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Research Papers

Tax treaties and the allocation of taxing rights with developing countries *

Dimitri Paolini[†], Pasquale Pistone[‡], Giuseppe Pulina[§] and Martin Zagler[¶]

Abstract

Worldwide income taxation in the country of residence is a legal dogma of international taxation. We question this dogma from the perspective of relations between developed and developing countries from a legal and economic perspective, and make a modern and fair proposal for tax treaties. We will show under which conditions a developing and a developed country will *voluntarily* sign a tax treaty where *information is exchanged truthfully* and whether they should *share revenues*. Moreover, we will demonstrate how the conclusion of a tax treaty can assist in the *implementation of a tax audit system*.

Keywords: international corporate income taxation, tax treaties, revenue sharing, asymmetric information, uncertainty, locational decisions, principal-agent models.

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JEL-Codes: F53, H25, H87, D82.

1 Wither the worldwide income tax principle

Worldwide income taxation in the country of residence is a global legal dogma of international taxation (see Mc Daniel (2007); Fleming *et al.* (2009)). Conceived to fit relations between countries with symmetrical flows of capital, this dogma gradually spread throughout the world (see Christians (2010)). We question this dogma from the perspective of relations between developed and developing countries for two reasons. From a legal perspective, expanding the taxing sovereignty beyond the national borders leads to overlaps with the sovereignty of the state of source and international double taxation may arise. From a tax policy perspective, the deduction of the foreign tax by the country of residence¹, reduces the possibilities of developing countries to attract foreign capital through tax policy. A reduction of such tax by the country of source turns into a lower deduction against taxes due in the country of residence. This achieves capital export tax neutrality, but eliminates the possibility to reduce taxes by countries in order to attract foreign capital.

This paper regards this outcome in conflict with international tax justice and a fair allocation of taxing powers (see Pistone & Goodspeed (2010)). In particular, in the presence of unidirectional flows of income or capital, as it is typically the case for relations with developing countries, worldwide income taxation by the country of residence allows capital exporting countries to link up to their taxing jurisdiction income that has in fact been sourced or produced outside of it and thus interfere with the tax policy decisions of the country in connection with whose territory income was generated. The ambition of this paper is to present a solution to replace the worldwide income tax principle. A modern view, that takes information sharing seriously, is needed to make use of tax treaties as an instrument for a fairer allocation of taxing powers and co-operation between developing and

¹i.e. relief for juridical double taxation by the so-called foreign tax credit method.

developed countries.

2 Legal interference in tax policies of developing countries through tax treaties

The features of this policy can be summarized as follows: When - as it is often the case - taxes levied in the developing country are lower than those applicable in the developed country, the latter will in fact levy its own taxes on income produced on the territory of the developing country under the noble justification that this will discourage developing countries from negotiating a race to the bottom with powerful multinational enterprises. (see Brooks (2007); Pistone (2010))

Remarkably, developing countries often abstain from compensating their more favorable domestic tax regimes. The even more remarkable effect of this international scenario is that multinational enterprises are stimulated to invest in complex (and expensive) international tax planning schemes in order to repatriate the investment of their capital through high tax jurisdictions that exempt foreign source income and an appropriate use of the diversity of tax treaties around the world (see Commission (2009)).

This paper aims at considering whether the allocation of taxing powers can be reshaped in a way that allows the developing country to have a "fair share"² of the revenue originated from the exploitation of its territory (Benshalom (2010), Brauner (2010), Brooks (2009)). The goal of the joint legal and economic analysis is to secure for each developing country a sound and sustainable tax policy, based on the certainty of financial resources, sourced within the same country, consis-

²To be defined below.

tently with the national policy objectives of such country and without external interferences (Brauner (2010), Christians (2010), Dagan (2010)).

From a legal perspective, states are free to decide whether or not to conclude a tax treaty. However, if a treaty exists, the contracting states are obliged to execute it in good faith, in compliance with the requirements of the Vienna Convention on the Law of Treaties. Therefore, insofar as a treaty exists and includes a clause on the exchange of information, the supply of information will be an ordinary consequence of the obligation to execute the treaty in good faith. Nevertheless, some years ago the OECD has clarified that requests for information not duly backed up by a precise documentation gathered in the framework of a preliminary auditing activity are to be regarded as fishing expedition and thus do not imply any obligation for the requested contracting state to supply the information.

From an economic perspective, information asymmetries as the one described above, where a developing country will have information on firms of developed countries can be solved by giving the developing country the right incentives to share this information. These information sharing theories can be implemented in tax treaties. In these theories information is considered a tradable good, and thus revenue sharing inevitably will come alongside the exchange of information. Until now such (economic) theories have found a limited attention among legal experts of taxation.

Bacchetta & Espinosa (2000) have analyzed the problem of information sharing for capital income taxation, demonstrating that information exchange can be supported only if governments interact repeatedly. Keen & Ligthart (2007) apply the concept of information exchange to the EU savings directive. They compare a

scenario without information exchange to a situation with the exchange of information, where a country can unilaterally set a withholding tax to retain part of the tax revenues. Whilst they do not explicitly state it in their paper, the model could be used to analyze the benefits of signing a tax treaty with revenue sharing and information exchange, and can thus be considered a special case of the analysis carried out here.

