint-significance, statistically significant at the one percent level, indicates that the positive effect of tax sparing on FDI lasts for more than one year following the adoption of the provision. The pattern of post-treatment, contemporaneous, and anticipatory effects - illustrated in Figure 1 - suggests that tax sparing leads FDI growth and not the opposite. This pattern is inconsistent with a pre-existing trend of increasing FDI between countries that sign tax sparing agreements. Instead, this pattern appears consistent with a causal interpretation of the estimated effect of tax sparing agreements.

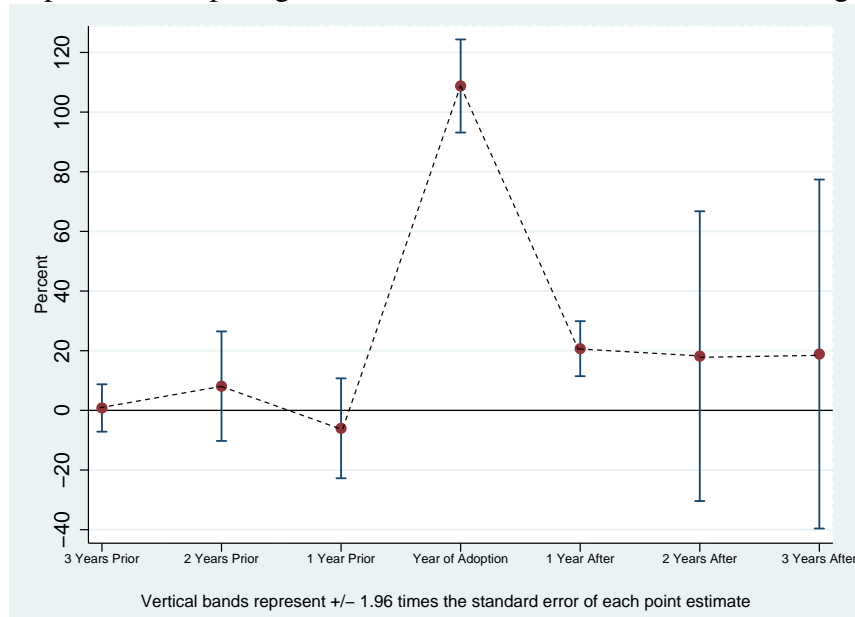
¹⁵This instantaneous and substantial response suggested by the lag-lead specification implies that the initial effect is likely to be a reallocation of the income of multinational companies. Worldwide investors have an incentive to shift the income earned by other affiliates to the affiliate located in the tax sparing country, to repatriate this income at lower cost. In addition, both worldwide and territorial investors may reallocate the passive assets of their affiliates in tax sparing countries, to fully benefit from fiscal incentives on interest and royalties withholding tax rates. Note that by international accounting standards, the FDI measure will capture the income reallocated that is reinvested or distributed.

Table 10: Endogenous Tax Sparing Provisions

	Endogenous tax sparing provisions				
	E(FDI _{ij}) ..) Leads and lags [1]	E(FDI _{ij}) ..) Bilateral time varying [2]	Pr(tax sparing _{ij} = 1 ..) First stage probit [3]	E(FDI _{ij}) ..) IV Poisson [4]	E(FDI _{ij}) ..) Spatial lag [5]
Ln home GDP	0.264 (0.190)	0.418 ^b (0.170)	0.071 ^a (0.024)	0.523 ^b (0.213)	0.388 ^b (0.164)
Ln host GDP	0.603 ^a (0.130)	0.676 ^a (0.081)	0.075 ^a (0.024)	0.616 ^a (0.133)	0.704 ^a (0.082)
Ln host population	-1.431 (1.070)	-1.759 ^a (0.623)	0.215 ^a (0.026)	-0.936 (0.997)	-1.849 ^a (0.623)
Bilateral trade costs	-0.546 ^a (0.147)	-0.584 ^a (0.127)	-0.503 ^a (0.057)	-1.506 ^a (0.222)	-0.540 ^a (0.126)
Home financial crisis	-0.057 (0.035)	-0.120 ^b (0.049)	-0.306 ^a (0.060)	-0.083 (0.051)	-0.087 ^c (0.048)
Tax differential	1.790 ^a (0.529)	1.115 ^a (0.333)	-1.312 ^a (0.229)	1.343 ^a (0.447)	1.000 ^a (0.335)
Tax sparing <i>t+3</i>	0.008 (0.039)				
Tax sparing <i>t+2</i>	0.078 (0.086)				
Tax sparing <i>t+1</i>	-0.062 (0.079)				
Tax sparing <i>t</i>	0.736 ^a (0.074)	0.259 ^b (0.131)		0.797 ^c (0.416)	0.265 ^b (0.134)
Tax sparing <i>t-1</i>	0.188 ^a (0.045)				
Tax sparing <i>t-2</i>	0.167 (0.202)				
Tax sparing <i>t-3</i>	0.173 (0.235)				
Ln distance			0.104 ^a (0.031)	-0.374 ^a (0.120)	
Colony			0.103 (0.088)	0.459 ^b (0.200)	
Common language			0.268 ^a (0.068)	0.667 ^a (0.205)	
Bilateral Investment Treaty		0.071 (0.058)	0.235 ^a (0.043)	-0.050 (0.117)	
UN vote correlation		-0.352 (0.310)	1.452 ^a (0.195)	-0.004 (0.453)	
Sum of polity indexes		0.000 (0.008)	-0.002 (0.003)	-0.005 (0.006)	
Tax sparing neighbouring countries			6.009 ^a (0.228)		
Ln FDI neighbouring countries					0.033 (0.023)
Home-country fixed effects				x	
Host-country fixed effects				x	
Country-pair fixed effects	x	x			x
Observations	3,583	7,716	9,613	9,613	7,851
Joint-significance: Tax sparing <i>t-1, t-2, t-3</i>	0.000				
Joint-significance: Tax sparing <i>t+1, t+2, t+3</i>	0.536				

Notes: The letters “a”, “b” and “c” indicate respectively a significance level of 1, 5 and 10 percent. Standard errors, which are clustered at the country-pair level, are in parentheses and time dummies are included.

Figure 1: Estimated Impact of Tax Sparing Provisions on FDI for Years Before, During, and After Adoption



Omitted variable and selection bias

The second potential source of endogeneity bias is from omitted variables. Even in the presence of country-pair fixed effects, time varying omitted variables may cause bias. The determination of the correlation between the error term, ϵ_{ijt} , and tax sparing requires to consider the determinants of the inclusion of a tax sparing provision in a bilateral tax treaty. No empirical work has examined the determinants of tax sparing provisions. However, since tax sparing is a form of aid aiming to promote economic development, its determinants should be similar to those of Official Development Assistance (ODA). Development economists have examined empirically for many years the determinants of ODA. These determinants are summarised by Clist (2011) with the introduction of a 4P framework - Poverty, Population, Policy, and Proximity - which encapsulates the various forms of aid allocation practice. An important question is whether the unobserved determinants of FDI are associated with the probability of signing a tax sparing provision. For instance, unobserved conflicts and instability in a host country that inhibit British FDI would cause ϵ_{ijt} to be negative. The probability of signing a tax sparing provision with a vulnerable country might be high if in addition to supporting the fragile state, there is an expected gain for the U.K. in compensating its British multinational firms abroad for an increase in the cost of doing business and in uncertainty. Thus tax sparing and conflicts/instability may be positively correlated, but the FDI equation error term ϵ_{ijt} and conflicts/instability may be negatively correlated. In that case, tax sparing and ϵ_{ijt} are negatively correlated, and the coefficient on tax sparing will tend to be *underestimated*. On the other hand, an unobserved increase in a source country's salience in the U.K., such as cooperative diplomatic relations, may both lead to the

U.K. signing a tax sparing agreement with that source country and British MNCs investing more heavily in that country. In that case, tax sparing and ϵ_{ijt} could be positively correlated, and the coefficient on tax sparing will tend to be *overestimated*.

