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Tax Sparing Agreements, Territorial Tax Reforms, and Foreign Direct Investment

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(PRELIMINARY AND INCOMPLETE)

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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 (with 8189 observations on 1103 country pairs), coding tax sparing provisions in all bilateral tax treaties among these countries. We find that tax sparing agreements are associated with a 30 percent increase in bilateral FDI stocks. 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.

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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 (as 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.

By way of background, the distinction between "residence" (or "home") countries and "source" (or "host") countries is fundamental to international taxation. The former are countries in which the parents of MNCs are headquartered. Source countries are those in which MNC affiliates undertake business activity. The income generated by normal business operations in the source country 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

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

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.

This fundamental problem has been discussed extensively since the 1950's, when the U.K.'s 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 US MNCs in 67 source countries. He finds that Japanese FDI is substantially higher, relative to US FDI, in source countries with which Japan has a tax sparing agreement. US FDI serves here as a control, as both Japan and the US had worldwide tax systems, while the US 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 has a worldwide system, 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 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]

[2]These 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.

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 literature reviewed above). However, the 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 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.

The previous literature has not investigated the question of whether the effect of tax sparing agreements differs across worldwide and territorial residence countries (as might be expected on a priori grounds). 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 countries. 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. It is also relatively small, in the sense that it allows us to rule out at the 95 percent confidence level a relative decline in FDI in sparing countries of more than about 10 percent. While such a decline is quite meaningful, it is substantially smaller than the baseline 30 percent estimate of the increase in FDI due to tax sparing agreements. This suggests that much of the benefit from tax sparing is available to territorial MNCs, and reinforces the continuing relevance of tax sparing in a world in which most residence countries are territorial.

Finally, we 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 38.01 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 an effect on Japanese and New Zealand FDI in developing countries. The reforms are associated with increased New Zealand FDI in tax sparing countries and increased in both Japanese and New Zealand FDI 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.

The paper is organised as follows. The next section presents some background information on territorial and worldwide tax systems, and discusses the tax costs incurred by both types of investors, with and without tax sparing. 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. An example is the following: Article 21 (on the "Elimination of Double Taxation") of the tax treaty between the U.K. and Sri Lanka 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]

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 US taxes were illogical" (as quoted in Toaze (2001), p 884).[4] On the other

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

[4] Recently, the United States has experienced a growing trend towards "inversion" transactions - mergers in which US-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

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 stylized characterizations 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 entrerprises operating abroad are not subject to the home country 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 host country effective tax rate $t_h^{'}$. 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_h are $t_h^{'} D_h + w_h^{'d}(D_h - t_h^{'} D_h)$, where $w_h^{'d}$ 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: $t_h^{'} + w_h^{'d}(1 - t_h^{'})$.

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, $w_h^{'i}$, and on royalties, $w_h^{'r}$, 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_f, 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, t_f.

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_j. 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. Profits of a foreign branch of a corporation are subject to corporate taxation at home even if not repatriated. Thus the income earned abroad is taxed at rate t'_h for a subsidiary. For a branch, this income is taxed at rate t_j , when $t_j > t'_h$, or at rate t'_h when $t_j < t'_h$. The taxes paid abroad on a dividend payment of D_h are $t'_h D_h + w'^d_h(D_h - t'_h D_h)$. Tax liabilities are calculated on the grossed-up dividend payment D_h. Allowing a tax credit for the foreign tax paid abroad, the global tax on a dividend payment is thus t_j when $t_j > t'_h + w'^d_h(1-t'_h)$ and $t'_h + w'^d_h(1-t'_h)$ when $t_j < t'_h + w'^d_h(1-t'_h)$, for both subsidiaries and branches. As in a territorial tax system, interest and royalty payments from a foreign affiliate (subsidiary or branch) 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 t_j, since withholding taxes on interest and royalties are generally lower than t_j.