The first empirical application that investigates the motives for countries to sign a tax treaty has been carried out by Voget *et al.* (2011). They find that apart from reducing or eliminating cross-border double taxation, tax treaties are also signed to obtain a legal instrument for the exchange of tax information. In this respect, this last paper provides evidence for the theory presented in this paper.

The current concern to move toward global fiscal transparency has increased the general awareness of the importance to secure an effective exchange of information through tax treaties. Therefore, regardless of whether tax treaties in fact affect foreign direct investment, this study aims at establishing a fair and effective exercise of the taxing sovereignty on the basis of tax treaties in relations with developing countries through a mechanism that pursues an effective exchange of information. Barthel *et al.* (2010)

The authors regard tax treaties as the only instrument through which developed countries can obtain the sufficient and objectively reliable information to exercise their sovereignty on revenue from developing countries (see Christians (2005)). However, developing countries not necessarily dispose of the relevant infrastructure and auditing system for supplying that information, which also entails substantial costs for them. Furthermore, insofar as the tax treaty flow of information does not

work properly, developed countries find themselves in a similar situation to that arising in the absence of a tax treaty. Accordingly, for instance, they would be unable to check whether transfer pricing within multinational groups effectively corresponds to the function performed by companies in developing countries with respect to income sourced in those countries. In such cases, firms may more easily hide all or a part of their revenues.

3 Broad lines of a fair tax treaty with developing countries

This paper elaborates a model that allows for an effective and sustainable exchange of information in situations with unidirectional flows of income and capital, assuming this as the situation most frequently occurring in relations with developing countries. The analysis also takes into account the possible impact of an effective exchange of information on the mobility of investment by multinational enterprises at the international level, assuming two scenarios in which firms respectively (i) can and (ii) cannot move to other developing countries.

The mechanism contemplated in this study allocates taxing powers in a way that makes it affordable for developing countries to sustain the costs of an effective auditing carried out at the standards required by global fiscal transparency (and in certain cases even to introduce such a system of auditing) and exercise their tax sovereignty in compliance with their own policy. The allocation of taxing powers allows one contracting state (normally the developed country) to tax the income up to arm's length value and the other contracting state (normally the developing

country) to tax the remaining part of the income³.

In the following, we will present the design for a modern and fair tax treaty. The treaty is modern in the sense that it takes information sharing between contracting states seriously. It is fair in the sense that it will comprise revenue sharing of tax revenues collected by the developed country. We will assume that both contracting states are small, and we can therefore treat tax rates as given. For the sake of simplicity we assume that governments are Leviathan, and maximize government revenues.

The paper proceeds as follows. In the next section, we will discuss the situation if firms are immobile. Though this scenario may not be realistic, it is simple and yet permits us to show all the main results. We will relax this assumption in section 5. Within each section, we will need to solve four distinguished cases, depending on whether a treaty exists or not, and whether the developing country audits firms and gathers the necessary information for information sharing or not. We will describe the benchmark case without a treaty in the first subsection. Here we will assume that the developed country adopts the tax credit method, and unilaterally allows full deduction of all tax payments to the developing state.⁴ In the second subsection, we will discuss the alternative case of a treaty, where we assume that countries split the tax base according to the arm's length transfer pricing principle. In order to obtain information about its taxpayers from the developing country, the developed country may be willing to share part of its tax revenues, and we will indicate the range of revenue sharing where a tax treaty is feasible.

³A good example of this is the predetermined mechanism currently applicable on a unilateral basis for determining transfer pricing in the Brazilian tax system.

⁴This scenario covers the vast majority of all potential international tax cases

4 The model economy without firm relocation

We consider $n \in \mathfrak{R}^+$ identical multinational firms that produce a fixed quantity, q , of a homogeneous good in a developing country U . We assume, for the ease exposition, that firms sell the q goods in a developed country D at a price $p_d \in \mathfrak{R}^+$.⁵ The sales price p_d is constant and known to both countries. We will normalize $p_d = 1$.

Firms produce with constant marginal costs \tilde{c}_i . These costs, by hypothesis, are stochastic and unknown to both countries. For the sake of simplicity we assume that each \tilde{c}_i is a random variable which can assume two values: *high* (with probability $\rho \in [0, 1]$) or *low* (with probability $(1 - \rho)$), i.e. $\tilde{c}_i \in \{c_l, c_h\}$ ⁶. Note that the developed country cannot observe the true realization of individual production cost \tilde{c}_i , but knows the probability ρ , so that it can foresee the number of firms producing with a low and high marginal costs.

As quantity neither influences marginal costs nor the sales price, we will assume that each firm produces exactly one unit of the good, $q = 1$ without loss of generality. Expected gross operating profits of firms are therefore given by $1 - \bar{c}$, where $\bar{c} = E(\tilde{c}_i) = \rho c_h + (1 - \rho)c_l$. In the absence of a tax audit system, firms can claim any reasonable cost to either country.⁷

Both countries can and - in the absence of a tax treaty - will tax each firm i 's realized global gross profits $1 - \tilde{c}_i$.⁸ We thus exclude headquarter shopping. Fi-

⁵We assume that consumers in D are immobile.

⁶with $0 < c_l < c_h < p_d = 1$.

⁷In our case, firms can claim at most costs of c_h .

