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

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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, coding tax sparing provisions in all bilateral tax treaties among these countries. We find that tax sparing agreements are associated with up to 97 percent higher FDI. The estimated effect is concentrated in the year following the entry into force of tax sparing agreements, 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.

Keywords: FDI; international tax; development; tax sparing.

JEL classification: H25 ; F21; F35.

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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. 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); 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. This is because 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. 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

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

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 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 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. 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 8,974 observations on 1,176 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. In our dataset, a substantial number - 6.5 percent - of the observations are zeros (indicating the absence of any FDI from the residence to the source country in that year).[2] In order to address these econometric issues, we use a Poisson pseudo-maximum likelihood (PPML) fixed effects estimator (with country-pair fixed effects and year effects).

We analyse both the impact of tax sparing agreements and that of the residence country tax system, using several different sources of identification. The first is the longitudinal variation generated by the signing or termination of tax sparing agreements. We find that tax sparing agreements are associated with a 86 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, 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. We start with an instrumental variables (IV) strategy

[2]By using country-pair fixed effects we excludes from the analysis country-pairs with no FDI for the entire period of investigation, as there is no within-country variations associated with those pairs. Without excluding those country-pairs, the proportion of zeros would be about half of the observations.

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. The IV analysis yields an estimate that is slightly larger in magnitude, implying that tax sparing agreements are associated with a 97 percent higher stock of bilateral FDI. Following Baier and Bergstrand (2007), another approach to address potential endogeneity is by including home-country-by-time and host-country-by-time fixed effects in addition to the country-pairs fixed effects. In the absence of an omitted variable bias, our results suggest that the inclusion of a tax sparing provision in bilateral tax treaties leads to an increase of 54 percent in FDI from the signatory country. Simultaneity is addressed as in Baier and Bergstrand (2007) and Yotov et al. (2016) by adding to the specification with the rich set of fixed effects a lead variable that captures the future value of tax sparing. We find that 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 following the date of entry into force of the agreement. This pattern is inconsistent with a pre-existing trend of increasing FDI between countries that sign tax sparing agreements. Instead, it appears consistent with a causal interpretation of the estimated effect of tax sparing agreements.

We also decompose the effects of tax sparing on FDI along the intensive and extensive margins. Using a two-part model, we estimate separately a binary indicator for whether the bilateral FDI stock is strictly greater than zero and the size of the FDI stock. We find that tax sparing has an impact on the intensive margin but not the extensive margin of 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).

Tax reforms in some of the residence countries in our dataset 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.[3]

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. 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

[3]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 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.

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.

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. 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...".[4]

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.

As this description makes clear, tax sparing involves revenue losses for the residence country. On the other hand, the source country benefits from the greater efficacy of any tax holidays or other

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

tax incentives that it chooses to grant in attracting FDI. Thus, in a manner that is described more precisely below, tax sparing entails losses for the residence country and gains for the source country (and residence country multinationals). It may thus seem puzzling that residence countries agree to tax sparing provisions. One way to resolve this puzzle is to view these provisions 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. Thus, to the extent that the residence country is already providing other forms of aid to the source country, the former can in principle reduce these other forms of aid when a tax sparing agreement is signed (by the expected cost to it of tax sparing). It is also worth bearing in mind that tax treaties in general involve transfers of revenue from source to residence countries (e.g. by limiting withholding taxes). Including a tax sparing agreement in a tax treaty results in some mitigation of this transfer.[5]

Given the benefits of tax sparing, it may seem that all developing countries would wish to include tax sparing agreements in their tax treaties. To the extent that they must give up alternative forms of aid in order to do so, however, it is not clear that this is the case. In particular, their preference for tax sparing will depend on the extent to which they plan to offer tax holidays or incentives, and on the value to them of alternative forms of aid that would have to be foregone. Perhaps as a result, tax sparing agreements are fairly common (on average the OECD countries of our sample include a tax sparing provision in 31 percent of their BTTs with developing countries), but far from being widespread (as described below with respect to our summary statistics). There are, however, instances of developing countries that insist on tax sparing agreements, and refuse to sign tax treaties that do not contain these provisions. One example is Brazil, which does not have a tax treaty with the US. The failure to reach agreement over many decades is generally attributed to Brazil's insistence on the inclusion of a tax sparing provision, combined with the unwillingness of the US to include one (see Mitchell (1997) for a detailed account).

The willingness of developing countries to insist on tax sparing provisions suggests that they believe that these agreements matter in terms of attracting FDI. Even so, it would be helpful to know whether multinational firms actually face lower tax rates in source countries with tax sparing agreements. Unfortunately, this would require extensive data on the taxes actually paid by firms at the bilateral (country-pair) level, which is not available. However, Chow et al. (2017) collect data on

[5] Braun and Zagler (2018) find that the signing of tax treaties between developed and developing countries is associated with an increase in official development assistance from the former to the latter.

the impact of foreign tax holidays over 1995-2013 on US multinational firms' effective tax rates (as reported in firms' financial statements). They find that source country tax holidays substantially lower US firms' foreign tax rates - for instance, their summary statistics (Table 2, p,. 40) show that the average tax rate is eight percentage points lower in firm-years with a tax holiday than in firm-years without a tax holiday. This suggests that these firms would benefit quite substantially from tax sparing, were it available (however, it is not, as the US has never entered into a tax sparing agreement). From this study, it can be inferred that non-US multinational firms would also benefit substantially from foreign tax holidays and thus from tax sparing (indeed, where tax sparing exists, incentives to participate in foreign tax holidays which are provided by more than 80 percent of developing countries (OECD, 2015) would be even stronger than they are for US firms).

As foreshadowed in the discussion above, 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). 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 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 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.[6] 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 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.