To address omitted variable bias, we first add a set of time-varying controls for bilateral economic ties and political affinity which could both explain the signature of tax sparing provision and an increase in FDI, such as a dummy for a bilateral investment treaty, a measure of bilateral correlation in UN votes (from Gartzke (1999)), and, as in Martin et al. (2012), the country-pair sum of democracy indices from the Polity IV database.¹⁶ In Column (2), these three bilateral time-varying controls are included in the model. Their coefficients are not significantly different from zero and the coefficient estimated on the tax sparing variable, 0.26, is not altered by their inclusion (the coefficient estimated on tax sparing without the bilateral time-varying controls in Column (1), Table 9, is of similar magnitude). The use of these controls tend to indicate that the coefficient on tax sparing is not overestimated by an omitted variable bias, as they should decrease the potential positive correlation between tax sparing and ϵ_{ijt} .

Second, as it is less straightforward to proxy for unobservables which can have opposite effects on the selection on tax sparing and on FDI (such as conflicts and vulnerability), we address the potential endogeneity bias associated with omitted variables and selection with an instrumental variables (IV) strategy. We instrument a tax sparing provision between the home country i and the host country j , with the *second lag* of the average number of tax sparing provisions signed between the same home country i and the neighbouring countries of the host country j , Z_{ijt} . The neighbouring countries correspond to the other countries of the same geographical region.¹⁷ The economic rationale for this instrument stems from the idea that multinational firms tend to follow a “sequential location decision”, where they first decide in which region to locate and then in which country (Davies and Voget, 2008). Tax competition to attract FDI is expected to be regional (Azémar et al., 2015). A recipient developing country might be more likely to sign a tax sparing provision with a home country if neighbouring countries have signed this provision with the same home country, to allow firms to benefit from fiscal incentives within their boundaries as well as in neighbouring countries. This suggests that tax sparing provisions signed by neighbouring countries can influence tax sparing provisions signed by a host country j . However, tax sparing provisions signed two years earlier by the neighbouring countries of country j should not have a direct effect on the location of FDI in the country j .

By viewing tax sparing as potentially endogenous, we allow for a possible correlation between the

¹⁶Democratic countries are more open to FDI (Jakobsen and De Soya, 2006) and are less prone to violence (Levy and Razin, 2004). The signature of tax sparing provisions can promote peaceful relations between countries, since it is in general the political objective of economic and trade agreements (Martin et al., 2012).

¹⁷Following the World Bank classification, the developing countries of our sample belong to six regions: East Asia and Pacific, Latin America and Caribbean, Middle East and North Africa, South Asia, Sub-Saharan Africa, Europe Central Asia.

error term ϵ_{ijt} of Equation (1) and the likelihood of signing a tax sparing agreement. Our instrumental variable strategy consists in allowing a binary variable to be endogenous with a Poisson pseudo-maximum likelihood estimation. We use a treatment effect model and implement a two-step instrumental variable procedure (Wooldridge, 2010). First, we estimate a probit binary response model of tax sparing on the instrumental variable and the other controls. From the probit model, we compute the fitted probabilities (\hat{G}_{ijt}). Second, we use the Poisson estimator, instrumenting tax sparing with the fitted probabilities (\hat{G}_{ijt}) from the previous step. This method has the advantage of being fully robust to misspecification of the probit model, and the standard errors are asymptotically valid and do not need to be adjusted for the first-stage probit (Wooldridge, 2010). We assume the following reduced-form equation for TS_{ijt} :

$$TS_{ijt} = \begin{cases} 1 & \text{if } Z_{ijt}\phi + v_{ijt} \geq 0, \\ 0 & \text{otherwise,} \end{cases}$$

where Z_{ijt} is a vector of variables affecting a country i 's likelihood to sign a tax sparing agreement with a country j . Z_{ijt} contains all the variables of X_{ijt} as well as the instrumental variable "tax sparing of neighbouring countries". There is endogeneity if the errors v_{ijt} and ϵ_{ijt} are not independent.

In Column (4), we report the coefficients, and their robust standard errors, estimated with the Poisson model with tax sparing instrumented by (\hat{G}_{ijt}).¹⁸ The results of the first-stage probit model are reported in Column (3). They indicate that the average number of tax sparing provisions signed by neighbouring countries has a positive effect on tax sparing, with a coefficient that is statistically significant at the one percent level. As required, the instrument has an effect on the probability of signing a tax sparing agreement.¹⁹ The other results indicate that selection into tax sparing is positively affected by the proximity with the host country. Indeed, the probability to sign a tax sparing agreement increases when the host country has a common language and has low bilateral trade costs. Those proximity factors also have a positive effect on FDI, implying that country-pairs with cultural and economic ties select into tax sparing and higher FDI. However, some factors have opposite effects on selection into tax sparing and on FDI such as the GDP per capita and the corporate tax rate. FDI is attracted by countries with higher income per capita (positive sign on host GDP and negative sign on population) and low corporate tax rates, while the probability of signing

¹⁸With IV Poisson, the GMM estimator is used to solve a minimisation problem to make the sample-moment conditions as close to zero as possible. With this model, adding country-pair fixed effects leads to an incidental parameter problem. As the number of observations become large, the IV poisson GMM estimator fails to converge to consistent estimators. Home country fixed effects and host-country fixed effects along with bilateral time invariant variables (such as distance, common language and colony) are thus used with IV Poisson GMM instead of the country-pair fixed effects.

¹⁹In interpreting the coefficient estimated on "tax sparing neighbouring countries", note that the variable ranges from 0 to 0.5714 in magnitude (see Table 7: Summary Statistics). With a probit model, the coefficient estimated of 6 indicates that each one-unit increase in tax sparing neighbouring countries increases the probit index by 6 standard deviations. A transformation of the results facilitate their interpretation. By deriving the change in the probability of tax sparing for a change in tax sparing neighbouring countries at the mean, we obtain 1.03.

a tax sparing agreement increases with the needs of the host country (positive sign on population) and with good macro-economic policies (ability to generate fiscal receipts).

The coefficient estimated on the endogenous tax sparing of 0.8 in Column (4), indicates that the volume of FDI received by tax sparing countries is 2.3 times larger than nonsparing countries ($[exp(0.8) - 1]$). This magnitude is close to the one obtained for Japanese FDI by Hines (2001) and Azémar et al. (2007), where FDI received by tax sparing countries is 1.4-2.4 and 2.8 times larger, respectively. The coefficient estimated on the endogenous tax sparing variable is thus larger than the coefficient estimated with the assumption of exogeneity (Table 9, where FDI received by tax sparing countries is 0.3 times larger than nonsparing countries). This suggests selection into tax sparing on unobservables that tend to have a negative impact on FDI, leading to an underestimation of the effect of the tax sparing agreement if the omitted variable bias is not taken into account. The results should be interpreted with caution, because the validity of the exclusion restriction (that tax sparing agreements in neighbouring countries do not affect a country's own inbound FDI) may be questionable. For instance, there may be a priori reasons -related to complementarities across neighbouring countries - that FDI in neighbouring countries (which is influenced by tax sparing in neighbouring countries) may affect FDI in country i . Even so, we might still expect tax sparing among neighbours to be less subject to endogeneity concerns than a host country's own tax sparing agreements. Furthermore, using the second lag of the instrument should mitigate this concern. If the signature of tax sparing by neighbouring countries generates some reorganisation of FDI in the host country j , most of the reorganisation should be complete after two years. This tends to be confirmed by the insignificance of a spatial lag included in the baseline equation in Column 5. This spatial lag corresponds to a measure of average FDI from a similar home country to the neighbouring countries of the host country. The result indicates that there is no substitution or complementary relationships between FDI from a home country i to a host country j and FDI from the same home country i to the neighbouring countries of the host country j .²⁰

4.3 Tests for Alternative Explanations

Bilateral Tax Treaties

As tax sparing agreements are provisions included in bilateral tax treaties (BTT), not controlling for BTT raises the question of whether we are measuring the effect of tax sparing on FDI or the effect of bilateral

²⁰As for the measure of the IV, the neighbouring countries correspond to the other countries of the same geographical region (following the World Bank classification). Since we use an average of FDI in neighbouring countries, less than 0.5 percent of the observations have zero values. The log of FDI can be used to estimate an elasticity. A similar insignificant result is obtained when FDI in neighbouring countries is in level (with a coefficient estimated of 1.23E-06 due to the scale of FDI), or when FDI in neighbouring countries is instrumented using simple averages of neighbouring countries' FDI determinants. These unreported results are available upon request.

tax treaties on FDI. From a theoretical point of view, BTT could have a positive influence on FDI as they alleviate double taxation, offer lower withholding tax rates, and provide information about how the firms will be taxed which can reassure investors (Davies, 2004). However, this assumption is not supported by the data. Most empirical analyses find no statistically significant effect of BTT on FDI (Louie and Rousslang, 2002; Blonigen and Davies, 2004), and when the effect is significant it is negative rather than positive (Egger et al., 2006).²¹ These results can be explained by the fact that double taxation is already alleviated unilaterally by most countries and lower withholding tax rates on interest and royalties are compensated by home country taxation. In addition, as one of the objectives of the signature of BTTs is to facilitate the exchange of information in order to reduce tax avoidance and evasion, BTTs could have a detrimental effect on FDI.