⁸For the sake of simplicity we assume that D can levy a corporate income tax on revenues in D even in absence of a subsidiary.

nally, we assume that there are no firms that produce in D and sell in U .

The developing country U can learn the actual realization of each firm's \tilde{c}_i bearing a (sunk) cost $M(n)$, with $\partial M(\cdot)/\partial n > 0$. We assume that there are fixed costs of implanting a tax audit system, $M(0) > 0$. The developed country D cannot observe or learn the true realization of \tilde{c}_i and must therefore trust either the firm or the developing country U 's claim. In legal terms country U 's claim can be dismissed for the absence of any legal obligation of country D to consider it. However, country D may also find it unsatisfactory to passively import data from the firms without being able to verify their true realization. This situation has allowed international tax planning to make use of artificial structures and tax driven schemes for several decades. This practice is judged highly undesirable in the framework of global fiscal transparency, which is making considerable progress with the support of the G20.

4.1 No Treaty

In the absence of a tax treaty and firm relocation, the developing country must still decide whether to implement a tax audit system and thereby reveal information about its resident firms, in particular about their true costs of production. The developing country U will decide to audit if and only if tax revenues with implementation of an audit system, that we denote with T_u^{na} , are (weakly) greater than tax revenues without audit, T_u^{nn} ,

$$T_u^{na} = nt_u(1 - \bar{c}) - M(n) \geq nt_u(1 - c_h) = T_u^{nn} \quad (1)$$

where $t_u \in [0, 1]$ is the tax rate in country U . This condition is satisfied if and only if audit costs are (weakly) inferior to the tax revenue gain. Formally,

$$M(n) \leq nt_u(c_h - \bar{c}) \quad (2)$$

If no treaty is signed and therefore no information is exchanged, country D has to rely on each firm i 's declaration about costs, irrespective of the implementation of an audit system in the developing country U . From a legal perspective, this type of information is generally considered of limited relevance, due to the low reliability of data that cannot be cross-checked with tax authorities. A different conclusion is generally only possible for publicly available information, such as for instance in respect of data required for companies quoted on the stock exchange, or of facts of common knowledge. In such circumstances courts generally acknowledge the right of country D to apply disproportionate measures to prevent the occurrence of abusive practices (i.e. tax avoidance and evasion).⁹

Since the developed country D does not have the necessary information and no way to procure it, all firms will declare *high* costs i.e. $c_i = c_h \forall i \in n$ and will deduct taxes payed in country U that depends on the implementation decision of country U .

In the absence of a tax audit system in the developing country, both countries will tax the same tax base, and tax revenues in country D will equal,

$$T_d^{nn} = n(t_d - t_u)(1 - c_h) \quad (3)$$

where $t_d \in [0, 1]$ is the tax rate in country D . By contrast, if U has implemented a tax audit system, firms will declare true costs to country U and therefore deduct higher taxes in country D . In this case tax revenues will equal,

$$T_d^{na} = n(t_d - t_u)(1 - c_h) - nt_u(c_h - \bar{c}) \quad (4)$$

In the absence of audit, firms hide part of their revenues and therefore evade an amount of taxes equal to $nt_d(c_h - \bar{c})$.

⁹see European Court of Justice, decision 18 December 2007, case C-101/05, A.

Without an audit system we define the global tax revenues as:

$$T^{nn} = T_u^{nn} + T_d^{nn} = nt_d(1 - c_h) \quad (5)$$

In the presence of audit, the global tax revenues is:

$$T^{na} = T_u^{na} + T_d^{na} = nt_d(1 - c_h) - M(n) \quad (6)$$

Global tax revenues are decreasing in audit cost $M(n)$. A developed country therefore has no incentive to support auditing in the developing economy. They are a function of the tax rate in the developed country, but not of the tax rate in the developing country due to the foreign tax credit. From a tax policy perspective of the developing country this may imply that whatever goal is regarded as relevant and whatever measures can apply for tax purposes, the outcome is simply random and impossible to be predicted in advance, thus generating a negative impact on tax reforms that such country may want to implement for enhancing its tax governance in compliance with international standards.

4.2 A Treaty

Tax treaties with developing countries typically follow the UN model tax treaty, where countries agree to exchange information and eliminate double taxation by splitting firm revenues according to the arm's length transfer pricing rule. The arms length principle defines the just transfer price as average production costs plus a mark-up. We will assume that this transfer price equals $\alpha\tilde{c}_i$, where $\alpha > 1$.

Both countries will lose part of the tax base when signing a treaty. The developed country D could gain from a double tax treaty if this reveals true production costs of firms. However, the developing country U would unconditionally lose from a

tax treaty, as it could observe true production costs even in the absence of a treaty through auditing. Developing countries will therefore only voluntarily sign tax treaties if an element of revenue sharing is included in the treaty.

From a legal perspective there is a traditional opposition to include revenue sharing in tax treaties, since ex post a contracting state is obliged to execute a treaty in good faith according to the obligations and regardless of what this may entail.¹⁰ Nonetheless, there are several examples that include elements of revenue sharing in bilateral tax treaties. A good example, frequently included in Swiss tax treaties, can be found for taxing income of frontier workers. Another example arises in the EU directive (transitional regime) and international agreements on the taxation of savings. A third example can be found in the Australian tax treaty practice at the level of the memorandum of understanding that is generally annexed to tax

¹⁰This may obviously lead to the fact that a contracting state may refrain from signing a treaty ex ante.

treaties.¹¹ Accordingly we will now propose that revenue sharing is to be included in a fair tax treaty with a developing country.