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

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)		
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 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
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%. 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:
Active income				
Dividend payment (territorial)	n.a.	$t'_f + w'^d_f(1-t'_f)$.	n.a.	$t'_f + w'^d_f(1-t'_f)$.
Dividend payment (worldwide)	$t_h > t'_f + w'^d_f(1-t'_f)$ $t_h < t'_f + w'^d_f(1-t'_f)$	t_h $t'_f + w'^d_f(1-t'_f)$	$t_h > [t_f + w^d_f(1-t_f)]$ $t_h < [t_f + w^d_f(1-t_f)]$	$t_h - [t_f + w^d_f(1-t_f)] + [t'_f + w'^d_f(1-t'_f)]$ $t'_f + w'^d_f(1-t'_f)$
Passive income				
Interest (territorial and worldwide)	$t_h > w'^i_f$ $t_h < w'^i_f$	t_h w'^i_f	$t_h > w^i_f$ $t_h < w^i_f$	$t_h - w^i_f + w'^i_f$ w'^i_f
Royalties (territorial and worldwide)	$t_h > w'^r_f$ $t_h < w'^r_f$	t_h w'^r_f	$t_h > w^r_f$ $t_h < w^r_f$	$t_h - w^r_f + w'^r_f$ w'^r_f

Note: With t_h: home statutory tax rate, t_f: foreign statutory tax rate, t'_f: foreign effective tax rate, w^d_f: nominal dividend withholding tax rate, w^i_f: nominal interest withholding tax rate, w^r_f: nominal royalties withholding tax rate, w'^d_f: effective dividend withholding tax rate, w'^i_f: effective interest withholding tax rate, w'^r_f: 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 limited outbound FDI,[7] and restricts attention on the impact of tax sparing agreements between developed home countries and developing host countries (following the focus of the past literature on tax sparing). 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 in 2002, corresponding to the beginning of the period of analysis. 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 (2016), as shown in Table 4. This variable is 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

[7]The 11 excluded OECD members are: Chile, the Czech Republic, Estonia, Hungary, Israel, the Republic of Korea, Mexico, Poland, the Slovak Republic, Slovenia, and Turkey. In our dataset, the 23 developed home countries that we use have a mean outbound FDI stock across all (developed and developing) host countries of $3.7 billion. In contrast, the majority of the 11 excluded OECD members have mean outbound FDI stocks across all (developed and developing) host countries of around 1%-2% of that number. A few of the excluded countries (such as the Republic of Korea and Mexico) have larger outbound FDI stocks, but for none of the 11 excluded countries does the mean outbound FDI stock exceed 14% of the mean for the 23 developed home countries

between zero for the Unites 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 13,643 observations at the country-pair-year level on 1,941 country-pairs. With country-pair fixed effects, the baseline estimating sample includes 8,974 observations on 1,176 country-pairs over 2002-2012.[8]

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, 6.5 percent of the observations - 582 out of 8,974 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-

[8]With 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 8,974 observations although the full sample includes 13,643 observations.

maximum-likelihood (PPML) estimator. 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).[9]

Our approach to addressing these econometric issues is twofold. First, we use a Poisson pseudo-maximum likelihood (PPML) fixed effects estimator (with country-pair fixed effects and year effects in our baseline specification and additional fixed effects in other specifications). Standard errors are clustered at the country-pair level to address potential correlation of errors. Second, we use a two-part model (following Egger et al. (2011)), as described below. The baseline equation for the PPML model is:

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

where FDI_{ijt} is the stock of FDI from home (residence) country i in host (source) country j in year t. TS_{ijt-1} 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 $t-1$. Tax sparing agreement is one year lagged in the baseline equation to allow FDI stocks to adjust to a change in tax policy.[10] In addition, the tax sparing variable was constructed using the “Date of Entry into Force" of the bilateral tax treaty. However, most bilateral tax treaties are effective on the taxable year beginning on or after the first day of January of the calendar year next following the year in which the BTT enters into force. Thus it is reasonable to expect investors to respond to the signature of tax sparing with a lag.[11] 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 multiplicative error term. Due to the inclusion of these fixed effects, the effect of tax sparing is identified through within-country-pair changes in tax sparing agreements. Thus, U.S. outbound FDI does not influence the estimation of the tax sparing effect, as the tax sparing variable does not change for country-pairs for which the U.S. is the residence country.

[9] For Monte Carlo simulations of the properties of this and various other estimators in the context of gravity models of bilateral international trade, see Egger and Staub (2016).

[10] Blonigen and Davies (2000) and Millimet and Kumas (2009) find a lagged effect of bilateral tax treaties on FDI stocks. We also present the estimated results for an immediate effect of tax sparing on FDI stock.

[11] This lagged effect of treaties is also found in the trade literature when investigating the effect of free trade agreements on trade (Baier and Bergstrand, 2007).

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.

Table 5: 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 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 most common tool to analyse bilateral FDI is the gravity equation based on Newton's law of gravity in physics, where the volume of FDI between two countries is proportional to their economic masses, and inversely proportional to measures of FDI resistance between both countries. The choice of control variables is thus based on a gravity equation with the usual main determinants of both horizontal and vertical FDI as measures of FDI resistance (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. 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 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.[12] This variable is from Laeven and Valencia (2012).[13] Descriptions and summary statistics for all variables are available in Tables 7 and 8.

[12] 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.

[13] An alternative dummy variable for financial crisis has been tested: a dummy variable 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 variable is not statistically significant and it does not alter the results of the analysis.