2.2 Tax Costs With 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 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 withholding and royalty tax rates - applied to investors from either worldwide or territorial tax systems - 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 host country and home country tax systems on foreign investors' corporate income taxes, with and without tax sparing

	Without tax holiday (source country)		With tax holiday (source country)		
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		
	Territorial system	Worldwide system	Territorial system	Worldwide system without tax sparing	Worldwide system with tax sparing
Residence country taxation					
Dividend received	60	60	100	100	100
Grossed-up dividend	n.a	100	n.a	100	100
Corporate income tax : 40% (a)	n.a	40	n.a	40	40
Creditable foreign tax (b)	n.a	40	n.a	0	40
Foreign tax credit (min (a, b))	n.a	40	n.a	0	40
Net corporate income tax (CIT)	0	0	0	40	0
Source country tax	40	40	0	0	0
Residence country tax	0	0	0	40	0
Total	40	40	0	40	0
After-tax profit	60	60	100	60	100

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

Table 2: Impact of the interaction of host country and home 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
Foreign tax credit	*15*	*5*	*15*
Source country tax	15	5	5
Resident country tax	25	35	25
Total	40	40	30
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%. In the absence of fiscal incentives, the foreign tax credit corresponds to the corporate income tax in the home country. In that case, the investor is not subject to an additional tax in both systems. When the host country grants tax holidays, and without tax sparing, the situation of the investor from a worldwide tax system is unchanged. Such a firm pays a 40% tax rate to its home country, and after-tax profit is still 60. The result here is that no tax benefits remain in the hands of the investors, 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.

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 decides to lower the tax on interest to 5%. 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.

To summarize, 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_h^i from the effective one $w_h^{'i}$, 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: $t_f - w_h^i + w_h^{'i}$, allowing the investor to benefit from the difference between w_h^i and $w_h^{'i}$. Similarly, the tax cost of a royalty payment is $t_f - w_h^r + w_h^{'r}$.

For "worldwide" investors, under tax sparing the income earned abroad by a subsidiary is still taxed at rate t_h'. For a branch, this income is taxed at rate t_h' when $t_j < t_h$, where t_h is the host country statutory tax rate, or at rate $t_j - t_h + t_h'$, when $t_j > t_h$. The tax sparing provision allows the investor to claim a 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 for both subsidiaries and branches are $t_j - [t_h + w_h^d(1 - t_h)] + [t_h' + w_h^{'d}(1 - t_h')]$, when $t_j > [t_h + w_h^d(1 - t_h)]$. 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 $t_h' + w_h^{'d}(1 - t_h')$. For interest and royalties their global tax costs (which are the same as those of "territorial" investors) are $t_j - w_h^i + w_h^{'i}$, and $t_j - w_h^r + w_h^{'r}$, respectively.

This discussion of the taxation of worldwide and territorial multinational firms illustrates the fiscal advantages provided by the tax sparing provision. The existing empirical evidence reviewed in the Introduction (Hines, 2001; Azémar et al., 2007) suggests that this provision is important for worldwide MNCs. However, these studies are based on studying FDI from a single worldwide residence country - Japan -and so are unable to measure the impact of tax sparing for a wider set of residence countries (including those with territorial systems). 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. Thus, we turn next to a description of our dataset and empirical specification, which seeks to advance our understanding of the impact of tax sparing along these various dimensions.

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 3) 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 destination 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 3. 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 3 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 3, 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 Unites States and 47 for the United Kingdom. Table 4 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. These changes in tax sparing agreements are listed in Table 5. 32 of these changes, occurred after 2002, provide usable longitudinal variation for our analysis.

The dataset is identified at the country-pair-year level - i.e. each observation represents for instance 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. The baseline estimating sample includes 8,189 observations on 1,103 country-pairs over 2002-2012.

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 estimates 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, are severely biased in the presence of heterosckedasticity 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 year effects). Standard errors are clustered at the country-pair level to address potential correlation of errors. However, the results are broadly similar when using an OLS fixed effects specification. Our baseline equation is:

$$FDI_{ijt} = exp(\beta_1(TS_{ijt}) + \beta_2(TS_{ijt} * PostTaxReform_{it}) + \beta_3(PostTaxReform_{it}) + \gamma X_{ijt} + \mu_{ij} + \delta_t)\epsilon_{ijt}, \quad (1)$$

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. $PostTaxReform_{it}$ is a dummy variable which takes the value one from 2004 onwards for Norway and from 2009 onwards for the U.K., Japan and New Zealand; and zero otherwise. X_{jt} 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.