On average the OECD countries of our sample include a tax sparing provision in 31 percent of their BTTs with developing countries,²² indicating that tax sparing and BTT do not overlap in a large number of instances. While most of the BTTs entered into force prior to 2002, we observe 293 instances in which new BTTs entered into force or in which existing BTTs were terminated over 2002-2012.

For comparison purposes, in Column (1) of Table 11 we simply replicate the results of our baseline equation where BTTs are omitted. In Columns (2), we substitute the dummy tax sparing by a dummy BTT which takes the value one if the home country i has a BTT with the host country j in year t . The coefficient estimated on the dummy BTT is positive but is not significantly different from zero. In Column (3) we include together the tax sparing and the BTT dummies. However, both dummies have information in common. BTTs and tax sparing take the same value one when a tax sparing provision is included in a BTT. To remove this redundant information, we use a “dummy BTT without tax sparing” which takes the value one when a BTT is signed between two countries but does not include a tax sparing provision. In other words, we estimate a coefficient for tax sparing (corresponding to BTT with tax sparing) and a coefficient for BTT without tax sparing. The coefficient estimated on the tax sparing dummy is unaffected by the inclusion of the BTT dummy and the coefficient estimated on BTT without tax sparing is positive but non statistically significant. This result tends to indicate that investors are responsive to a particular provision of BTTs, tax sparing, and not to the remaining provisions.

Tax Treaty Shopping

One concern when measuring the effect of tax sparing on FDI is that the estimated increase in bilateral FDI might result from ending a diversion of FDI due to past treaty shopping, without affecting the total stock of FDI. Treaty shopping with respect to tax sparing implies that FDI is diverted through a third country to

²¹See Davies (2004) for an excellent survey on tax treaties and FDI.

²²This average is 33 percent if we remove the United States and Iceland from the calculation. Both countries never include a tax sparing provision in their BTTs.

Table 11: Bilateral Income Tax Treaties and Treaty Shopping

	The role of BTTs			Treaty shopping
	E(FDI _{ij}) ..) [1]	E(FDI _{ij}) ..) [2]	E(FDI _{ij}) ..) [3]	E(FDI _{ij}) ..) [4]
Ln home GDP	0.434 ^a (0.166)	0.429 ^a (0.166)	0.428 ^b (0.166)	0.423 ^b (0.167)
Ln host GDP	0.691 ^a (0.085)	0.692 ^a (0.085)	0.692 ^a (0.085)	0.684 ^a (0.087)
Ln host population	-1.817 ^a (0.628)	-1.810 ^a (0.628)	-1.831 ^a (0.628)	-1.944 ^a (0.636)
Bilateral trade costs	-0.592 ^a (0.129)	-0.594 ^a (0.128)	-0.594 ^a (0.128)	-0.621 ^a (0.128)
Home financial crisis	-0.120 ^b (0.049)	-0.119 ^b (0.049)	-0.120 ^b (0.049)	-0.113 ^b (0.049)
Tax differential	1.033 ^a (0.339)	1.018 ^a (0.339)	1.021 ^a (0.339)	1.025 ^a (0.341)
Tax sparing	0.260 ^b (0.130)		0.340 ^b (0.169)	0.256 ^b (0.128)
BTT		0.120 (0.103)		
BTT without tax sparing			0.099 (0.105)	
Ln FDI conduit				0.018 ^c (0.010)
Country-pair fixed effects	x	x	x	x
Observations	8,189	8,189	8,189	8,167
Number of pair	1,103	1,103	1,103	1,103

Notes: The letters "a", "b" and "c" indicate respectively a significance level of 1, 5 and 10 percent. Standard errors, which are clustered at the country-pair level, are in parentheses and time dummies are included.

benefit from reduced corporate tax rates made possible under favorable tax sparing treaties. To this effect a tax sparing agreement must be signed between the host and the intermediate country. When a tax sparing provision is agreed between two countries, FDI might not be diverted anymore leading to an overestimation of the real effect of tax sparing on bilateral FDI originating from the home country. In other words, the signature of tax sparing may have an effect on the origin of FDI rather than leading to a real increase in bilateral FDI.²³ To consider this possibility, the baseline equation is augmented to include the role played by potential conduit countries. While the dependent variable is unchanged and corresponds to the direct bilateral FDI from the home country i to the host country j , we include as an additional determinant "*ln FDI conduit*", corresponding to the total FDI from the home country i to OECD countries having a tax sparing provision with the host country j . The inclusion of this variable allows us to see whether FDI received by potential conduit countries substitutes for bilateral FDI from the home country i to the host country j , as would be the case with treaty shopping. In Column (5), the coefficient estimated on "*ln FDI conduit*" is positive and statistically significant. This result indicates a complementary relationship between total home FDI in potential conduit countries and bilateral FDI, and by extension it suggests that the effect of tax sparing on bilateral FDI is not overestimated by treaty shopping.

Tax Incentives

Another concern is that FDI may respond to tax incentives such as tax concessions and tax holidays which are not observed in this analysis. As tax incentives may be correlated with tax sparing - the aim of tax sparing being to allow investors to fully benefit from tax incentives - the omission of tax incentives may lead to a spurious relationship between tax sparing and FDI. To address this issue, we use the average effective tax rate paid by U.S. multinational firms as a proxy for tax incentives provided by the host country. This average effective tax rate is calculated using the Bureau of Economic Analysis's data, and corresponds to the ratio of corporate income tax paid by all U.S. affiliates in a country to total pretax income.²⁴ This measure has two advantages. First, this is the only measure of effective tax rate available for a wide range of developed and developing countries across time. Second, since the U.S. never includes a tax sparing provision in its bilateral tax treaties, this effective tax rate is likely to reflect the standard tax burden actually paid by multinational firms in a host country independently from tax sparing provisions.

The baseline equation is augmented with the effective tax rate measure in Column (1) of Table 12. The coefficient estimated on the effective tax rate is negative but not statistically significant. As the effective

²³For example a tax sparing agreement entered into force between Luxembourg and Malaysia in 2004. Prior to this agreement Luxembourg FDI might have been diverted through countries such as the United Kingdom which has a tax sparing agreement with Malaysia since 1973. From 2004, Luxembourg FDI might no longer be diverted, increasing then the apparent effect of tax sparing.

²⁴We exclude observations with a tax burden less than zero or exceeding unity, as at the aggregated level this might reflect erroneous data.