Table 7: Summary Statistics

Variable	Unit	Obs	Mean	Std. Dev.	Min	Max
FDI stock	USD, millions	8974	1828.44	5798.03	0	101030
Ln home GDP	Log of GDP in USD	8974	27.62	1.41	23.12	30.42
Ln host GDP	Log of GDP in USD	8974	24.89	1.82	19.57	29.74
Ln host population	Log of population	8974	16.60	1.87	11.30	21.02
Ln bilateral trade costs	Index	8974	4.95	0.47	2.57	6.99
Home financial crisis	Binary variable	8974	0.43	0.50	0	1
Tax differential	Rate	8974	0.04	0.09	-0.24	0.40
Tax sparing $t-1$	Binary variable	8974	0.25	0.44	0	1
Ln distance	Log of kilometers	8974	8.44	0.91	4.09	9.78
Colony	Binary variable	8974	0.07	0.25	0	1
Common language	Binary variable	8974	0.10	0.30	0	1
Bilateral Investment Treaty	Binary variable	8974	0.60	0.49	0	1
UN vote correlation	Binary variable	8974	0.72	0.19	0	1
Sum of Policy indexes	Index	8276	14.48	5.99	-2.00	20.00
Ln FDI conduit	Log of USD, millions	8947	7.21	5.22	-1.02	14.71
Ln FDI neighbouring countries	Log of USD, millions	8694	6.54	1.71	-6.21	10.47
Bilateral Tax Treaty	Binary variable	8974	0.65	0.48	0	1
Tax sparing neighbouring countries $t-1$	Mean of binary variables	8974	0.11	0.10	0	0.57
WTR interest	Rate	8654	0.11	0.08	0	0.40
WTR royalties	Rate	8654	0.12	0.08	0	0.40
GTR interest	Rate	8966	0.28	0.08	0	0.42
GTR royalties	Rate	8974	0.28	0.08	0	0.42
EATR	Rate	6948	0.24	0.07	0	0.41

Table 8: 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 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 for 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	
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
Correlation of UN votes	Bilateral correlation in UN votes	Gartzke (1999)
Sum of democracy indices	Country-pair sum of democracy indices	Polity IV database
Tax sparing neighbouring countries	Average number of TS signed between the home country i and the neighbouring countries of host country j	Authors calculations
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 17)	Authors' calculations
GTR royalties	Global tax rate on royalties in the presence of tax holidays (see table 17)	Authors' calculations
EATR	Difference between the pre-tax and after-tax net-present values of a hypothetical investment in one period.	Bösenberg and Egger (2017)

4 Estimation Results

4.1 Tax Sparing Provision and FDI

Table 9 presents our baseline regression results, in which bilateral FDI stock is regressed on a tax sparing dummy variable and a set of control variables derived from a gravity equation for FDI. All estimations report standard errors clustered at the country-pair level, and include (unreported) year effects. Country-pair fixed effects are included in Columns 1-3 and 6, and home-country fixed effects and host-country fixed effects are included in Column 5.

Table 9: Tax Sparing and FDI

	Exogenous tax sparing			Endogenous tax sparing		
	$E(FDI_{ijt})\|.)$	$E(FDI_{ijt})\|.)$	$E(FDI_{ijt})\|.)$	$Pr(\text{tax sparing}_{ijt}=1\|.)$	$E(FDI_{ijt})\|.)$	$E(FDI_{ijt})\|.)$
	Poisson	Poisson	Poisson	First stage probit	IV Poisson	Poisson
			Bilateral tax varying			Spatial lag
	[1]	[2]	[3]	[4]	[5]	[6]
Ln home GDP		0.618^a	0.578^a	0.035	0.634	0.575^a
		(0.170)	(0.183)	(0.023)	(0.481)	(0.181)
Ln host GDP		0.568^a	0.606^a	0.026	0.643^a	0.584^a
		(0.091)	(0.088)	(0.021)	(0.112)	(0.094)
Ln host population		-1.063^c	-0.935	0.192^a	-0.103	-0.816
		(0.618)	(0.592)	(0.022)	(0.604)	(0.683)
Bilateral trade costs		-0.035	-0.088	-0.260^a	-1.141^a	-0.066
		(0.118)	(0.107)	(0.052)	(0.166)	(0.104)
Home financial crisis		-0.112^a	-0.113^b	-0.304^a	-0.149^a	-0.084^b
		(0.041)	(0.044)	(0.058)	(0.049)	(0.040)
Tax differential		0.463	0.795^b	-1.636^a	1.239^a	0.335
		(0.429)	(0.363)	(0.252)	(0.467)	(0.419)
Tax sparing $t-1$	0.579^a	0.622^a	0.611^a		0.677^c	0.672^a
	(0.195)	(0.177)	(0.177)		(0.402)	(0.195)
Ln distance				0.119^a	-0.509^a	
				(0.027)	(0.097)	
Colony				0.159^c	0.450^b	
				(0.083)	(0.186)	
Common language				0.334^a	0.701^a	
				(0.077)	(0.201)	
Bilateral Investment Treaty			0.111	-0.007	-0.022	
			(0.077)	(0.040)	(0.116)	
UN vote correlation			-0.376	1.578^a	0.126	
			(0.280)	(0.180)	(0.401)	
Sum of Polity indexes			0.005	0.001	0.003	
			(0.010)	(0.003)	(0.008)	
Tax sparing neighbouring countries				5.630^a		
				(0.206)		
Ln FDI neighbouring countries t						0.040
						(0.039)
Ln FDI neighbouring countries $t-1$						0.027
						(0.044)
Country pair fixed effects	X	X	X			X
Home country fixed effects					X	
Host country fixed effects					X	
Observations	10,619	8,974	8,276	8,276	8,276	7,027

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 effects are included.

There is clear evidence of a positive relationship between tax sparing and the FDI stock. In Column (1), we start with a simple model where the effect of tax sparing provisions on FDI is tested with country-pair fixed effects only. The coefficient of 0.58 is statistically significant at the one percent level. In Column (2), we include usual covariates based on the gravity equation for FDI as discussed in section 3.[14] The impact of the inclusion of these covariates on the magnitude of the coefficient estimated on tax sparing is quite modest. This coefficient reaches a magnitude of 0.62 and remains statistically significant at the one percent level. As the Poisson specification takes an exponential form, the percentage impact of tax sparing on FDI corresponds to 100[exp(0.62) - 1]. Thus, the estimated coefficient implies that the inclusion of a tax sparing provision in a bilateral tax treaty increases FDI from the signatory country by 86 percent. 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.