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.[5] We control for the corporate tax

[5]Trade 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

Table 3: 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	Transition (2009)	18
Luxembourg	Territorial	14
Netherlands	Territorial	6
New Zealand	Transition (2009)	10
Norway	Transition (2004)	36
Portugal	Territorial	7
Spain	Territorial	13
Sweden	Territorial	43
Switzerland	Territorial	8
United Kingdom	Transition (2009)	47
United States	Worldwide	0

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

Table 4: Number of Tax Sparing (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 5: 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			

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 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. 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.[6] This variable is from Laeven and Valencia (2012).[7] Descriptions and summary statistics for all variables are available in Tables 6 and 7.

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).

[6]Most 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.

[7]An 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 6: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Full sample:					
FDI stocks	13021	1034.924	4565.773	0	101030
Ln home GDP	13021	27.0325	1.5293	22.9101	30.4185
Ln host GDP	13021	24.2749	1.8604	19.3862	29.7387
Ln bilateral trade costs	13021	5.2759	0.5576	3.2021	6.9945
Home financial crisis	13021	0.3431	0.4748	0	1
Ln host population	13021	16.4872	1.7806	11.1688	21.0239
Tax differential	13021	0.0212	0.1014	-0.44	0.4
Tax sparing	13021	0.1757	0.3806	0	1
Ln distance	13021	8.7083	0.7653	4.0879	9.8497
Colony	13021	0.045	0.2073	0	1
Common language	13021	0.1187	0.3234	0	1
Bilateral investment treaty	13021	0.4131	0.4924	0	1
UN vote correlation	13021	0.7091	0.1603	0	1
Sum of democracy indices	11767	13.6874	5.841	-1	20
Reduced sample (FE poisson):					
FDI stocks	8189	1640.844	5669.61	0	101030
Ln home GDP	8189	27.6261	1.4084	22.9101	30.4185
Ln host GDP	8189	24.8416	1.8687	19.3862	29.7387
Ln bilateral trade costs	8189	4.9937	0.4366	3.2021	6.9945
Home financial crisis	8189	0.3656	0.4816	0	1
Ln host population	8189	16.8819	1.7879	11.2902	21.0239
Tax differential	8189	0.03815	0.0911	-0.26	0.4
Tax sparing	8189	0.2627	0.4401	0	1
Ln distance	8189	8.5662	0.8252	4.0879	9.7809
Colony	8189	0.0694	0.2541	0	1
Common language	8189	0.1109	0.314	0	1
Bilateral investment treaty	8189	0.5896	0.4919	0	1
UN vote correlation	8189	0.6929	0.1872	0	1
Sum of democracy indices	7717	14.2198	5.7777	-1	20

Table 7: Description of Variables

Variable	Description	Source
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 - World Development Indicators
Ln bilateral trade costs	Symmetric country-pair trade costs	World Bank
Tax differential	Home country statutory tax rate - host country statutory tax rate	Statutory Corporate Tax Rate 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 for home country experiencing a systemic banking crisis	Laeven and Valencia (2012)
Tax sparing	1 when a Tax Sparing 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	
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	Head and Mayer (2010)
Bilateral investment treaty	1 if a bilateral investment treaty is signed	UNCTAD
UN vote correlation	Bilateral correlation in UN votes	Gartzke (1999)
Sum of democracy indices	Country pair sum of democracy indices	Polity IV database

4 Results

4.1 Baseline regression results

Table 8 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 sparing dummy), and a set of control variables.[8] 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 based only on the 34 new tax sparing provisions or terminations which occurred within the 2002-2012 sample period. Thus, the Poisson fixed effects estimator only uses within country-pair variation to identify this effect. Note that 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, the estimating sample in Column (1) consists of 8189 observations on 1103 country-pairs, although the full sample includes 13021 observations on 1950 country-pairs.

The previous literature has not investigated the question of whether the effect of tax sparing agreements differs across worldwide and territorial residence countries. Based on our discussion in Section 2, it might be expected on a priori grounds that the effect may be substantially greater for worldwide home countries than for territorial home countries, as MNCs from the former benefit from tax sparing with respect to both active and passive income while MNCs from the latter benefit only from tax sparing with respect to passive income. In Column (2) of Table 8, we add to the specification an interaction between our tax

[8]These 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.