In order to obtain a voluntary agreement, the developed economy, D , will propose a compensation fee f for the revelation of information about every firm. We

¹¹Australian tax treaties with developing countries, in particular in cases where unilateral flows of information can arise, are generally accompanied by a memorandum of understanding (MOU) on extraordinary and ordinary costs to provide information. The relevant provision on costs is as follows:

Pursuant to Article X of the Agreement it is mutually decided that costs that would be incurred in the ordinary course of administering the domestic tax laws of the requested party will be borne by the requested party when such costs are incurred for the purpose of responding to a request for information. Such ordinary costs will normally cover internal administration costs and any minor external costs.

All other costs that are not ordinary costs are considered extraordinary costs and will be borne by the requesting party. Examples of extraordinary costs include, but are not limited to, the following:

- reasonable fees charged by third parties for carrying out research;
- reasonable fees charged by third parties for copying documents;
- reasonable costs of engaging experts, interpreters, or translators;
- reasonable costs of conveying documents to the requesting party;
- reasonable litigation costs of the requested party in relation to a specific request for information; and
- reasonable costs for obtaining depositions or testimony.

All requests for payment must be supported by the relevant documentation, ie. an invoice/receipt for payment.

The parties above named will consult each other in any particular case where extraordinary costs are likely to exceed a certain threshold to determine whether the requesting party will continue to pursue the request and bear the cost.

assume that the developed country will offer f_l if revealed costs of the firm are *low* and f_h if revealed costs were *high*.

The timing is as follows: first the developed country D chooses and announces f_h and f_l ¹². Then the developing country U decides whether to sign the treaty or not. Finally, after realization of \tilde{c}_i (which is not observable by the developed country), if U signed the contract, it audits the firms, collects taxes if any and pays $\eta \cdot f_h + (n - \eta)f_l$ (where $\eta \in [0, n]$ is the number of firms whose actual $c_i = c_l$) to D .

In order to induce U to sign the treaty and to give a true declaration about the actual realization of each c_i , the developed country D needs to choose the lump sum fee vector f according to the following condition:

1. *Incentive compatibility (IC)* When a state π_η ¹³ actually happened, the tax revenues of the developing country when it declares π_η must be (weakly) greater than its tax revenues when it declares π_j for all $j \in [0, n]$ different from η ;¹⁴
2. *Participation constraint (PC)* the expected tax revenues of the developing country when it accepts the treaty must be (weakly) greater than what it gets when it refuses.

¹²So $f_h \leq f_l$

¹³In this state of the world just η firms make a low revenue while the others $(n - \eta)$ make the high one.

¹⁴We firmly believe that this condition is not met in the agreements that Switzerland has signed in 2011 with Germany and the United Kingdom on the single taxation of savings in the country of source. Such agreements, designed to preserve anonymity of investors, give the state of residence, which for the purpose of our article is in a similar situation to country D , no possibility of cross-checking cases of misreporting or of loose enforcement of taxes by Switzerland.

If we get back to the relations between countries D and U , we believe that this structural deficiency of the potential risk of misreporting can be overcome by using the incentive compatibility condition.

Suppose that D sets $f_h \neq f_l$, then U has an incentive to misreport the correct transfer price in order to make an unfair profit. So, in order to satisfy the incentive compatibility constraint (IC) and then give the incentive to share the correct information to U , the developed country D has to set a unique fee $f = f_l = f_h$.

In order to satisfy the participation constraint (PC) the choice of f depends on whether in the absence of a treaty the developing country audits or not, equation (2). In the following we first analyze the case where condition (2) is satisfied, and thereafter the case when it is not satisfied.

4.2.1 A treaty with audit already in place

If the *tax revenue gain* from auditing is (weakly) greater than *audit costs* (condition (2) is satisfied), then implementing a monitoring system does not depend on the treaty, since it will be implemented anyway. If this is the case, then the developing country U will sign the treaty if tax revenues plus revenue sharing nf^{ta} exceeds tax revenues in the absence of a treaty,

$$T_u^{ta} = nt_u(\alpha - 1)\bar{c} - M(n) + nf^{ta} \geq T_u^{na} \quad (7)$$

The previous equation is satisfied if and only if the tax revenue loss of the reduced tax base and audit costs are (weakly) inferior to the tax revenue gain. Formally, the participation constraint is satisfied if and only if,

$$\underline{f}_u^{ta} = t_u(1 - \alpha\bar{c}) \leq f^{ta} \quad (8)$$

where \underline{f}_u^{ta} is the minimum level of revenue sharing for which country U with an audit system will be willing to sign the treaty.