Table 12: Tax Incentives and Withholding Tax Rates

	$E(FDI_{ij} \cdot)$ [1]	$E(FDI_{ij} \cdot)$ [2]	$E(FDI_{ij} \cdot)$ [3]	$E(FDI_{ij} \cdot)$ [4]	$E(FDI_{ij} \cdot)$ [5]	$E(FDI_{ij} \cdot)$ [6]
Ln home GDP	0.423 ^b (0.181)	0.433 ^b (0.170)	0.437 ^a (0.167)	0.438 ^a (0.167)	0.365 ^b (0.169)	0.365 ^b (0.169)
Ln host GDP	0.742 ^a (0.095)	0.697 ^a (0.085)	0.692 ^a (0.085)	0.692 ^a (0.085)	0.673 ^a (0.078)	0.673 ^a (0.078)
Ln host population	-2.485 ^b (1.044)	-1.802 ^a (0.624)	-1.798 ^a (0.631)	-1.797 ^a (0.631)	-1.557 ^b (0.644)	-1.558 ^b (0.644)
Bilateral trade costs	-0.651 ^a (0.173)	-0.594 ^a (0.128)	-0.592 ^a (0.130)	-0.592 ^a (0.130)	-0.556 ^a (0.125)	-0.557 ^a (0.125)
Home financial crisis	-0.107 ^b (0.049)	-0.119 ^b (0.049)	-0.119 ^b (0.049)	-0.119 ^b (0.049)	-0.119 ^b (0.050)	-0.120 ^b (0.050)
Tax differential	1.028 ^a (0.359)	1.053 ^a (0.339)	1.023 ^a (0.342)	1.023 ^a (0.342)	2.111 ^a (0.515)	2.123 ^a (0.515)
Tax sparing	0.396 ^a (0.143)	0.251 ^c (0.130)	0.261 ^b (0.130)	0.264 ^b (0.128)	0.091 (0.169)	0.092 (0.169)
ETR (for U.S. firms)	-0.112 (0.084)					
Extended ETR		-0.184 ^a (0.071)				
WTR interest			0.370 (0.792)			
WTR royalties				0.375 (0.735)		
GTR interest					-2.121 ^a (0.703)	
GTR royalties						-2.144 ^a (0.701)
Country-pair fixed effects	x	x	x	x	x	x
Observations	3,182	8,189	7,851	7,851	8,181	8,189
Number of pair	434	1,103	1,042	1,042	1,103	1,103

Notes: The letters "a", "b" and "c" indicate respectively a significance level of 1, 5 and 10 percent. Standard errors, which are clustered at the country-pair level, are in parentheses and time dummies are included.

tax rate contains a large number of missing values, in Column (2) this measure is extended by using the statutory tax rate when the effective tax rate is not observed. The coefficient estimated on this extended effective tax rate is negative and statistically significant. The inclusion of both variants of the effective tax rates does not alter the estimated effect of tax sparing.

Withholding Tax Rates

The robust positive elasticity estimated between tax sparing and FDI, is not statistically different for FDI from territorial and worldwide tax systems, nor before and after a territorial tax reform. This suggests that withholding tax rates on passive income are an important determinant of FDI. To test directly the responsiveness of FDI to withholding tax rates, in Column (3) of Table 12 we include a withholding tax rate on interest and a withholding tax rate on royalties. Both variables correspond to the negotiated bilateral withholding tax rate if there is a BTT in place between the home and the host country, or correspond to the "non-treaty" withholding tax rate of the host country, in the absence of a BTT. This data come from Ernst and Young (2012) "Worldwide Corporate Tax Guide". These variables are time varying as the withholding tax rate changes when a BTT enters into force or is terminated.²⁵ The coefficients estimated on both interest and royalties withholding tax rates are not statistically significant. Two reasons may explain this result. First, without tax sparing, withholding tax rates are expected to have a limited effect on FDI as they are fully compensated by an immediate and generally higher statutory tax rate in the home country (deferral is not possible with passive income under both a worldwide and a territorial tax systems). Second, under tax sparing, the rate which matters for investors is the one corresponding to the difference between the effective withholding tax rate and the notional withholding tax rate.²⁶ As indicated in Section 2, to quantify the fiscal advantage of a tax sparing provision with passive income, three tax rates are required: the host country effective withholding tax rate, the host country nominal withholding tax rate, and the home country statutory tax rate. In the absence of data on effective withholding tax rates, following Azémar et al. (2007) we make the assumption that passive income benefit from tax holidays abroad. This hypothesis seems realistic since as indicated in the Figure 1 of OECD (2015), tax holidays are reported to be the most popular tax concessions offered by developing countries, being used by 82-88 percent of them. To be more specific about the use of tax holidays, Table 13 reports Hanson (2001)'s table on corporate income tax exemption for selected developing countries in 1990 and 1998. We extend these data for the year 2013 using PriceWaterhouseCooper Worldwide Tax Summaries corporate taxes 2013/14. This table shows that

²⁵As previously indicated, 293 changes occur between 2002 and 2012.

²⁶Note that the larger the difference between the effective withholding tax rate and the notional withholding tax rate, the larger the tax benefit of tax sparing. As emphasised by the OECD (1998), tax sparing may create an incentive for host countries to maintain higher rates of taxes as compared to non tax sparing countries. Interestingly, our data suggests that the withholding tax rates on interest and royalties are higher in bilateral tax treaties with tax sparing as compared to in bilateral tax treaties without tax sparing. The average withholding tax rate on interest corresponds to 9.35 percent in BTT with tax sparing versus 8.33 percent in BTT without tax sparing. The average withholding tax rate on royalties corresponds to 10.46 percent in BTT with tax sparing versus 7.76 percent in BTT without tax sparing.

tax holidays are frequently used by the selected developing countries and, when the data are available, for a substantial amount of time (up to twenty years). By assuming that the effective withholding tax rate on passive income equals zero, we can calculate a global effective tax rate on passive income.

Table 13: Corporate income Tax Exemption

	1990		1998		2013	
	CIT exemption	Period	CIT exemption	Period	CIT exemption	Period
Cote d'Ivoire	n.a.	n.a.	x	5-8 years	x	5-15 years
Egypt	x	5-20 years	x	5-20 years		
Gabon	x	0-10 years	x	0-10 years	x	2 years
Nigeria	x	0-5 years	x	0-5 years	x	3-5 years
Argentina					x	
Brazil					x	
Guatemala	x		x		x	5-10 years
Mexico						
Peru	x		x		x	
India	x	5 years	x	5 years	x	3-10 years
Philippines	x	3-6 years	x	3-6 years	x	6 years
Chile	x					
Sri Lanka			x		x	4-12 years
South Africa			x		x	
Thailand	x	3-8 years	x	3-8 years	x	10-15 years

Source: Hanson (2001) for the years 1990 and 1998, PWC Worldwide Tax Summaries Corporate Taxes 2013/14 for the year 2013.

The global effective tax rate of interest payments depends on t_h , w_f^i and $w_f'^i$, where t_h is the home country statutory tax rate, w_f^i the notional (foreign) withholding tax rate on interest and $w_f'^i$ the effective (foreign) withholding tax rate on interest. Similarly, the global tax rate on a royalty payment depends on t_h , w_f^r and $w_f'^r$, where w_f^r and $w_f'^r$ are the notional and effective (foreign) withholding tax rate on royalty, respectively. With the tax holidays assumption, $w_f'^i = 0$ and $w_f'^r = 0$. Under tax sparing, investors are allowed to reduce their home tax liability by a foreign tax credit equals to a notional amount of host country tax that would have been paid had the tax holiday not been in effect. The global tax rate of an interest payment corresponds thus to $t_h - w_f^i$ if $t_h > w_f^i$, and to zero if $t_h < w_f^i$. Without tax sparing, the global tax rate of an interest payment equals t_h as we make the assumption that investors benefit from a tax exemption abroad. Note that the statutory tax rate of OECD countries is generally higher than the withholding taxes of developing countries, thus even without the tax holiday assumption, the global tax rate on passive income would correspond to t_h in the majority of the cases. The same method is applied to calculate the global tax rate on royalties. Both global tax rate measures, of interest payments and royalties, are summarised in Table 14.

The global effective tax rates on interest and royalties are included in our baseline equation, respectively in Columns 5 and 6 of Table 12. The coefficient estimated on both variables is negative and statistically significant at the one percent level. These results indicate that when corrected for tax sparing benefits, withholding tax rates on passive income are important determinants of FDI. For the first time across the various estimations performed, the estimated coefficient reported on tax sparing is not statistically significant. This

Table 14: Measure of the Global Tax Rate on Passive Income in the Presence of Tax Holidays

	Without tax sparing	With tax sparing
<i>Interest payments:</i>		
If $t_h > w_f^i$	t_h	$t_h - w_f^i$
If $t_h < w_f^i$	t_h	0
<i>Royalties:</i>		
If $t_h > w_f^r$	t_h	$t_h - w_f^r$
If $t_h < w_f^r$	t_h	0

Note: Under the assumption of tax holidays, $w_f^i = 0$ and $w_f^r = 0$.

indicates that the effect of tax sparing agreements is mostly captured by the impact they have on effective tax rates on interest and royalties. This result is consistent with the absence of an effect of territorial tax reforms on FDI located in tax sparing countries.