The signing of tax sparing agreements is potentially endogenous. 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. The first 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 arguably 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

[14]These control variables have the expected signs and they are generally statistically significant across the regressions. Their inclusion in the baseline model is thus warranted. 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.

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. 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, 0.61, is not altered by their inclusion.

Second, we use a treatment effect model that (following Egger et al. (2011)) takes account of the potential endogeneity of tax sparing agreements. The first stage involves predicting the probability of signing a tax sparing agreement using a variable that arguably does not directly affect bilateral FDI. This is essentially equivalent to an instrumental variables (IV) strategy. In particular, we instrument a tax sparing provision between the home country i and the host country j in $t-1$, with the average number of tax sparing provisions signed between the same home country i and the neighbouring countries of the host country j in $t-1$, Z_{ijt}. The neighbouring countries correspond to the other countries of the same geographical region.[15] 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 thus expected to be regional. 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

[15]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.

countries can influence tax sparing provisions signed by a host country j. However, tax sparing provisions signed by the neighbouring countries of country j should arguably 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 error term ϵ_{ijt} of Equation (1) and the likelihood of signing a tax sparing agreement. As in Egger et al. (2011) with respect to the trade effects of preferential tax agreements, our instrumental variable strategy involves allowing a binary variable to be endogenous within 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 ($\widehat{G}_{ijt}$). Second, we use the IV Poisson GMM estimator, instrumenting tax sparing with the fitted probabilities ($\widehat{G}_{ijt}$) 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}:

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

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 (5), we report the coefficients, and their robust standard errors, estimated with the IV Poisson GMM model with tax sparing instrumented by ($\widehat{G}_{ijt}$).[16] The results of the first-stage probit model are reported in Column (4). 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.[17] The other results indicate that selection into tax sparing is positively affected by the proximity with the host country. Indeed, the probability of signing a tax sparing

[16]With 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 is technically not feasible and from an econometric perspective, could lead to an incidental parameter problem. 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. To make the results comparable, the IV is performed with the same sample as when country-pair fixed effects are included.

[17]In interpreting the coefficient estimated on "tax sparing neighbouring countries", note that the variable ranges from

agreement increases when the host country has a common language, was a former colony, 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 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 in Column (5) is qualitatively similar to the one estimated in Column (2) when tax sparing was treated as exogenous. Its magnitude of 0.68 indicates that the volume of FDI received by tax sparing countries is 97 percent larger than nonsparing countries ($[exp(0.68)-1]$). This result should be interpreted with caution though, 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. Since the signature of tax sparing by neighbouring countries can generate some reorganisation of FDI in the host country j, we include a FDI spatial lag in Column (6). 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 in year t or in year $t-1$.[18] This result tends to support the validity of our instrument since the assumption of exclusion restriction cannot be rejected.

Following Baier and Bergstrand (2007), our second approach to address potential endogeneity of tax sparing is by including home-country by time and host-country by time fixed effects in addition to the country-pair fixed effects. This rich set of fixed effects absorbs the covariates tested in our

0 to 0.57 in magnitude (see Table 7: Summary Statistics). With a probit model, the coefficient estimated of 5.6 indicates that each one-unit increase in tax sparing neighbouring countries increases the probit index by 5.6 standard deviations.

[18] As 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.

baseline gravity equation, and so these covariates are excluded from the specification. In Column (1) of Table 10, the PPML estimation results with home and host country by time fixed effects suggest that the coefficient estimated on tax sparing is positive and statistically significant at the one percent level. However, with a magnitude of 0.43, it has a smaller magnitude than the coefficient estimated with the IV approach (0.68). It is also smaller than the coefficient estimated with the assumption of exogeneity in Table 9 (0.62). The estimated coefficient on tax sparing reported in Column (1) suggests that, ceteris paribus, the inclusion of a tax sparing provision in bilateral tax treaties leads to an average increase of about 100*[exp(0.43) - 1]=54 percent in FDI from the signatory country.

Table 10: Tax Sparing and FDI with Country-Pair Fixed and Country-and-Time Effects

	$E(FDI_{ijt})\|.)$ Poisson [1]	$E(FDI_{ijt})\|.)$ Poisson [2]	$E(FDI_{ijt})\|.)$ Poisson [3]	$E(FDI_{ijt})\|.)$ Poisson [4]	$E(FDI_{ijt})\|.)$ Poisson [5]
Tax sparing $t+2$				-0.033	-0.018
				(0.053)	(0.052)
Tax sparing $t+1$					-0.014
					(0.046)
Tax sparing t		0.300^{c}	0.210		0.271^{c}
		(0.160)	(0.148)		(0.161)
Tax sparing $t-1$	0.428^{a}		0.356^{a}	0.421^{a}	0.329^{a}
	(0.135)		(0.103)	(0.137)	(0.098)
Tax sparing $t-2$					0.149
					(0.094)
Country pair fixed effects	x	x	x	x	x
Home country by time fixed effects	x	x	x	x	x
Host country by time fixed effects	x	x	x	x	x
Observations	10,594	11,503	10,594	10,594	9,486
Overall tax sparing effect					0.749^{a}
					(0.208)

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 effects are included.

In Column (2), we test the contemporaneous effect of tax sparing on FDI. The coefficient estimated on tax sparing t is positive and statistically significant at the 10 percent level. This suggests an immediate response of investors to the change in tax policy even if they will fully benefit from this change in the following tax year (since BTTs are generally effective from the 1st January of the year following the date of entry into force). However, this coefficient has a smaller magnitude and a lower statistical significance than the one estimated on lagged tax sparing. In Column (3), when tax sparing t and tax sparing $t-1$ are tested together, tax sparing t is no longer statistically significant when tax sparing $t-1$ remains statistically significant at the one percent level. Those results suggest a lagged effect of tax sparing on the stock of FDI.