The developed country D will sign the treaty when audit was already in place if and only if tax revenues it receives with the treaty, T_d^{ta} , are greater than tax revenues if it does not sign,

$$T_d^{ta} = nt_d(1 - \alpha\bar{c}) - nf^{ta} \leq n(t_d - t_u)(1 - c_h) - nt_u(c_h - \bar{c}) = T_d^{na} \quad (9)$$

This gives the maximum fee the developed country is willing to pay,

$$\bar{f}_d^{ta} = t_d(c_h - \alpha\bar{c}) + t_u(1 - \bar{c}) \geq f^{ta} \quad (10)$$

where \bar{f}_d^{ta} is the maximum level of revenue sharing for which country D will be willing to sign the treaty with a developing country with an audit system.

A different conclusion can in our view only be reached when country D wants to promote good tax governance of country U regardless of an actual return, thus including for instance an element of aid to development, as the European Union, currently the major financial donor in the world, does since 2009.

A treaty is therefore feasible and fiscally rewarding if and only if condition 8 and 10 are both satisfied, i.e. $\underline{f}_u^{ta} \leq f^{ta} \leq \bar{f}_d^{ta}$.

4.2.2 A treaty initially without audit

If *audit costs* are greater than the *tax revenue gain*, U will not implement the audit system in the absence of the treaty. This means that in the absence of a treaty it will get a payoff of T_u^{nn} , defined in equation (1) above, since each firm i will declare high costs c_h , and it will get T_u^{tn} if it signs the treaty. The problem of

the developing country U consists of choosing whether to sign the treaty or not in order to maximize its tax revenues. It will accept the treaty if and only if:

$$T_u^{tn} = nt_u(\alpha - 1)\bar{c} - M(n) + nf^{tn} \geq nt_u(1 - c_h) = T_u^{nn} \quad (11)$$

The previous condition is satisfied if and only if the fee plus the net tax revenues gain are (weakly) greater than the cost of the audit system, or

$$\underline{f}_u^{tn} = t_u(1 - \alpha\bar{c}) + \frac{M(n)}{n} - t_u(c_h - \bar{c}) \leq f^{tn} \quad (12)$$

where \underline{f}_u^{tn} is the minimum level of revenue sharing for which country U without an audit system will be willing to sign the treaty.

This pattern is in substance linked to the recent developments concerning the Global Forum on Fiscal Transparency. Since 2009 countries are willing to sign tax treaties with exchange of information provisions in order not to be listed in the groups of uncooperative tax jurisdictions and be internationally blamed for not effectively countering tax avoidance and evasion. For such reason a developing country may be willing to sign a tax treaty with an exchange of information clause even when it knows that such clause will in fact not yield any advantage with respect to tax revenue for it. However, we believe that the developing country, even in such circumstances, will not effectively carry out tax audits unless it believes that it may gain from them.

In addition to the compensation of the loss of tax base as in condition (8) above, the developed economy must now also compensate the developing economy for the implementation of a tax audit system, which is the last part of the above condition (12) and replicates condition (2).

Similarly as above, the developed country D will sign the treaty when audit was not already in place if and only if the tax revenues it receives with the treaty

exceed tax revenues without the treaty,

$$T_d^{tn} = nt_d(1 - \alpha\bar{c}) - nf^{tn} \geq n(t_d - t_u)(1 - c_h) = T_d^{nn} \quad (13)$$

which leads to,

$$\bar{f}_d^{tn} = t_d(c_h - \alpha\bar{c}) + t_u(1 - c_h) \geq f^{tn} \quad (14)$$

where \bar{f}_d^{tn} is the maximum level of revenue sharing for which country D will be willing to sign the treaty with a developing country without an audit system.

The first term is the tax gain when a treaty is signed. The second by contrast is the tax revenue loss due to the ceasure of taxing rights to the developing country U . The two conditions for the developed economy, equations (10) and (14), differ only by the amount $t_u(c_h - \bar{c})$. If no audit system was in place before the treaty, the developed country can offer a lower compensation for the developing country U , as it can fully appropriate the higher tax revenues of the developing country U resulting from auditing.

A treaty is feasible if and only if conditions 12 and 14 are both satisfied, i.e.

$$\underline{f}_u^{tn} \leq f^{tn} \leq \bar{f}_d^{tn}.$$

4.2.3 Discussion

Jointly equations (10) and (14) give the maximum level of revenue sharing still acceptable for the developed economy D . Equations (8) and (12) define the minimum level of revenue sharing that the developing country U is willing to accept. Equations (10) and (8) hold for cases where an audit system is already in place, $M(n) \leq nt_u(c_h - \bar{c})$, whereas equations (14) and (12) hold otherwise.

The model implies an unambiguously positive level of revenue sharing. The com-

pensation will therefore be the result of a bargaining process and - depending on the bargaining power of the two parties - fall in between the minimum level of revenue sharing required by the developing economy U and the maximum level of revenue sharing offered by the developed country D .