4.4 Incidence of Territorial Tax Reforms for Developing Countries

Foreign Direct Investment

To shed more light on the effect of the territorial tax reforms on FDI in developing countries in general, and in tax sparing and nonsparing countries in particular, we now allow for heterogeneity in this effect. A territorial tax reform in relatively high corporate tax countries is expected to increase outbound FDI to developing countries as they correspond to lower corporate tax destinations on average. However, FDI from Japan, U.K., Norway, and New Zealand is not expected to react in the same way to a change from a worldwide to a territorial tax system. One reason is that the territorial tax reforms have been accompanied by decreases in the statutory tax rate to stimulate domestic investment and in order to partially offset the effect of moving to territoriality (as the decline in home corporate tax rates mitigates the increase of outbound FDI). The magnitude of the decline in statutory tax rates varies substantially from one country to another. This decline leads to statutory tax rates ranging from a competitive 24 percent for the U.K. - below the average statutory tax rate of the developing countries of the sample of 24.97 - to 38.01 percent for Japan, corresponding to the second highest statutory tax rate among OECD countries (after the U.S.: 40 percent) and the third worldwide (after the United Arab Emirates: 55 percent, and the U.S.), in 2012. The magnitude of the tax differential between the transition tax systems and developing countries is illustrated in Figure 2. After the territorial tax reform, the Japanese and the New Zealand statutory tax rates remain well above the average statutory tax rates of developing countries, while the tax differential is much smaller for Norway

and the U.K. At the period of the territorial tax reform, Norway had a statutory tax rate of 28 percent which corresponded to the average statutory tax rates of developing countries. A tax differential has emerged after the reform and increases until 2012. Regarding the U.K., the gap has substantially decreased with and after the territorial tax reform, leading to a statutory tax rate below the developing countries average in 2012.

In Column (1), we first test the average effect of the territorial tax reform on FDI in developing countries. The coefficient estimated on the reform is positive but not statistically significant. We then consider the fact that if the territorial tax reform can potentially affect the volume of FDI to developing countries, as it reduces the corporate tax burden of the firm, this effect might diverge from one country to another. In Column (2), the baseline equation is augmented by including a dummy territorial tax reform for U.K., Japan, Norway, and New Zealand. This dummy is only statistically significant for Japan, indicating that Japanese FDI have increased in developing countries after the territorial tax reform.

In Column (3), we interact the U.K., the Japanese, the Norwegian, and the New Zealand tax reform dummies with the tax sparing dummy. The attractiveness of tax sparing countries is not affected by the territorial tax reforms of the U.K., Japan and Norway, as the coefficients estimated on the interaction terms are not statistically significant. This mirrors the aggregate effect estimated in Table 9. Note that this result also indicates that the increase of Japanese FDI in developing countries after the reform, has benefited in the same way tax sparing and nonsparing countries. Interestingly, the coefficient estimated on the interaction term between the New Zealand tax reform and tax sparing is positive and statistically significant at the five percent level. This indicates that FDI from New Zealand increases in tax sparing countries after the territorial tax reform. With a relatively high tax differential with developing countries, the New Zealand shift to territoriality was expected to increase their outbound FDI. The decision to locate FDI in tax sparing countries rather than other developing countries with similar or lower corporate taxes is suggestive of the importance of fiscal incentives applying to passive income.²⁷ The decline of New Zealand FDI in nonsparing countries could be due to a substitution effect of the shift to a territorial tax system, which tends to increase FDI in tax sparing countries versus FDI in nonsparing countries or to the fact that host countries are not distinguished depending on their level of statutory tax rate.

The results previously obtained suggest that the territorial tax reform only has, on average, an effect on outbound FDI for countries with a large tax differential with developing countries (i.e Japan and New Zealand). A direct way to consider this possibility is to augment the equation estimated with the tax differential between the home and the host countries, as in Matheson et al. (2013). In Column (4), the tax reforms

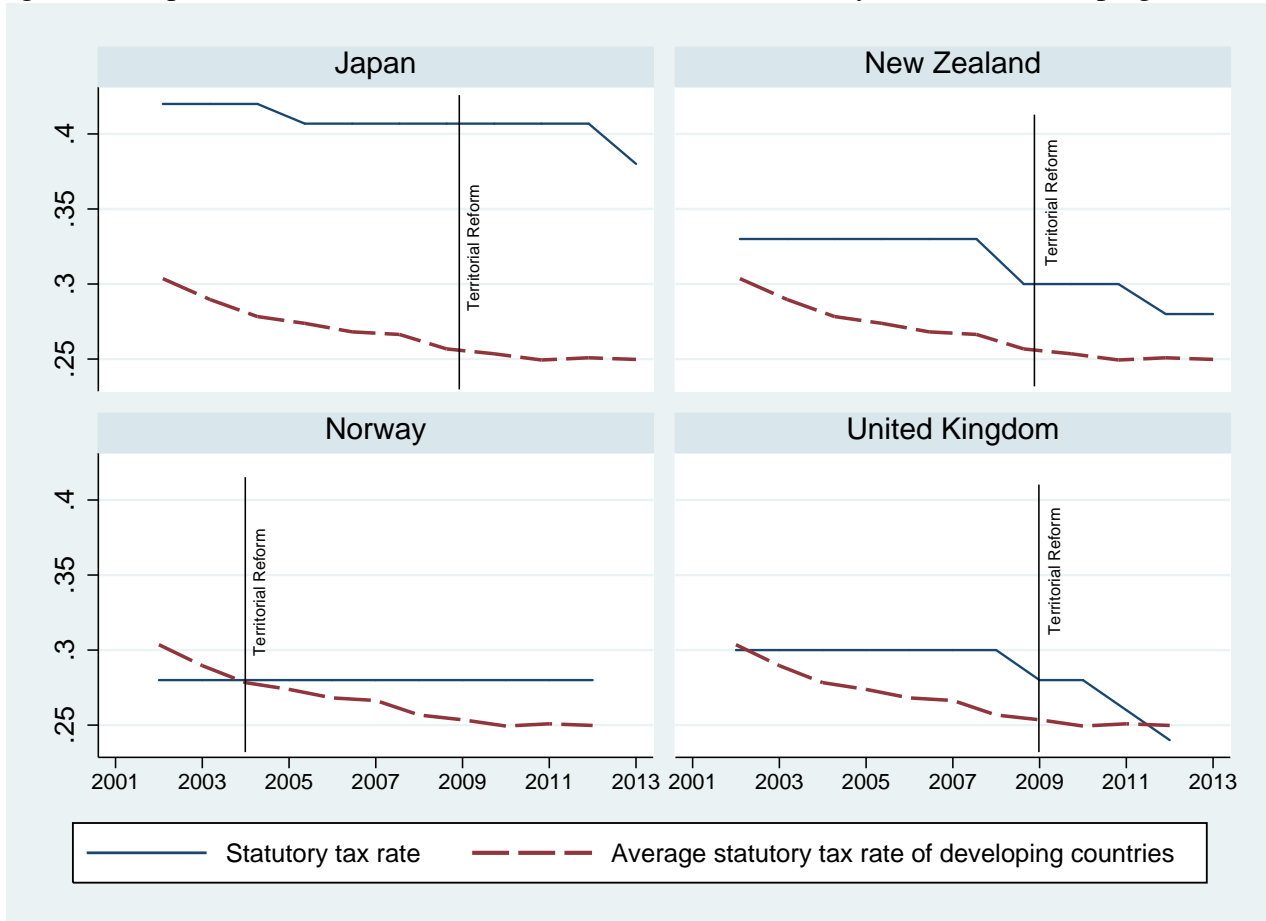
²⁷With regard to active income, all countries with a lower corporate tax rate than the home country (tax sparing and nonsparing) should be more attractive for investors after a territorial reform. However, after such reform, tax sparing countries should remain more attractive than nonsparing countries with respect to the taxation of passive income.