An important concern with the results in Columns (1)-(3) is the possibility of pre-existing trends. Residence countries may, for instance, negotiate tax sparing provisions only with source countries receiving increasing amounts of FDI. Following Baier and Bergstrand (2007), Wooldridge (2010) and Yotov et al. (2016), a test for the “strict" exogeneity of tax sparing can be performed by including a lead variable that captures the future level of tax sparing, to the specification with home and host countries by time and bilateral fixed effects. This allows us to test whether future tax sparing agreements (i.e. those not yet in force) seem to drive the result, and hence whether pre-existing trends are a concern. If tax sparing causes FDI but not vice versa, the leads should not be statistically different from zero.

In Column (4) of Table 10, tax sparing $t + 2$ is added to the basic model. In Column (5), two leads are added, tax sparing $t + 1$ and tax sparing $t + 2$ along with the contemporaneous effect and two lagged effects, $t - 1$ and $t - 2$. The coefficients estimated on the tax sparing leads are not statistically different from zero and they are small (essentially zero) in magnitude, suggesting that tax sparing leads FDI growth and not the opposite. These results are inconsistent with a pre-existing trend of increasing FDI between countries that sign tax sparing agreements. Instead, the negative sign of the coefficient estimated on the leads might suggest that firms delay investment temporarily in anticipation of a coming BTT. All in all, these results appear consistent with a causal interpretation of the estimated effect of tax sparing agreements.

The lags included in Column (5) capture the possibility that the effects of tax sparing change over time. The results show an increasing effect from the year of adoption to the next year, with a decreasing effect on the second year. Note that 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. The magnitude of 0.75 of the estimated overall tax sparing effect (reported at the bottom of Table 10), is strong and statistically significant at the one percent level, suggesting that the positive effect of tax sparing on FDI lasts for more than one year following the adoption of the provision. Note that the magnitude of the total effect, 0.75, is in line with the magnitude obtained with IV, 0.68. This is likely because, in the absence of country-pair fixed effects, the latter coefficient tends to capture the long term effect associated with tax sparing provisions which have been in force for a long time (including, but not only, pre-sample tax sparing provisions).

4.2 Tax Sparing and the Intensive and Extensive Margins of FDI

Our bilateral FDI stock variable contains 6.5 percent of zeros. Those zeros correspond to the absence of FDI stock on a particular year between two countries when FDI is observed for other years during the period of analysis. The inclusion of country-pair fixed effects excludes from the analysis country-pairs with no FDI for the entire sample period. Without excluding the non-FDI country pairs, the amount of zeros would reach 38 percent of the observations. This mass-point at zero in either case makes it interesting to apply a two-part model to decompose the effects of tax sparing on FDI and investigate their effects on the extensive margin of FDI, i.e. the number of country pairs for which FDI starts due to tax sparing, and the effect of tax sparing on the intensive margin of FDI, i.e. the extend to which tax sparing increases FDI between country pairs with already established multinational firms.

The two-part model has the advantage of allowing us to estimate separately the probability of investing in a foreign country - $Pr(FDI > 0)$ -, and the expected volume of investment in a foreign country, $E(FDI|FDI > 0)$. The former is estimated by logit and conditional logit models and the latter is estimated by Poisson PML. Columns (1) and (2) of Table 11 give parameters and standard errors when home-country and host-country fixed effects, and country-pair fixed effects are included, respectively. The methodology used in Column (1) allows the inclusion in the dataset of country-pairs with no FDI at all for the entire period of analysis, leading to a number of observations that is higher than when focusing on aggregate FDI with country-pair fixed effects in Table 9 and 10. The coefficient estimated on tax sparing suggests that the binary decision about FDI participation is not influenced by the inclusion of this provision in bilateral tax treaties. A similar result is obtained when, by using conditional logit to include country-pair fixed effects, we focus solely on the country-pairs starting to engage in FDI.[19] Note that this sub-sample corresponds exactly to the sub-sample we would like to focus on when decomposing the total effect of tax sparing as measured in Table 9 and 10 (with country-pair fixed effects), into the contributions from the extensive margin of FDI. Columns (3) and (4) display the results on the intensive margin of FDI with tax sparing when bilateral fixed-effects are included (Column 3) and when home-country by time and host-country by time fixed-effects are included (Column 4). The coefficient estimated on tax sparing is positive and statistically significant at the one percent level. Its magnitude corresponds to the magnitude estimated on total FDI. All in all, the results in Table 11 suggest that tax sparing has an impact on the intensive margin, but does not significantly influence the extensive margin of FDI. The coefficient estimated on tax sparing with the intensive margin accounts for the entire effect of tax sparing. Interestingly, this results is in line

[19]Conditional logit differs from the regular logit regression in that data are grouped and the maximum likelihood is calculated relative to each country-pair.

with Egger et al. (2011) when investigating the effects of preferential trade agreements on the trade margins.

4.3 Home Country Tax Systems

Worldwide and Territorial Tax Systems

The previous literature has not investigated the question of whether the effect of tax sparing agreements differs across worldwide and territorial source countries. In Column (1) of Table 12, we add to the specification which treats tax sparing as exogenous, an interaction between our tax sparing variable and a (time-varying) indicator for worldwide residence countries (we also include the latter variable separately). The coefficient estimated on the interaction term is statistically insignificant. However, the magnitude of this coefficient in absolute value corresponds to about one third of the coefficient estimated on tax sparing. The non-significance of the interaction term does not exclude the possibility that tax sparing may have a higher effect on FDI from territorial tax systems than from worldwide tax systems. Since endogeneity can lead to this conflicting result, in Column (1') we estimate this interaction term with country-pairs, home by time and host by time fixed effects. The coefficient is still not statistically significant but with a very small magnitude, clearly indicating that there is no significant difference in the estimated effect of tax sparing across worldwide and territorial home countries.