We can define the difference between the maximum revenue sharing fee offered by the developed country and the minimum revenue sharing fee requested by the developing country when auditing is already in place as

$$b^{ta} = \overline{f}_d^{ta} - \underline{f}_u^{ta} = t_d(c_h - \alpha\bar{c}) + t_u(\alpha - 1)\bar{c} \quad (15)$$

Similarly, the difference between the maximum revenue sharing fee offered by the developed country and the minimum revenue sharing fee requested by the developing country when auditing is not in place is

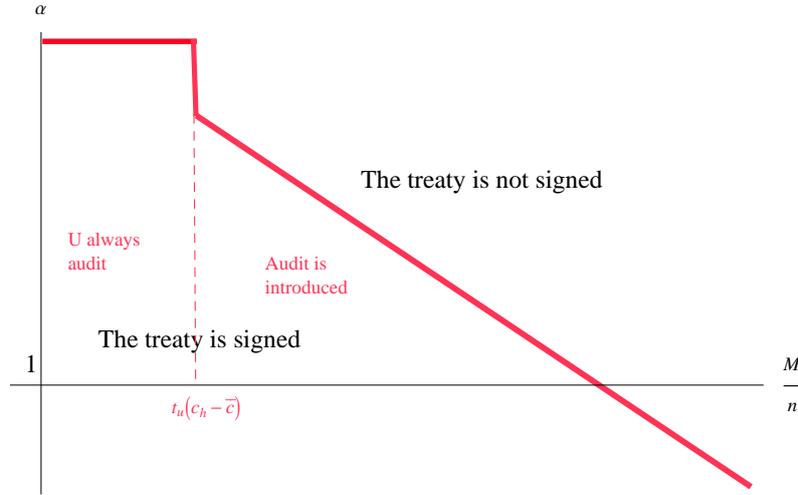
$$b^{tn} = \overline{f}_d^{tn} - \underline{f}_u^{tn} = t_d(c_h - \alpha\bar{c}) + t_u(\alpha - 1)\bar{c} - M(n)/n = b^{ta} - M(n)/n \quad (16)$$

We find that a tax treaty can be welfare improving for both countries if $b \geq 0$. Except for the unlikely case that the average arm's length price exceeds the maximum cost by a very large amount, we can ensure that a tax treaty is possible.

When tax rates in developed countries exceed tax rates in developing countries, $t_d > t_u$, the bargaining space is a decreasing function in the transfer price α . We can identify the transfer price for which both countries are indifferent between signing the treaty or not

$$\alpha = \begin{cases} \frac{1}{\bar{c}(t_d - t_u)}(t_d c_h - t_u \bar{c}) & \text{if } M(n) \leq n t_u (c_h - \bar{c}) \text{ with audit system} \\ \frac{1}{\bar{c}(t_d - t_u)}(t_d c_h - t_u \bar{c} - \frac{M(n)}{n}) & \text{if } M(n) \geq n t_u (c_h - \bar{c}) \text{ without audit system} \end{cases}$$

We can plot these conditions in the following graph:



The bold line on the graph above represents at each possible cost of audit $M(n)$ the maximum level of the transfer price for which both countries are just willing to sign the treaty. The intuition is that the greater the cost of auditing $M(n)$ the greater the developed country D share of tax base has to be (i.e. a lower α) for the treaty to be signed. If audit costs exceed the potential minimum gain from negotiating a treaty, $M(n)/n > b \Leftrightarrow \underline{f}_u^{tn} > \bar{f}_d^{tn}$, then no treaty will voluntarily be signed.

Interestingly, a treaty can stimulate a developing country to introduce a tax audit system together with a tax treaty, even if initially an audit system is too expensive to be implemented, $\bar{f}_d^{tn} - \underline{f}_u^{ta} \Leftrightarrow t_d \geq t_u$. This convenience is enhanced when additional funds are made available by international organizations or supranational entities, like the EU, for the specific purpose of improving the compliance with standards of good governance and thus increase the ability of the developing country to raise sufficient revenue from taxes collected within its jurisdiction. As long as the tax level is given the treaty acts as it increases the tax rate in U and the tax base in D. Moreover a treaty can end the evasion phenomenon since firms will declare truthfully. Obviously, there will be no treaty with developing countries

that exhibit excessive audit costs.

Summing either equations 7 and 9 or 11 and 13 yields global tax revenues with a treaty irrespective of the initial audit decision,

$$T^t = T_u^{ta} + T_d^{ta} = T_u^{tn} + T_d^{tn} = nt_d(1 - \alpha\bar{c}) + nt_u(\alpha - 1)\bar{c} - M(n) \quad (17)$$

we find that $T^t = T^{na} + nb^{ta} = T^{nn} + nb^{tn}$ which shows that a treaty is feasible if and only if the total tax revenues are increasing with the treaty.

We were able to show under which conditions countries are willing to sign a tax treaty voluntarily where they truthfully exchange information. We have been able to prove that such treaties will only come to place if the country in need of information is willing to share a nonzero part of these additional revenues with the other country. We have also proven that the developing country has no convenience to misreport information to the developed country. We were also able to show that the conclusion of a treaty can induce the developing country to implement a tax audit system. In the next section, we will analyze whether these conclusions hold under the obvious possibility that firms may leave (or enter) a country that has just signed a treaty.

5 The model economy with the decision to relocate

Capital is mobile internationally, and firms can relocate their production at will to any third country upon bearing a relocation cost k . For simplicity, we assume that third countries levy the same tax rate t_u as the developing country U under consideration.