Table 15: Incidence of Territorial Tax Reform for Tax Sparing and Non Tax Sparing Developing Countries

	Dependent variable: FDI stock					
	Full sample	Full sample	Full sample	Full sample	Tax sparing countries	Non tax sparing countries
	[1]	[2]	[3]	[4]	[5]	[6]
Ln home GDP	0.478 ^a (0.161)	0.418 ^b (0.180)	0.417 ^b (0.180)	0.426 ^b (0.179)	-0.043 (0.216)	0.803 ^a (0.250)
Ln host GDP	0.682 ^a (0.084)	0.679 ^a (0.084)	0.676 ^a (0.083)	0.686 ^a (0.084)	0.544 ^a (0.107)	0.706 ^a (0.084)
Ln host population	-1.809 ^a (0.626)	-1.760 ^a (0.619)	-1.804 ^a (0.630)	-1.776 ^a (0.609)	-0.896 (0.931)	-1.936 ^b (0.767)
Bilateral trade costs	-0.604 ^a (0.129)	-0.619 ^a (0.130)	-0.611 ^a (0.129)	-0.616 ^a (0.126)	-0.371 ^c (0.189)	-0.573 ^a (0.157)
Home financial crisis	-0.094 ^c (0.052)	-0.076 ^c (0.046)	-0.076 ^c (0.046)	-0.076 ^c (0.046)	0.036 (0.077)	-0.118 ^b (0.051)
Tax differential	1.032 ^a (0.340)	0.968 ^a (0.345)	0.968 ^a (0.351)	1.063 ^a (0.336)	3.028 ^a (0.603)	0.870 ^b (0.388)
Tax sparing	0.258 ^c (0.133)	0.249 ^c (0.132)	0.234 ^c (0.130)	0.252 ^c (0.132)		
Territorial tax reform	-0.074 (0.080)					
UK reform		0.008 (0.128)	-0.117 (0.166)	0.031 (0.114)	-0.028 (0.137)	0.030 (0.156)
Japanese reform		0.146 ^c (0.089)	0.377 ^b (0.153)	0.697 ^a (0.121)	0.819 ^a (0.130)	0.052 (0.063)
Norwegian reform		-0.093 (0.144)	-0.164 (0.132)	-0.033 (0.201)	-0.167 (0.250)	0.342 (0.301)
New Zealand reform		0.074 (0.281)	-0.606 ^b (0.246)	-0.154 (0.320)	0.209 (0.597)	0.575 (0.531)
UK reform x tax sparing			0.269 (0.210)			
Japanese reform x tax sparing			-0.235 (0.167)			
Norwegian reform x tax sparing			0.142 (0.298)			
New Zealand reform x tax sparing			0.745 ^b (0.367)			
UK reform x tax differential				1.510 (1.447)	-0.723 (1.648)	2.093 (1.901)
Japanese reform x tax differential				-4.567 ^a (0.836)	-6.028 ^a (0.899)	3.699 ^a (0.534)
Norwegian reform x tax differential				-2.980 (2.654)	-2.090 (3.541)	-7.642 (5.001)
New Zealand reform x tax differential				7.784 ^c (4.550)	-2.509 (10.250)	31.955 ^a (10.022)
Country-pair fixed effects		x	x	x	x	x
Observations	8,189	8,189	8,189	8,189	2,148	6,030
Number of pairs	1,103	1,103	1,103	1,103	261	849

Notes: The letters "a", "b" and "c" indicate respectively a significance level of 1, 5 and 10 percent. Standard errors, which are clustered at the country-pair level, are in parentheses and time dummies are included.

Figure 2: Corporate Tax Rate differential Between Transition Tax Systems and Developing Countries



of the U.K., Japan, Norway and New Zealand are interacted with the tax differential between country-pairs, as the positive effect of a territorial tax reform on FDI should increase with the tax differential between the home and the host country. For the U.K. and Norway, the tax reforms have no effect on FDI in developing countries, no matter the level of the tax differential. For New Zealand, the positive effect of the tax reform on FDI increases with the tax differential, as expected. For Japan, the results are paradoxical at first glance, as the positive effect of the tax reform on Japanese FDI decreases with the tax differential. This result can be obscured by the fact that we do not distinguish tax sparing from nonsparing countries in this regression. Before the tax reform, investors from a worldwide tax system might had an incentive to locate in tax sparing countries with higher statutory tax rates as they allowed them to benefit from a higher fictitious foreign tax credit. After the territorial reform, investors are not concerned about the amount of the foreign tax credit that they can claim at home as they do not pay taxes at home on their active income earned abroad. However, if the statutory tax rate is correlated with the withholding tax rates (as higher withholding tax rates imply higher fictitious foreign tax credit), they might continue to be attracted by tax sparing countries with a lower tax differential with the home country.²⁸

Since tax sparing blurs the effect of the tax differential on the tax reform and FDI relationship, we split the sample of developing countries to only consider tax sparing countries in Column (5) and nonsparing countries in Column (6). In tax sparing countries, the tax differential (which is negative for the four transition tax systems) is only statistically significant for Japan. This suggests that the territorial tax reform increases Japanese FDI in tax sparing countries where a potential higher fictitious tax credit can be claimed. The results of Column (6) indicate that the Japanese and New Zealand tax reforms have benefited (some) nonsparing countries. The effect is higher, the larger the tax differential. For instance, the magnitude of the coefficient estimated on the interaction term between New Zealand reform and tax sparing, indicates that the tax reform has increased New Zealand FDI by 2 percent in nonsparing countries with an average tax differential of 0.048, and up to 11 percent for countries with the highest tax differential of 0.33.

Official Development Assistance

We further explore another aspect of the impact of tax sparing and territorial reforms on developing countries by analysing the consequences for Official Development Assistance (ODA) from residence countries to source countries. Bilateral tax treaties impose generally low negotiated withholding tax rates, and thus arguably primarily benefit residence country. This problem is minor between developed countries as the tax gain for outbound FDI compensates for the tax loss for inbound FDI. However, when the BTT is signed between a developed country (usually the residence country) and a developing country, reallocating tax revenues may seem to be regressive redistribution at the expense of the developing country (Dagan,

²⁸The correlation between the statutory tax rate and the withholding tax rate on interest and on royalties corresponds to 0.3 on average in our sample.

2000). Tax sparing provisions mitigate this inter-nation redistribution, as foreign tax credits granted by the residence country for taxes spared by the source country represent a transfer from the residence country treasury to the source country treasury (relative to a scenario in which the same economic activity occurs but there is no tax sparing agreement).

This formulation suggests that there is a sense in which tax sparing may potentially serve as a substitute for ODA. If so, then signing a tax sparing agreement may be expected to lead to a decrease in (other forms of) bilateral aid. However, it would be challenging to interpret such a relationship, because the signing of a tax sparing agreement may be driven by unobservable factors that also lead the countries to simultaneously change their level of ODA. On the other hand, the territorial reforms may be viewed as leading to a quasi-exogenous decrease in tax sparing credits for sparing countries (relative to nonsparing countries). The reform does not directly change the resources available to the (developing) source country. The loss of tax sparing credits is offset by the fact that the residence country no longer imposes its taxes on the active foreign income of its MNCs (and tax sparing would continue to apply to passive income). Thus, if aid from the residence country is motivated solely by pure altruism, then we would expect that there would be no impact on ODA. However, the residence country may instead be motivated by impure altruism (Andreoni, 1990). The residence country may care about the (weighted) sum of tax sparing credits and ODA, for instance because these transfers provide political leverage or other advantages. Then, we would expect that a decrease in tax sparing credits would result in an increase in ODA, holding everything else constant.