Some territorial source countries limit the exemption of dividends paid by foreign affiliates to their parents to affiliates located in selected countries. Thus, those countries operate a hybrid system of international taxation, where exemption takes place with some countries while the income earned in other countries is subject to taxation. Six of our source countries have a hybrid tax system, namely: Canada, Finland, Greece, Iceland, Luxembourg, and Portugal. As shown in Table 13, these hybrid tax systems limit the eligibility of foreign affiliates exemption to bilateral tax treaty countries, to countries with tax information exchange agreement, to EU member countries, to EEA member countries or to countries with an effective corporate tax rate of at least 10.5 percent.[20] To take into account the fact that some countries can have both a territorial and a worldwide tax system, we build a dummy variable "hybrid worldwide tax system" which takes the value one when foreign affiliates are located in a country in which they are not eligible for exemption by the home country. This variable is then interacted with the dummy tax sparing. The interaction terms "worldwide tax system x tax sparing $t-$

[20] See the report "Evolution of Territorial Tax Systems in the OECD" prepared by PriceWaterhouseCooper (PriceWaterhouseCoopers, 2013) and Smart (2010) focusing on Canada, for information on hybrid tax systems.

Table 11: Tax Sparing, Intensive and Extensive Margin of FDI

	Pr(FDI>0) Logit [1]	Pr(FDI>0) Conditional Logit [2]	E(FDI|FDI>0) Poisson [3]	E(FDI|FDI>0) Poisson [4]
Ln home GDP	2.853^a	1.726	0.619^a	
	(0.738)	(1.059)	(0.170)	
Ln host GDP	0.915^b	0.302	0.568^a	
	(0.430)	(0.741)	(0.091)	
Ln host population	-5.593^b	-11.127^b	-1.066^c	
	(2.429)	(4.526)	(0.619)	
Bilateral trade costs	-2.320^a	-0.571	-0.034	
	(0.409)	(0.730)	(0.118)	
Home financial crisis	-1.098^a	-1.251^a	-0.110^a	
	(0.264)	(0.445)	(0.041)	
Tax differential	-1.962	-4.316	0.485	
	(1.837)	(3.224)	(0.429)	
Ln distance	-3.553^a			
	(0.429)			
Colony	3.364^a			
	(1.277)			
Common language	1.163^b			
	(0.463)			
Bilateral Investment Treaty	0.476^b			
	(0.239)			
UN vote correlation	-1.674			
	(1.140)			
Sum of Polity indexes	-0.019			
	(0.037)			
Tax sparing $t-1$	0.161	-0.209	0.621^a	0.423^a
	(0.317)	(0.910)	(0.178)	(0.133)
Country pair fixed effects		x	x	x
Home country fixed effects	x			
Host country fixed effects	x			
Home country by time fixed effects				x
Host country by time fixed effects				x
Observations	11,598	1,364	8,338	9,686

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 effects are included.

1" and "hybrid worldwide tax system x tax sparing $t-1$" are highly correlated (0.97) though. Indeed, the observations of both interaction terms are only changing between 6 country-pairs: Greece-Latvia, Greece-Lithuania, Greece-Slovenia, Portugal-China, Portugal-India, Portugal-Tunisia. Greece and Portugal have a territorial tax system with EU members (for both) and with EEA members, Portuguese speaking African countries, and East Timor (for Portugal). Greece, which mainly has a worldwide tax system switches to territoriality with EU members and it has a tax sparing agreement with the EU members Latvia, Lithuania and Slovenia. Portugal, which has a territorial system switches to a worldwide tax system with three countries with which it has a tax sparing agreement: China, India and Tunisia (see Table 13). The other observations remain unchanged since Iceland does not have tax sparing provisions included in BTTs, Luxembourg only has tax sparing provisions with countries having an effective corporate tax rate higher than 10.5 percent, and for Canada and Finland, tax sparing can only be associated with a territorial tax system and never with a worldwide tax system. Indeed, a tax sparing provision only exists if there is a bilateral tax treaty in place.

The results obtained in Column (2) (with country-pair fixed effects) and in Column (2') (with home country by time, host country by time and country-pair fixed effects) are almost identical to the ones obtained in Columns (1) and (1'). The results suggest that there is not statistically significant difference in the responsiveness of FDI from territorial and worldwide tax systems, and this even when taking into account that the tax system of the home country can vary with the country-pair.

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 rate[21] (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 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.

[21] As 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 12: Territorial Tax Reforms, Tax Sparing and FDI

	$E(FDI_{ijt})\|.)$ Poisson [1]	$E(FDI_{ijt})\|.)$ Poisson [1']	$E(FDI_{ijt})\|.)$ Poisson [2]	$E(FDI_{ijt})\|.)$ Poisson [2']	$E(FDI_{ijt})\|.)$ Poisson [3]	$E(FDI_{ijt})\|.)$ Poisson [3']
Ln home GDP	0.589^a		0.585^a		0.586^a	
	(0.175)		(0.175)		(0.176)	
Ln host GDP	0.550^a		0.550^a		0.548^a	
	(0.092)		(0.092)		(0.092)	
Ln host population	-1.061^c		-1.059^c		-1.045^c	
	(0.613)		(0.613)		(0.612)	
Bilateral trade costs	-0.043		-0.042		-0.042	
	(0.119)		(0.119)		(0.119)	
Home financial crisis	-0.086^b		-0.087^b		-0.085^b	
	(0.039)		(0.039)		(0.039)	
Tax differential	0.414		0.411		0.410	
	(0.437)		(0.437)		(0.437)	
Tax sparing $t-1$	0.643^a	0.427^a	0.649^a	0.427^a	0.609^a	0.429^a
	(0.184)	(0.140)	(0.183)	(0.140)	(0.178)	(0.135)
Worldwide tax system x Tax sparing t-1	-0.224	-0.002				
	(0.147)	(0.151)				
Worldwide tax system	0.101					
	(0.138)					
Hybrid worldwide tax system x Tax sparing $t-1$			-0.233	-0.002		
			(0.145)	(0.151)		
Hybrid worldwide tax system			0.111			
			(0.136)			
Territorial tax reform x Tax sparing $t-1$					0.233	0.004
					(0.148)	(0.167)
Territorial tax reform					-0.106	
					(0.137)	
Country pair fixed effects	X	X	X	X	X	X
Home country by time fixed effects		X		X		X
Host country by time fixed effects		X		X		X
Observations	8,974	10,594	8,974	0.992	8,974	10,594

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 effects are included.