5.1 No treaty

First, suppose that the developing country has neither a tax treaty nor an efficient tax audit system. Then the firm will claim as before high costs in both countries and be taxed according to the global income principle, yielding expected profits of

$$\pi^{nns} = (1 - \bar{c}) - t_d(1 - c_h) \quad (18)$$

in case it decides to stay. Profits are given by revenues (normalized to unity) minus expected production costs \bar{c} , and minus tax payments on declared profits to the developed country D , since taxes payed in U can be deducted. Suppose, now, that firms can move paying a reallocation cost k . The profit of a single firm in case it decides to move to another country without audit and treaty will be

$$\pi^{nnn} = \pi^{nns} - k \quad (19)$$

In the absence of a proper tax audit or a tax treaty, the foreign tax credit method impedes firms to relocate, as profits of relocating firms (19) are weakly lower than profits of remaining firms (18), $\pi^{nnn} \leq \pi^{nns}$. Note that the foreign tax credit method impedes tax competition between developing countries, as their respective tax rates are irrelevant for the locational decision of foreign firms, equations 18) and 19). Tax revenues in the developed and the developing country respectively are $T_u^{nns} = nt_u(1 - c_h)$ and $T_d^{nns} = n(t_d - t_u)(1 - c_h)$.

Second, suppose now that the developing economy implements a tax audit system, but does not communicate the findings to the developed economy due to the lack of a treaty. If the developed country D offers tax deductions following the foreign tax credit method, firms can deduct all the taxes payed in U . Profits in the case firms do not relocate are identical to the case in the absence of auditing (18), $\pi^{nas} = \pi^{nns}$. Profits in the case firms relocate are also identical

to the case in the absence of auditing (19), $\pi^{nan} = \pi^{nnn}$. Firms will again decide to remain in the developing country U given (weakly) positive moving costs, $k \geq 0$.

Tax revenues in the developed country now differ since firms deduct a higher amount of taxes. Tax revenues in the developed country equal $T_d^{nas} = nt_d(1 - c_h) - nt_u(1 - \bar{c})$, whereas for the developing country they change to $T_u^{nas} = nt_u(1 - \bar{c}) - M(n)$. As opposed to the case without auditing, the developed country D will now receive lower tax revenues as firms will now deduct higher tax payments to the developing country U of the amount $t_u(c_h - \bar{c})$. The developing country by contrast gains these tax revenues, but has to pay auditing costs of $M(n)$. The developing country U prefers to implement a tax audit system if $T_u^{nas} \geq T_u^{nns}$, or

$$M(n) \leq nt_u(c_h - \bar{c}). \quad (20)$$

This means that an audit system will be implemented if the tax gain is greater than auditing costs.

5.2 A Treaty

As in the absence of a relocation decision, we will consider a treaty with information exchange and revenue sharing. Note that in the absence of auditing, the developed economy will not benefit from a treaty, and will therefore not be willing to share tax revenues. This case is therefore identical to the no treaty/no audit case above.

With the conclusion of a tax treaty, firms are now aware that information about their true cost structure will be shared with the developed economy. By contrast, a treaty eliminates double taxation according to the worldwide income taxation

principle with foreign tax credit¹⁵, and firms will now declare part of their profits in the developing country U , which might offer lower tax rates. If the prior effect dominates, firms can expect to pay higher taxes and may consider relocation.

In order to prevent capital flight, the developing country U may consider the possibility to pay a subsidy, s , in order to induce firms to stay. We can think of these subsidies either as a reduction in the tax rate offered to firms considering relocation, where the effective tax rate will be $\tau_u = t_u - s/(\alpha\bar{c} - \bar{c})$, or a transfer in kind (e.g. infrastructure), which would reduce production costs. In either case, the subsidy given is a form of tax competition.¹⁶ Profits in case the firm leaves are given by equation (19) above, whereas if the firm remains they are given by

$$\pi^{tas} = (1 - \bar{c}) - t_u(\alpha - 1)\bar{c} - t_d(1 - \alpha\bar{c}) + s \quad (21)$$

The optimal subsidy to firms from the perspective of the developing country U now equals

$$s \geq t_u(\alpha - 1)\bar{c} + t_d(c_h - \alpha\bar{c}) - k \quad (22)$$

The first part represents taxes payed in U , whereas the second term controls for taxes evaded in D in the absence of a treaty, and the last part is the moving cost. Firms can therefore claim all taxes paid to the developing country U short of relocation costs k , and will receive the additional taxes paid to the developed country D back from the developing country through the subsidy s . With very high

¹⁵Considering that tax treaties generally apply the ordinary tax credit method, this is possible only to the extent that taxes, as it is often the case levied by the developing country (usually the country of source) are lower than those levied by the developed country.

¹⁶However, in several parts of the world this option remains merely theoretical, since some legal obstacles may prevent its implementation. This is certainly the case of the European Union, where this type of incentives is in principle incompatible with the provision of state aids and needs an explicit *ex-ante* approval by the European Commission in order to lawfully apply.

relocation costs, this subsidy could in theory be negative, and developing countries could in principle appropriate these locational rents. Substituting subsidies from above, we find that tax revenues will equal

$$T_u^{tas} = n\underline{f}_u^{tas} + nk - nt_d(c_h - \alpha\bar{c}) - M(n) \quad (23)$$