Table 8: Tax Sparing, Territorial Tax Reforms, and FDI

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

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. It is estimated somewhat imprecisely, but the standard errors allow us to rule out at the 95 percent level a coefficient on the interaction term that exceeds approximately 0.11. While quite substantial, this is relatively small compared to the baseline estimated effect of tax sparing of 0.26 in Column (1).

The apparent absence of a stronger effect for worldwide home countries may appear surprising, in the light of the discussion in Section 2. However, it is consistent with a scenario in which the ability of worldwide MNCs 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 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 US Congress enacted a measure that permitted US MNCs to repatriate foreign income at a very low US 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.

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. Again, the estimate is somewhat imprecise, but the standard errors allow us to rule out at the 95 percent level a coefficient on the interaction term that is lower than approximately -0.09. This would correspond to a relative decline in FDI in sparing countries of about 10 percent. While such a decline is quite meaningful, it is substantially smaller than the baseline 30 percent estimate of the increase in FDI due to tax sparing agreements (from the baseline estimated effect of tax sparing of 0.26 in Column (1).

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 available to territorial MNCs. There is no strong evidence to 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 emphasized earlier, the fixed effects Poisson model uses only within-country-pair longitudinal variation to identify its effects. To broaden the available variation to include time-invariant cross-country-pair differences, Columns (4)-(6) of Table 8 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 Endogeneity

The signing and termination of tax sparing agreements is of course potentially endogenous. For instance, an unobserved 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, 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.

First, following Autor (2003), we use the difference-in-differences framework of this study to set a test for causality *a la* Granger (1969).[9] The tax sparing provision is signed at different times in different countries, allowing 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.

$$\begin{aligned} FDI_{ijt} = exp(\Sigma\beta_{-\tau}(TS_{ijt-\tau}) + \beta(TS_{ijt}) + \Sigma\beta_{+\tau}(TS_{ijt+\tau}) + \alpha_1(TS_{ijt} * PostTaxReform_{it}) \\ +\alpha_2(PostTaxReform_{it}) + \gamma X_{ijt} + \mu_{ij} + \delta_t)\epsilon_{ijt}, \end{aligned} \tag{2}$$

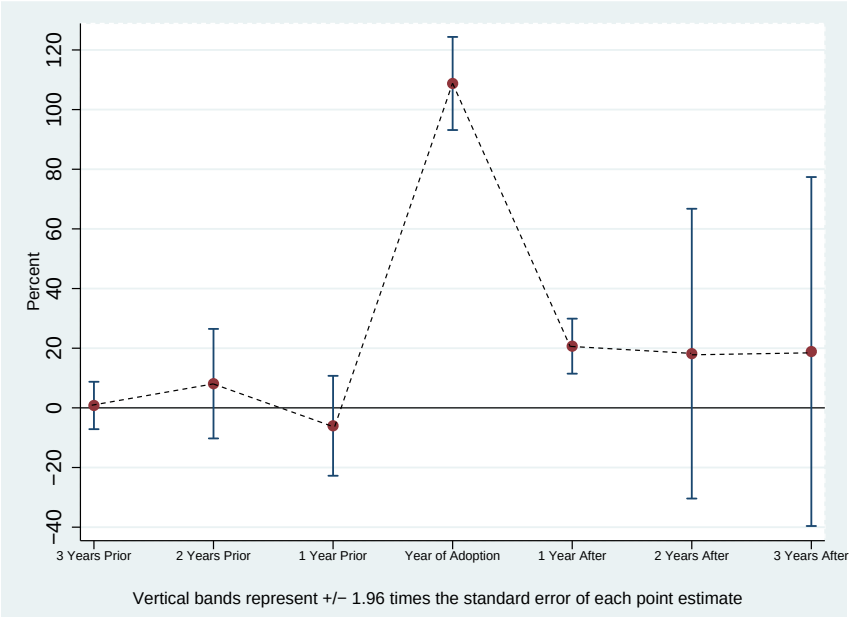
where $\Sigma\beta_{-\tau}(TS_{ijt-\tau})$ corresponds to three lags $(\beta_{-1}, \beta_{-2}, \beta_{-3})$, and $\Sigma\beta_{+\tau}(TS_{ijt+\tau})$, corresponds to three leads $(\beta_{+1}, \beta_{+2}, \beta_{+3})$. If tax sparing causes FDI but not vice versa, the leads should not be statistically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

Equation (2) is estimated in Column (1) of Table 9, 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. 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 the adoption, FDI increases substantially (indeed, it doubles in size). After the entry into force of the provision, FDI increases by 19 to 21 percent over the three following years, although this is statistically

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

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.