Table 13: Hybrid Tax Systems

Hybrid tax systems	Countries of foreign affiliates eligible for exemption	No changes: worldwide x tax spring $t-1$ = hybrid worldwide x tax sparing $t-1$	Changes: worldwide x tax spring t-1 $\neq$ hybrid worldwide x tax sparing $t-1$
Canada	Bilateral tax treaty countries and countries with which Canada has signed a tax information exchange.	No changes as if there is no BTT in place, there is no tax sparing provision.	
Finland	EU member countries and treaty countries.	No changes as if there is no BTT in place, there is no tax sparing provision.	
Greece	EU member countries only.		Greece has a tax sparing agreement with the EU members: Latvia, Lithuania and Slovenia. Dividends repatriated from these countries are exempt from taxation in Greece.
Iceland	EU member countries and OECD member countries.	No changes because Iceland has zero tax sparing agreement.	
Luxembourg	All countries with an effective tax rate of at least 10.5 percent.	No changes because tax sparing agreements are signed with countries having an EATR higher than 10.5 percent.	
Portugal	EU and EEA member countries and Portuguese speaking African countries and East Timor.		Portugal has a tax sparing agreement with the non-EU and non-EEA members: China, India and Tunisia. Dividends repatriated from these countries are taxed in Portugal.

Source: PriceWaterhouseCooper (2013).

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.[22]

Territorial Tax Reforms

In Columns (3) and (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).[23] 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 pre-existing 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 not statistically significant.

Taken together, the results (or lack thereof) in Table 12 point towards a conclusion that much of the benefit from tax sparing is also available to territorial MNCs. There is no strong evidence to suggest

[22] A 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.

[23] Note that these reforms were not accompanied by changes in tax sparing agreements. As indicated in Table 6, during the period of investigation, the U.K. has terminated a tax sparing provision with Malaysia four years before the reform and has signed a tax sparing provision with Barbados three years after. Norway, which reform took place in 2004, has terminated a tax sparing provision with Slovenia in 2012 and with Turkey in 2012.

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.

It is also worth commenting briefly on the implications of these results for the U.S., which is a major source of outbound FDI but has no tax sparing agreements. Our basic results suggest that U.S. FDI in developing countries may thus be lower than would otherwise be the case. The aggregate FDI statistics are broadly consistent with this implication. For instance, in 2012 (the last year of our sample period), the aggregate stock of U.S. FDI in developing countries was about 11% of that in developed countries. In contrast, Japan (another major source of FDI, which has an extensive network of tax sparing agreements) had an aggregate stock of FDI in developing countries in 2012 that was about 32% of that in developed countries. When we consider all of the other (non-U.S.) resident countries of our sample having a network of tax sparing agreements, in total their aggregate stock of FDI in developing countries in 2012 was about 20% of that in developed countries. Our results on territorial tax reforms suggest that the recent U.S. territorial reform (e.g. Dharmapala (2018)) is unlikely to change this situation since worldwide MNC seem to already benefit from foreign low tax rates on their active income (with cross-crediting and deferral). In addition, the U.S. territorial tax reform has been accompanied by a substantial decrease in the corporate tax rate, which should mitigate the incentive to locate in developing countries for tax considerations. For instance, with a decrease from 35% to 21 %, the new U.S. corporate tax rate is below the average corporate tax rate of the developing countries of the sample (25% in 2012).

4.4 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 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 BTTs 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).[24] 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 offset 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,[25] 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.

[24]See Davies (2004) for a survey on tax treaties and FDI.

[25]This 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 14: Bilateral Tax Treaties and Treaty Shopping

	The role of BTTs			Treaty shopping	The role of BTTs			Treaty shopping
	$E(FDI_{ijt})\|.)$ [1]	$E(FDI_{ijt})\|.)$ [2]	$E(FDI_{ijt})\|.)$ [3]	$E(FDI_{ijt})\|.)$ [4]	$E(FDI_{ijt})\|.)$ [5]	$E(FDI_{ijt})\|.)$ [6]	$E(FDI_{ijt})\|.)$ [7]	$E(FDI_{ijt})\|.)$ [8]
Ln home GDP	0.618^a	0.616^a	0.613^a	0.604^a				
	(0.170)	(0.170)	(0.170)	(0.171)				
Ln host GDP	0.568^a	0.569^a	0.570^a	0.562^a				
	(0.091)	(0.090)	(0.090)	(0.091)				
Ln host population	-1.063^c	-1.013	-1.088^c	-0.044				
	(0.618)	(0.620)	(0.617)	(0.119)				
Bilateral trade costs	-0.035	-0.039	-0.025	-0.106^b				
	(0.118)	(0.118)	(0.118)	(0.041)				
Home financial crisis	-0.112^a	-0.112^a	-0.113^a	-1.222^c				
	(0.041)	(0.041)	(0.041)	(0.637)				
Tax differential	0.463	0.456	0.447	0.455				
	(0.429)	(0.429)	(0.430)	(0.429)				
Tax sparing $t-1$	0.622^a		0.703^a	0.614^a	0.428^a		0.453^a	0.429^a
	(0.177)		(0.205)	(0.179)	(0.135)		(0.148)	(0.131)
BTT $t-1$		0.137				0.022		
		(0.124)				(0.070)		
BTT without tax sparing $t-1$			0.101				0.030	
			(0.086)				(0.065)	
Ln FDI conduit				0.011^c				0.008
				(0.007)				(0.009)
Country pair fixed effects	x	x	x	x	x	x	x	x
Home country by time fixed effects					x	x	x	x
Host country by time fixed effects					x	x	x	x
Observations	8,974	8,974	8,974	8,947	10,594	10,594	10,594	10,566

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 effects are included.