Note that tax revenues depend on tax rates in the developed economy due to the subsidy. The developed economy will receive revenues equal to

$$T_d^{tas} = nt_d(1 - \alpha\bar{c}) - n\bar{f}_d^{tas} \quad (24)$$

5.3 Discussion

Once again, we have to distinguish two cases indicated by condition (20), whether audit is already in place before signing the treaty, $M(n) \leq nt_u(c_h - \bar{c})$, or not. On the one hand, if audit was already in place before signing the treaty, the developing country will accept the treaty if and only if tax revenues under a treaty exceed tax revenues without a treaty, $T_u^{tas} \geq T_u^{nas}$ or

$$\underline{f}_u^{tas} \geq t_d(c_h - \alpha\bar{c}) + t_u(1 - \bar{c}) - k$$

The developed country will accept the treaty if and only if tax revenues under a treaty exceed tax revenues without a treaty, $T_d^{tas} \geq T_d^{nas}$ or

$$\bar{f}_d^{tas} \leq t_d(c_h - \alpha\bar{c}) + t_u(1 - \bar{c})$$

Note that $\underline{f}_u^{tas} = \bar{f}_d^{tas} - k$. Hence the developed country D will be willing to offer a revenue sharing fee that will exceed the revenue sharing fee requested by the developing country U for any nonnegative relocation costs $k \geq 0$. The treaty surplus b that was generated in the absence of firm relocation is now entirely absorbed by firms through subsidies, where applicable. By contrast, the relocation costs k generate a different rent that opens a new bargaining space k . Let us define

global taxation as the sum of both countries' tax revenues: $T^{nas} = T_d^{nas} + T_u^{nas} = nt_d(1 - c_h) - M(n)$ is the global taxation if no treaty is signed and $T^{tas} = T_d^{tas} + T_u^{tas} = nt_d(1 - c_h) + nk - M(n)$. So:

$$T^{tas} \geq T^{nas} \rightarrow k > 0$$

This means that the global taxation is increasing in the treaty if and only if there exists a positive cost for each firm to move.

On the other hand, if auditing was initially not in place and condition (20) was not satisfied, $M(n) \geq nt_u(c_h - \bar{c})$, the developing country will accept the treaty if and only if tax revenues under a treaty exceed tax revenues without a treaty, $T_u^{tns} = T_u^{tas} \geq T_u^{nns}$ or

$$\underline{f}_u^{tns} \geq t_d(c_h - \alpha\bar{c}) + t_u(1 - c_h) + M(n)/n - k$$

The developed country by contrast will accept the treaty if and only if tax revenues under a treaty exceed tax revenues without a treaty, $T_d^{tns} = T_d^{tas} \geq T_d^{nas}$ or

$$\bar{f}_d^{tns} \leq t_d(c_h - \alpha\bar{c}) + t_u(1 - c_h)$$

The minimum revenue sharing fee acceptable for the developing country will be lower than the maximum revenue sharing fee offered by the developed country if

$$M(n) \leq nk - nt_d(1 - c_h)$$

Together with condition (20), This identifies the space were a treaty is feasible even if there was no auditing initially, namely when relocation costs are high, or

$$k \geq t_d(1 - c_h) + t_u(c_h - \bar{c})$$

As before global taxation in the absence of a tax treaty equals $T^{nns} = T_d^{nns} + T_u^{nns} = nt_d(1 - c_h)$ and $T^{tns} = T_d^{tns} + T_u^{tns} = nt_d(1 - c_h) + nk - M(n)$ under a treaty.

Global tax revenues under a treaty are larger if relocation costs exceed auditing costs, or

$$T^{tas} \geq T^{nas} \rightarrow nk > M(n)$$

This means that global taxation is increasing with the treaty if and only if the cost for each firm to move is greater than the cost for the developing country to audit it.

Note that for the usual case that tax rates in the developed economy exceeding tax rates in the developing economy, $t_d > t_u$, the subsidy is increasing in the arm's length pricing mark-up α . Developing countries need not pay a subsidy if the mark-up is defined according to

$$\alpha = \frac{t_d c_h - t_u \bar{c} - k}{(t_d - t_u) \bar{c}}$$

Substituting the minimum subsidy feasible from equation (22) into the profit function (21), we find that net profits will equal $\pi^{tas} = (1 - \bar{c}) - t_d(1 - c_h) - k$. Together, the developed and the developing country can levy at most the developed countries tax rate on the minimum declarable taxbase $1 - c_h$ and skim off relocation costs. (Tax) revenues in the developing economy will consist of profit taxation of firms, revenue sharing from the developed country, minus subsidies to firms and audit costs.

6 Conclusions

This paper has departed from the observation that worldwide income taxation in the country of residence is a global legal dogma of international taxation. We have questioned this dogma from the perspective of relations with developing countries from a legal and economic perspective, and made a modern and fair proposal for tax treaties. We have supported a new vision of how taxing rights should be allocated in a treaty between a developed and a developing country. We argue that

developed countries should share tax revenues with developing countries, as this is mutually beneficial. Developing countries will receive revenues, and developed countries obtain information on its tax subjects through voluntary exchange of information. Our proposal for a new allocation of taxing powers reflects inter-state fairness that should secure consistency with international tax justice goals and achieve an objective standard of splitting taxing powers on cross-border income in compliance with internationally accepted standards, such as the arm's length principle. We have shown under which conditions a developing and a developed country will voluntarily sign a tax treaty where information is exchanged truthfully and when they should share revenues. Moreover, we have demonstrated how the conclusion of a tax treaty can assist in the implementation of a tax audit system.

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