To test these predictions, we merge into our dataset data on bilateral ODA from David Roodman's database.²⁹ This database reports various measures and components of ODA at the country-pair-year level. We use a specification similar to that in Equation (2); however, we replace the FDI dependent variable with ODA. There are a large number of zeroes in the ODA data, and so we use a Poisson PML specification for essentially the same reasons as in the FDI model (note, however, that the ODA data represents flows rather than stocks, which affects the interpretation of the magnitudes). As control variables, we rely on the substantial prior literature on the determinants of ODA, which has focused on what has come to be known as the 4P framework - Poverty, Population, Policy, and Proximity (e.g. Clist (2011)). This is thought to encapsulate the various forms of aid allocation practice. We thus control for the log of population, the log of GDP, and the World Bank's poverty gap measure (at \$1.25 a day). Many of the variables used in prior studies are time-invariant, and so are absorbed by our country-pair fixed effects. However, we also control for the World Bank's measure of telephone lines in the recipient country and for the correlation of the countries' UN votes. We also control for the World Bank governance indicators (for recipient countries) constructed by Kaufmann et al. (2005).³⁰ Finally, we control for measures of recipient country natural

²⁹Available at <http://davidroodman.com/data/>

³⁰They compile several hundred different underlying governance-related variables reported in many different datasets collected

Table 16: Tax Sparing, Territorial tax Reforms, and Official Development Assistance

	Dependent variable:			
	ODA [1]	ODA [2]	Grants [3]	Grants [4]
Log of GDP	-0.474 ^b (0.200)	-0.4793 ^b (0.200)	-0.281 (0.178)	-0.291 (0.178)
Log of Population	-2.338 ^c (1.250)	-2.248 ^c (1.238)	-0.448 (0.897)	-0.336 (0.908)
Telephone Lines	-0.022 (0.018)	-0.023 (0.018)	0.002 (0.012)	0.002 (0.012)
Poverty Gap at \$1.25/day	-0.008 (0.014)	-0.008 (0.014)	-0.018 (0.013)	-0.018 (0.013)
Correlation of UN Votes	-0.527 (0.679)	-0.566 (0.688)	0.549 (0.523)	0.519 (0.527)
Tax Sparing	-0.778 (0.719)	-0.778 (0.719)	-0.780 (0.717)	-1.220 (0.872)
Territorial Reform x tax sparing	-0.222 (0.275)		0.327 ^c (0.191)	
U.K. Territorial Reform x tax sparing		-0.329 (0.269)		0.168 (0.256)
Japanese Territorial Reform x tax sparing		-0.251 (0.482)		0.410 ^b (0.179)
New Zealand Territorial Reform x tax sparing		-0.164 (0.289)		0.421 ^b (0.212)
Norwegian Territorial Reform x tax sparing		0.573 ^c (0.325)		0.734 ^a (0.246)
Territorial Reform	-0.008 (0.164)	-0.010 (0.164)	-0.262 (0.168)	-0.263 (0.168)
World Bank Governance Indicators	X	X	X	X
Natural Disaster Controls	X	X	X	X
Country-pair fixed effects	X	X	X	X
Observations	6,041	6,041	6,372	6,372
Number of country-pairs	1,327	1,327	1,359	1,359

Notes: The letters “a”, “b” and “c” indicate respectively a significance level of 1, 5 and 10 percent. Standard errors, which are clustered at the country-pair level, are in parentheses and time dummies are included.

disasters from the EM-DAT database.³¹ These report the number of deaths from natural disasters, the total number of people affected, and the economic damage at the (source) country-year level.

The results are reported in Table 16. Columns 1 and 2 use an overall measure of ODA (net ODA). Tax sparing agreements are associated with decreases in net ODA, but the relationship is not statistically significant. Territorial reforms provide quasi-exogenous variation in the value of tax sparing credits granted by the residence country, but there is no significant effect of these reforms on net ODA. However, the component of ODA that consists of grants (for which results are reported in Column 3) experiences an increase at the time of a territorial reform that is of borderline statistical significance. Disaggregating the effect by residence country (as reported in Column 4) shows that this effect is statistically significant for three of the four residence countries that experienced territorial reforms (all except the UK). This finding is consistent with the impure altruism framework described above. While there are important limitations, Table 16 provides some evidence that tax sparing may indeed serve as a partial substitute for ODA.

5 Conclusion

Developing countries' efforts to attract multinational firms with tax holidays and other fiscal incentives may potentially be undone by the tax system of the multinational firm's home country. Tax sparing provisions have emerged as a mechanism that is included in many bilateral tax treaties (BTTs) to prevent host country tax incentives being nullified by residence country taxation. While tax sparing has been widely discussed, prior empirical analysis of its consequences has been extremely limited in various respects. In this paper, we construct a new dataset of tax sparing provisions by coding the presence of this provision in the bilateral tax treaties between 23 OECD countries and 113 developing and transition economies over the period 2002-2012. We merge this data with data on bilateral FDI, bilateral foreign aid, and various relevant country-pair characteristics to form a dataset that has 8189 observations on 1103 country-pairs in the baseline specification. In this analysis, we use two distinct sources of variation - the signing or termination of tax sparing agreements, and quasi-experimental variation generated by territorial tax reforms in residence countries that change the value of pre-existing tax sparing provisions.

We find that tax sparing agreements are associated with a 30 percent increase in the stock of FDI in our baseline specification (and up to a 123 percent increase in other specifications). This effect does not

by international organisations, private firms, nonprofit organisations and universities. Kaufmann et al. (2005) classify these variables as pertaining to six different aspects of governance. They use an unobserved components weighting procedure to construct aggregate country scores for the following elements of country-level governance: Voice and Accountability, Political Stability, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption. Each of these measures takes values from approximately -2.5 to 2.5, with higher values indicating better governance). Each index is normalized so that the mean across all countries is 0 and the standard deviation is 1.

³¹Available at <http://www.emdat.be/database>

differ across worldwide and territorial residence countries. It is robust to including various controls, and is not driven by other features of BTTs. It is also robust to controlling for treaty shopping and source country tax incentives. Much of the effect of tax sparing appears attributable to its impact on credits for withholding taxes on interest and royalties (which applies to both worldwide and territorial home countries). The territorial reforms in four residence countries - Norway in 2004, and the U.K., Japan, and New Zealand in 2009 - during our sample period do not lead to a significant change in FDI (consistent with the absence of differences across worldwide and territorial home countries). However, these reforms are associated with increases in certain forms of bilateral foreign aid from residence countries to sparing countries, relative to nonsparing countries, suggesting that tax sparing and foreign aid may function as substitutes.

Our results suggest that the growth of tax sparing provisions in bilateral tax treaties can be an important tool to encourage FDI in developing countries. The positive net effect of tax sparing on FDI reveals that if the signature of the provision may encourage an excessive repatriation of profits from developing countries, this counterproductive effect (in an economic development perspective) is more than compensated by additional equity and/or intra-company loans accruing to the tax sparing developing country. However, one concern suggested by the instantaneous and substantial response of FDI to tax sparing with the lag-lead specification is that tax sparing may lead to the shifting of income or assets from related affiliates located in the resident country and nonsparing countries to the affiliate located in the tax sparing country.

The results also highlight the continuing relevance of tax sparing provisions in a world in which most residence countries are territorial. They should thus be of interest to scholars and policymakers in the area of economic development, as well as to those interested in international taxation and public finance. They also point to the importance of controlling for tax sparing provisions when studying cross-border FDI flows and other topics in international economics, even when the effects of taxes are not the primary focus. The results also highlight the linkages between tax treaties and foreign aid. They also hold lessons for residence countries contemplating tax reforms. For instance, a U.S. transition from a worldwide tax system to a territorial tax system could substantially increase U.S. FDI to developing countries if this tax reform is not accompanied by a decrease of the U.S. corporate tax rate (as suggested by the effect of the Japanese tax reform). This effect could be mitigated by a lower U.S. corporate tax rate (as suggested by the effect of the U.K. tax reform).