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



In addition, we also use an instrumental variables (IV) strategy based on instrumenting for tax sparing agreements using the 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. We instrument a tax sparing provision between the home country i and the host country j, with 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

Table 9: Reverse Causality and Omitted Variables

	Dependent variable: FDI stock			
	Fixed effects			
	Rev. causality Leads and lags	Rev. causality IV	Omitted var. Bilateral time varying	Omitted var. Rev. causality
	[1]	[2]	[3]	[4]
Ln home GDP	0.264	0.393^{b}	0.418^{b}	0.375^{b}
	(0.190)	(0.167)	(0.170)	(0.170)
Ln host GDP	0.603^{a}	0.707^{a}	0.676^{a}	0.693^{a}
	(0.130)	(0.087)	(0.081)	(0.083)
Ln host population	-1.431	-1.842^{a}	-1.759^{a}	-1.783^{a}
	(1.070)	(0.630)	(0.623)	(0.625)
Bilateral trade costs	-0.546^{a}	-0.598^{a}	-0.584^{a}	-0.590^{a}
	(0.147)	(0.129)	(0.127)	(0.127)
Home financial crisis	-0.057	-0.142^{b}	-0.120^{b}	-0.143^{b}
	(0.035)	(0.058)	(0.049)	(0.058)
Tax differential	1.790^{a}	1.136^{a}	1.115^{a}	1.220^{a}
	(0.529)	(0.341)	(0.333)	(0.334)
Tax sparing *t+3*	0.008			
	(0.039)			
Tax sparing *t+2*	0.078			
	(0.086)			
Tax sparing *t+1*	-0.062			
	(0.079)			
Tax sparing *t*	0.736^{a}	0.251^{b}	0.259^{b}	0.249^{c}
	(0.074)	(0.126)	(0.131)	(0.128)
Tax sparing *t-1*	0.188^{a}			
	(0.045)			
Tax sparing *t-2*	0.167			
	(0.202)			
Tax sparing *t-3*	0.173			
	(0.235)			
Residual		0.407		0.421
		(0.638)		(0.641)
Bilateral Investment Treaty			0.071	0.071
			(0.058)	(0.059)
UN vote correlation			-0.352	-0.348
			(0.310)	(0.309)
Sum of democracy indices			0.000	0.000
			(0.008)	(0.008)
Country pair fixed effects	x	x	x	x
Observations	3,583	8,189	7,716	7,716
Number of pairs	896	1,103	1,033	1,033
Joint-significance: Tax sparing *t-1*,*t-2*, *t-3*	0.000			
Joint-significance: Tax sparing *t+1*,*t+2*, *t+3*	0.534			
IV first stage, TS neighbouring countries		2.782^{a}		
		(1.050)		

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.

countries correspond to the other countries of the same geographical region.[10] The economic rationale for this instrument stands from the fact that multinational firms tend to follow a "sequential location decision" Davies and Voget (2008), where they first decide in which region to locate and then in which country. 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 by the neighbouring countries of the country j should not have a direct effect on the location of FDI in the country j.

With our Poisson Fixed Effects estimator, we follow a control function approach where we augment our baseline regression with an estimated term that controls for the potential endogeneity of tax sparing (Column (2)). This is done by a two-step procedure where we regress tax sparing on X_{ijt} (the exogeneous control variables) and Z_{ijt} (the average number of tax sparing provisions signed by neighbouring countries):

$$TS_{ijt} = \gamma X_{ijt} + \alpha Z_{ijt} + \mu_{ij} + \delta_t + \varphi_{ijt}, \tag{3}$$

Then, we predict the residuals $\hat{v}_{ijt}$, that we include in our baseline regression:

$$FDI_{ijt} = exp(\beta(TS_{ijt}) + \gamma X_{ijt} + \mu_{ij} + \delta_t + \hat{v}_{ijt})\phi_{ijt}, \tag{4}$$

where $\hat{v}_{ijt}$ is now an explanatory variable and the new error term ϕ_{ijt} is uncorrelated with $\beta(TS_{ijt})$, as well as $\hat{v}_{ijt}$ and γX_{ijt}. Reported at the bottom of Column (2), the first stage regression indicates that the average number of tax sparing provisions signed by neighbouring countries has a positive effect on tax sparing, with a coefficient statistically significant at the one percent level. In the second stage, the coefficient estimated on the residuals, $\hat{v}_{ijt}$, measures the strength of the endogeneity. 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 neighboring 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. While the caveats above should be borne in

[10]Following 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.

mind, it is noteworthy that Column (2) provides no evidence that the baseline result is driven by endogeneity. The coefficient estimated on the dummy tax sparing is not affected by the inclusion of the residuals.