For comparison purposes, in Column (1) of Table 14 we simply replicate the results of our baseline equation where BTTs are omitted. In Column (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 $t-1$.[26] The coefficient estimated on the dummy BTT is positive but is not significantly different from zero. In Column (3) we want to 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 not 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. Similar results are obtained in Columns (5)-(7) when we add home-country by time and host-country by time fixed effects.

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 benefit from reduced corporate tax rates made possible under favourable 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.[27] 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

[26] As for tax sparing, the BTT dummy is lagged by one year, as BTTs tend to be effective on January of the year following the entry into force. Similar results are obtained when the BTT variable is not lagged. These results are available upon request.

[27] For 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.

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 (4), the coefficient estimated on “ln FDI conduit" is positive, small in magnitude and statistically significant at the 10 percent level. It is not statistically different from zero in Column (8) when home-country by time and host-country by time fixed effects are included. If anything, these results tend to indicate a complementary relationship between total home FDI in potential conduit countries and bilateral FDI, and by extension they suggest 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 effective average tax rate (EATR) computed by Bosenberg and Egger (2017). This EATR corresponds to the difference between the pre-tax and after-tax net present values of a hypothetical investment in one period. Thus, it measures the discrete cost of capital associated with investing in a country. This recent measure has the advantage of being available for a large number of countries and of covering our period of analysis. Unfortunately, it is not ideal for our purpose because it does not reflect the actual taxes paid by multinational firms in a given host country, and is moreover not country-pair-specific. However, it does address a potential shortcoming of our tax rate differential variable used in the baseline analysis, namely that many FDI choices are discrete rather than continuous, and are influenced by the EATR rather than by the statutory marginal tax rate (which influences instead changes in investment on the intensive margin). The baseline equation is augmented with the EATR in Column (1) of Table 15. The coefficient estimated on the EATR is negative and statistically significant at the 5 percent level. The inclusion of this variable 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.

Table 15: Tax Incentives and Withholding Tax Rates

	E(FDI$_{ijt}$)|.) Poisson [1]	E(FDI$_{ijt}$)|.) Poisson [2]	E(FDI$_{ijt}$)|.) Poisson [3]	E(FDI$_{ijt}$)|.) Poisson [4]	E(FDI$_{ijt}$)|.) Poisson [5]
Ln home GDP	0.630^a	0.619^a	0.619^a	0.565^a	0.562^a
	(0.177)	(0.170)	(0.170)	(0.178)	(0.178)
Ln host GDP	0.568^a	0.569^a	0.569^a	0.556^a	0.555^a
	(0.093)	(0.091)	(0.091)	(0.086)	(0.085)
Ln host population	-0.945	-0.033	-0.033	-0.883	-0.875
	(0.678)	(0.118)	(0.118)	(0.609)	(0.607)
Bilateral trade costs	-0.018	-0.111^a	-0.111^a	-0.039	-0.040
	(0.128)	(0.041)	(0.041)	(0.121)	(0.122)
Home financial crisis	-0.108^b	-1.048^c	-1.049^c	-0.107^b	-0.107^b
	(0.043)	(0.620)	(0.620)	(0.042)	(0.042)
Tax differential	-0.029	0.448	0.449	1.401^b	1.477^b
	(0.483)	(0.432)	(0.432)	(0.597)	(0.597)
Tax sparing $t-1$	0.620^a	0.622^a	0.623^a	0.538^a	0.521^a
	(0.177)	(0.177)	(0.177)	(0.179)	(0.162)
EATR	-1.153^c				
	(0.666)				
WTR interest		0.280			
		(0.543)			
WTR royalties			0.208		
			(0.509)		
GTR interest				-1.632^b	
				(0.728)	
GTR royalties					-1.762^b
					(0.726)
Country pair fixed effects	x	x	x	x	x
Observations	6,945	8,654	8,654	8,966	8,974

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 effects are included.

To test directly the responsiveness of FDI to withholding tax rates, in Column (2) of Table 15 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 comes 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.[28] 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.[29] 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 benefits from tax holidays abroad. This hypothesis seems realistic since as indicated by the 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 16 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 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.

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

[28] As previously indicated, 293 changes occur between 2002 and 2012.

[29] Note 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-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.

Table 16: 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 Worlwide Tax Summaries Corporate Taxes 2013/14 for the year 2013.

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 17.

The global effective tax rates on interest and royalties are included in our baseline equation, respectively in Columns 4 and 5 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 decreases in magnitude (from 0.62 to 0.54-0.52). This indicates that part of the effect of tax sparing agreements is captured by the impact they have on effective tax rates on interest and royalties.

Table 17: Measure of the Global Tax Rate on Passive Income in the Presence of Tax Holidays

	Without tax sparing	With tax sparing
Interest payments:		
If $t_h > w_f^i$	t_h	$t_h - w_f^i$
If $t_h < w_f^i$	t_h	0
Royalties:		
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 $w_f^{'r} = 0$.

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 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, and various relevant country-pair characteristics to form a dataset that has 8,974 observations on 1,941 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 an increase of up to 97 percent in the stock of FDI. This effect does not 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).

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 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.

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