References

- Andreoni, J. (1990). Impure Altruism and Donations to Public Goods: A Theory of Warm-Glow Giving. *The Economic Journal* 100, 464–477.
- Autor, D. H. (2003). Outsourcing at Will: The Contribution of Unjust Dismissal Doctrine to the Growth of Employment Outsourcing. *Journal of Labor Economics* 21(1), 1–42.
- Azémar, C., R. Desbordes, and J.-L. Mucchielli (2007). Do Tax Sparing Agreements Contribute to the Attraction of FDI in Developing Countries? *International Tax and Public Finance* 14(5), 543–562.
- Azémar, C., R. Desbordes, and I. Wooton (2015). Country Size and Corporate Tax Rate: Rationale and Empirics. CEPR Working Paper No. 10800.
- Bilzin-Sumberg (2014). The Real Tax Benefits of Inverting to Canada. Insights, <http://www.bilzin.com/publications/Detail.aspx?publication=1098>.
- Blonigen, B. and R. Davies (2004). The Effects of Bilateral Tax Treaties on U.S. FDI Activity. *International Tax and Public Finance* (11), 601–622.
- Brainard, S. L. (1997). An Empirical Assessment of the Proximity- Concentration Trade-off Between Multinational Sales and Trade. *American Economic Review* 87(4), 520–544.
- Brooks, K. (2009). Tax Sparing: a Needed Incentive for Foreign Investment in Low-income Countries or an Unnecessary Revenue Sacrifice? *Queens Law Journal* 34, 505–564.
- Clist, P. (2011). 25 Years of Aid Allocation Practice: Wither Selectivity? *World Development* 39(10), 1724–1734.
- Dagan, T. (2000). The Tax Treaties Myth. *New York University Journal of International Law and Politics*, 939–996.
- Davies, R. (2004). Tax Treaties and Foreign Direct Investment: Potential versus Performance. *International Tax and Public Finance* 11, 775–802.
- Davies, R. and J. Voget (2008). Tax Competition in an Expanding Union. Oxford University Centre for Business Taxation Working Paper n° 08/30.
- De Mooij, R. and S. Ederveen (2003). Taxation and Foreign Direct Investment: A Synthesis of Empirical Research. *International Tax and Public Finance* 10(6), 673–93.
- Desai, M. A. and J. R. Hines (2003). Evaluating International Tax Reform. *National Tax Journal* 56(3), 487–502.
- Dharmapala, D., C. F. Foley, and K. J. Forbes (2011). Watch What I do, not What I say: The Unintended Consequences of the Homeland Investment Act. *The Journal of Finance* 66(3), 753–787.
- Dharmapala, D. and J. R. Hines (2009). Which Countries Become Tax Havens? *Journal of Public Economics* 93(9), 1058–1068.
- Egger, P. (2008). On the Role of Distance for Outward FDI. *Annals of Regional Science* 42, 375–389.
- Egger, P., M. Larch, M. Pfaffermayr, and H. Winner (2006). The Impact of Endogenous Tax Treaties on Foreign Direct Investment: Theory and Evidence. *Canadian Journal of Economics* 39, 901–931.

- Egger, P., V. Merlo, M. Ruf, and G. Wamser (2015). Consequences of the New UK Tax Exemption System: Evidence from Micro-Level Data. *The Economic Journal*, Forthcoming.
- Ernst and Young (2012). Worldwide Corporate Tax Guide.
- Gartzke, E. (1999). United Nations General Assembly Voting Data. Updated by Erik Voeten and Adis Merdzanovic. <http://www9.georgetown.edu/faculty/ev42/UNVoting.htm>.
- Granger, C. W. J. (1969). Investigating Causal Relation by Econometric and Cross-Sectional Method. *Econometrica* 37, 424–438.
- Hanson, G. (2001). Should Countries Promote Foreign Direct Investment. United Nations Conference on Trade and Investment, G24 discussion paper series.
- Head, K. and T. Mayer (2010). The Erosion of Colonial Trade Linkages After Independence. *Journal of International Economics* 81, 1–14.
- Head, K. and T. Mayer (2013). Gravity Equations: Workhorse, Toolkit, and Cookbook. CEPR Discussion Paper, No. 9322.
- Helpman, E. (1984). A Simple Theory of Trade with Multinational Corporations. *Journal of Political Economy* 92, 451–471.
- Hines, J. (1999). Lessons from Behavioral Responses to International Taxation. *National Tax Journal* 52(2), 305–322.
- Hines, J. (2001). Tax Sparing and Direct Investment in Developing Countries. In J. Hines (Ed.), *International Taxation and Multinational Activity*, pp. 39–66. University of Chicago Press.
- Jakobsen, J. and I. De Soya (2006). Do Foreign Investors Punish Democracy? Theory and Empirics. *Kyklos* 53(3), 383–410.
- Javorcik, B. S. (2004). Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers Through Backward Linkages. *American Economic Review* 94(3), 605–627.
- Kaufmann, D., A. Kraay, and M. Mastruzzi (2005). Governance Matters IV: Governance indicators for 1996–2004. Washington DC: World Bank.
- Laeven, L. and F. Valencia (2012). Systemic Banking Crises Database: An Update. IMF, WP/12/163.
- Levy, G. and R. Razin (2004). It Takes Two: An Explanation for the Democratic Peace. *Journal of the European Economic Association* 2(1), 1–29.
- Louie, H. and D. J. Rousslang (2002). Host-Country Governance, Tax Treaties, and American Direct Investment Abroad. Mimeo. Office of Tax Analysis.
- Markle, K. S. (2012). A Comparison of the Tax-motivated Income Shifting of Multinationals in Territorial and Worldwide Countries. Oxford University Centre for Business Taxation, n^o 1206.
- Markusen, J. (1984). Multinationals, Multi-Plant Economies and the Gains from Trade. *Journal of International Economics* 16, 205–226.
- Martin, P., T. Mayer, and M. Thoenig (2012). The Geography of Conflicts and Regional Trade Agreements. *American Economic Journal: Macroeconomics* 4(4), 1–35.

- Matheson, T., V. Perry, and C. Veung (2013). Territorial vs. Worldwide Corporate Taxation: Implications for Developing Countries. IMF Working Paper 13/205.
- Mitchell, R. (1997). United States-Brazil Bilateral Income Tax Treaty Negotiations. *Hastings International and Comparative Law Review* 21(1), 209–239.
- Novy, D. (2009). Gravity Redux: Measuring International Trade Costs with Panel Data. University of Warwick Working Paper, No. 861.
- OECD (1998). *Tax Sparing, A Time for Reconsideration*. OECD Publications.
- OECD (2001). *Corporate Tax Incentives for Foreign Direct Investment*. OECD Publications.
- OECD (2015). Tax Incentives for Investment - Options for LICS. <http://www.oecd.org/tax/tax-global/options-for-low-income-countries-effective-and-efficient-use-of-tax-incentives-for-investment-call-for-input.pdf>.
- Overesch, M. and J. Rincke (2011). What Drives Corporate Tax Rates Down? A Reassessment of Globalization, Tax Competition, and Dynamic Adjustment to Shocks. *The Scandinavian Journal of Economics* 113, 579–602.
- Portes, R. and H. Rey (2005). The Determinants of Cross-Border Equity Flows. *Journal of International Economics* 65, 269–296.
- Santos Silva, J. and S. Tenreyro (2006). The Log of Gravity. *Review of Economics and Statistics* 88(4), 641–658.
- Tillinghast, D. R. (1996). Tax Treaty Issues. *University of Miami Law Review* 50, 455–482.
- Toaze, D. (2001). Tax Sparing: Good Intentions, Unintended Results. *Canadian Tax Journal* 49(4), 879–924.
- Weichenrieder, A. J. (1996). Anti-tax-avoidance provisions and the size of foreign direct investment. *International Tax and Public Finance* 3(1), 67–81.
- Westerlund, J. and F. Wilhelmsson (2011). Estimating the Gravity Model without Gravity using Panel Data. *Applied Economics* 43(6), 641–649.
- Winkelmann, R. (2008). *Econometric Analysis of Count Data*. Berlin: Springer-Verlag Berlin Heidelberg.
- Wooldridge, J. M. (2010). *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: The MIT Press, second edition.
- Yeaple, S. R. (2003). The Complex Integration Strategies of Multinationals and Cross Country Dependencies in the Structure of Foreign Direct Investment. *Journal of International Economics* 60(2), 293–314.