To further address omitted variables bias, we 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 FDI, such as a dummy for 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.[11] In Column (3), 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 is not altered by their inclusion. Finally, in Column (4) we directly include $\hat{v}_{ijt}$ along with our bilateral time-varying controls for economic ties and political affinity. The coefficient estimated on tax sparing is not affected by the inclusion of these additional controls.

4.3 Incidence of Territorial Tax Reforms for Developing Countries

The results of Table 8 indicate that the importance of tax sparing is not affected by territorial tax reform. They do not, however, address the issue of whether the reforms directly affected FDI in developing countries. As the reform countries' outbound FDI may have been affected by omitted factors that also caused the tax reform, these effects must be interpreted with great caution. However, some results relevant to this question are presented in Table 10. Column (1) allows for heterogeneity in the effect of the territorial tax reform on FDI located in tax sparing countries. FDI from Japan, U.K., Norway, and New Zealand are not expected to react in the same way to a change from a worldwide tax system to a territorial tax system in the home country. 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 very competitive 24 percent for the U.K. - below the OECD average of 25.15 and the global average of 24.4 - 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.[12] If territorial tax reforms remove taxes on foreign earnings, due to continued home country taxation of passive income, tax sparing might continue to

[11] Democratic 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).

[12] Source: KPMG.

attract a disproportionate share of FDI that might depend on the home country statutory tax rates.

In Column (1), we interact the U.K., the Japanese, the Norwegian, and the New Zealand tax reforms 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 8. Surprisingly, the coefficient estimated on the interaction term between New Zealand tax reform and tax sparing is positive and statistically significant at the five percent level. This indicates that New Zealand FDI increases in tax sparing countries after the territorial tax reform. New Zealand has statutory tax rates ranging between 30 percent (before the reform) and 28 percent from 2011, which are higher that the OECD and the global averages. The shift to territoriality could be 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 suggests the importance of fiscal incentives that apply to passive income. Recall that the shift to territoriality improves the attractiveness of tax sparing countries with regard to active income since tax sparing for worldwide investors does not exempt them from taxation at home on their foreign earnings, but lowers the amount of foreign tax credit which the investor can claim at home. With regard to active income, all countries with a lower corporate tax rate than the home country (tax sparing and nonsparing) appear to be more attractive for investors after the shift to a territorial tax system. After the reform, tax sparing countries remain more attractive than nonsparing countries with respect to the taxation of passive income.

The results of Column (1) indicate that to understand the implications of OECD territorial tax reforms for developing countries, it is important to consider tax sparing provisions. In Column (2), we simply test the effect of the four territorial tax reforms on FDI, without distinguishing tax sparing from nonsparing countries. The coefficient estimated on the tax reform is only positive and statistically significant for Japan. That said, as explained above, territorial tax reforms have been accompanied by a decrease in the home country statutory tax rates. To understand the effect of a territorial tax reform on FDI, the tax differential between the home and the host country should be taken into account, as in Matheson et al. (2013). In Column (3), the tax reforms 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

Table 10: Incidence of Territorial Tax Reform for Tax Sparing and Non Tax Sparing Developing Countries

	Dependent variable: FDI stock							
	Full sample	Full sample	Full sample	Non TS countries	Non TS countries	Non TS countries	Non TS countries	Non TS countries
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Ln home GDP	0.417^{b}	0.418^{b}	0.426^{b}	0.658^{a}	0.428^{b}	0.573^{a}	0.468^{a}	0.437^{a}
	(0.180)	(0.180)	(0.179)	(0.201)	(0.173)	(0.193)	(0.168)	(0.166)
Ln host GDP	0.676^{a}	0.679^{a}	0.686^{a}	0.681^{a}	0.698^{a}	0.674^{a}	0.689^{a}	0.690^{a}
	(0.083)	(0.084)	(0.084)	(0.086)	(0.085)	(0.085)	(0.085)	(0.085)
Ln host population	-1.804^{a}	-1.760^{a}	-1.776^{a}	-1.780^{a}	-1.754^{a}	-1.719^{a}	-1.783^{a}	-1.794^{a}
	(0.630)	(0.619)	(0.609)	(0.662)	(0.633)	(0.645)	(0.630)	(0.629)
Bilateral trade costs	-0.611^{a}	-0.619^{a}	-0.616^{a}	-0.666^{a}	-0.601^{a}	-0.645^{a}	-0.589^{a}	-0.592^{a}
	(0.129)	(0.130)	(0.126)	(0.129)	(0.128)	(0.129)	(0.130)	(0.129)
Home financial crisis	-0.076^{c}	-0.076^{c}	-0.076^{c}	-0.017	-0.117^{b}	-0.019	-0.127^{a}	-0.118^{b}
	(0.046)	(0.046)	(0.046)	(0.049)	(0.051)	(0.045)	(0.049)	(0.049)
Tax differential	0.968^{a}	0.968^{a}	1.063^{a}	1.263^{a}	0.965^{a}	1.196^{a}	1.064^{a}	1.032^{a}
	(0.351)	(0.345)	(0.336)	(0.365)	(0.345)	(0.350)	(0.341)	(0.339)
Tax sparing	0.234^{c}	0.249^{c}	0.252^{c}					
	(0.130)	(0.132)	(0.132)					
U.K. 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)							
U.K. reform	-0.117	0.008	0.031	-0.061	-0.078			
	(0.166)	(0.128)	(0.114)	(0.167)	(0.148)			
Japanese reform	0.377^{b}	0.146^{c}	0.697^{a}	0.408^{a}		0.089		
	(0.153)	(0.089)	(0.121)	(0.148)		(0.064)		
Norwegian reform	-0.164	-0.093	-0.033	-0.017			0.416	
	(0.132)	(0.144)	(0.201)	(0.096)			(0.309)	
New Zealand reform	-0.606^{b}	0.074	-0.154	-0.650^{b}				0.574
	(0.246)	(0.281)	(0.320)	(0.256)				(0.521)
U.K. reform x tax differential			1.510		2.226			
			(1.447)		(1.890)			
Japanese reform x tax differential			-4.567^{a}			3.766^{a}		
			(0.836)			(0.505)		
Norwegian reform x tax differential			-2.980				-7.902	
			(2.654)				(5.120)	
New Zealand reform x tax differential			7.784^{c}					31.580^{a}
			(4.550)					(9.813)
Country pair fixed effects	x	x	x	x	x	x	x	x
Observations	8,189	8,189	8,189	7,568	7,900	8,095	7,981	8,159
Number of pairs	1,103	1,103	1,103	1,031	1,071	1,094	1,078	1,097

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.

nonsparing countries in this regression. With tax sparing, the larger the difference between the withholding tax rate (which is probably correlated with the statutory tax rate) of the host country and the fiscal grant, the larger the benefit for the firm.

Another way to shed light on the paradoxical result for Japan is to focus on the effect of the tax reform on nonsparing countries only. For this sub-sample of countries, the interpretation of the results is straightforward. In Column (4), we remove from the sample the countries having signed a tax sparing provision with the U.K., Japan, Norway and New Zealand. Japanese FDI is the only one which increases in nonsparing countries after the territorial tax reform. New Zealand invests less in nonsparing countries after the reform, which could be due to a substitution effect of the shift to a territorial 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 U.K. and Norway do not invest more in nonsparing countries after the tax reform. Since the effect of a tax reform is expected to be influenced by the tax differential between the country pair, we then interact the tax differential with the tax reform in Columns (5)-(8). In Column (5), we remove from the sample the countries having signed a tax sparing provision with the U.K. We do the same in Columns (6), (7), and (8) by removing countries having signed a tax sparing provision with Japan, Norway, and New Zealand, respectively. The U.K. and Norwegian territorial tax reforms have not benefited nonsparing countries (even the low-tax jurisdictions). 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.

5 Conclusion

To be written

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