Bilateral Tax Treaty Formation with Tax Sparing

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Abstract

Tax sparing occurs when home government allows spared foreign taxes of its resident company to be used as tax credit. Regardless of tax revenue losses, empirical evidences shows countries willingly engage in tax sparing negotiation. This paper attempts to theoretically explains how and why countries agree on tax sparing.

We find that equilibrium tax sparing with host country's tax rate reduction can exist when two countries engage in treaty negotiation and the home country limits how much foreign tax credit its resident company can claim against tax liability at home. Moreover, the higher the home country's bargaining power, the lower the equilibrium tax sparing.

1 Introduction

For the past decades capital-importing countries, who are mostly developing countries, have been trying to convince capital-exporting countries that they should give tax relief to their resident investors not only on taxes which are paid but also taxes which are spared by the host countries. What these capital-importing or

host countries ask from the home countries, goes beyond conventional doctrine of a double taxation relief, which intend to solve problem of bilateral double taxation[1].

It is obvious that the host countries gain from tax sparing, once agreed, as it makes their tax incentives become even more attractive to foreign investors. But, what could possibly be beneficial to the home countries?. Regardless of the not-so-obvious returns, however, empirical evidence suggests that most developed countries allow tax sparing credit to their overseas investors.

In this paper, we theoretically explore scenarios where it is possible to have an agreement on tax sparing. We divide the paper into four sections. Firstly, we introduce an overview of tax sparing and its related arguments. Secondly, we review some works in this area. Thirdly, we presents theoretical models. Finally, we compare our models and draw some conclusions.

2 What is tax sparing

Tax sparing is a provision specified in bilateral tax treaty primarily between developed and developing countries, in which the home country (normally developed country) gives an income tax credit to its residential company for taxes which are "spared" by the host country as a result of host country's tax concession[2]. Without tax sparing, the host country's tax revenue forgone is transferred to home country's treasury when the residential company pays their annual income tax at home.

The terms and conditions of tax sparing vary from one treaty to another. Nevertheless, it usually involves tax credit on corporate income tax and/or withholding tax on dividend, royalty and interest income. Tax sparing provisions generally specify categories of taxpayers, eligible incomes, period of availability and a maximum tax rate or an amount of deemed paid tax eligible for tax sparing credit

[1] Double taxation occurs when a firm is taxed by both its host country and its resident country on the same bundle of income.

[2] Tax sparing is also agreed among developed countries such as in a treaty between United Kingdom and Switzerland (OECD, 1998, pp. 64-65).

(OECD, 1998, p.31). Limitation on period of tax sparing provision allows treaty countries to re-negotiate terms and conditions of tax sparing in case of changes in economic circumstances. For example, Article 23 of the tax treaty between Canada and Argentina signed in 1993 states the limit of tax sparing to the first five years of the treaty (subject to expansion) and that tax sparing shall not cover interest repatriated which is exempt from Argentina withholding tax (Toaze, 2001, pp. 892-893).

Most tax sparing provisions refer to an overall income tax which is spared by developing country without specifying eligible types of income such as in the Canada- China tax treaty signed in 1986 and the Spain-India tax treaty signed in 1993 (OECD, 1998, p. 50 and p. 58). The agreed tax sparing rate may be capped at a certain ceiling rate such as in the Australia-Vietnam tax treaty signed in 1996 which states that the deemed tax must not be more than 20% (OECD, 1998, p.47). In other cases, the granted tax sparing credit may be either equivalent to or greater than tax which the residential companies have to pay to the host country if tax incentives were not given (Toaze, 2001). Furthermore, tax sparing can be applied to dividend, royalty and interest incomes, such as in the Canada-Argentina tax treaty signed in 1993 and the Germany-Indonesia tax treaty signed in 1977 where the deemed tax credit is specified with a fixed rate of withholding tax on the payment of dividend, interest and royalty (OECD, 1998, p. 50 and p. 53).

The effects of tax sparing on a company's worldwide tax burden, however, depends on how home country treats foreign income of its resident company. Most countries levy tax on worldwide income of its resident company. However, not all incomes of foreign affiliates of the resident company are considered worldwide income of the parent company. Whether those incomes are included in the parent's tax base or not depends mainly on business formation of these affiliates operating overseas.

When an affiliate of a resident company operates overseas as a foreign branch, resident governments such as Canada and the U.S. consider income of

that branch to be the income of the resident company once it is generated. On the other hand, when an affiliate of resident company operates overseas as a foreign subsidiary, its income is subjected to the resident country taxation only when it is repatriated to the resident country. Income repatriation can be in the form of dividend, royalty and interest payment to parent companies or resident taxpayers at home.

Without tax sparing agreement, any tax reductions or benefits offered by the host country is transferred to the investor's country especially when an affiliate is operated as a foreign branch of the resident company (Toaze, 2001, p. 881). On the contrary, the effect of tax sparing is relatively minimal in the case of an affiliate operating as a foreign subsidiary because,with or without tax sparing, the resident company can still enjoy the benefits from the host country's tax incentives by a right-timing of its income repatriation.

3 The long-standing arguments on tax sparing

3.1 The US perspectives

Appearing for the first time in the proposed convention on tax sparing in the Pakistan-US tax treaty in 1950s, the tax sparing has received mixed reactions from the US. President Eisenhower expressed his support to the idea of tax sparing as he states that *"Under proper safeguard, credit could be given for foreign income taxes which are waived for an initial limited period, as we shall grant a credit for foreign taxes which are imposed. This would give maximum effectiveness to foreign tax laws that are designed to encourage new enterprises"* (Martin, 1998, p.450, in Toaze, 2001, p. 883). However, the tax treaty with tax sparing provision has never been legalised. The reluctance of the U.S. in giving tax sparing was noteworthy influenced by Stanley S. Surrey, a professor of Harvard University Law School who became the Treasury Department's assistant secretary for tax policy during President Kennedy administration (Toaze, 2001, p.884-885).

According to Surrey (1958a), the US should not grant tax sparing to Pakistan and other countries because, firstly, tax sparing would oppose the congress position on non-reduction of corporate income tax rate on foreign source income. Moreover, tax sparing could bring the US company's effective tax rate down to zero. In addition, the US tax rate applicable to foreign income would be fixed by tax treaty rate which can be lower than the US domestic tax rate. Secondly, tax sparing would reduce tax rate of the US overseas investor comparing to a domestic investor and this is against the principle of tax-burden equality. Thirdly, a country who has tax sparing agreement with the US would appear to be more attractive than those without it even if the tax concession provided in both countries are the same. Fourthly, tax sparing is harmful to the US tax policy and administration sovereignty because it would cause tax rate applied to U.S. taxpayers to be determined by foreign government and not the U.S. government. Once tax sparing is agreed, any change in developing country's domestic tax law will, in effect, change the U.S. effective tax rate. In addition, responsibility to investigate tax fraud caused by excessive claiming of tax credit lies with foreign government, who is in doubt of being capable of effective monitoring. Fifthly, it would give a windfall to investor. Surrey (1958a) pointed out that most American companies operating abroad are long-term investors and tax sparing would only result in a money bonus to them for activities they would do regardless of tax sparing. In addition, an assertion that tax sparing can increase the U.S. overseas investment is doubtful as it is widely agreed that tax sparing has no effect on American investment abroad (Surrey, 1958b, pp. 86-87). Sixthly, it is possible that once tax sparing is granted, the U.S. companies might quickly repatriate their profits out of foreign countries to enjoy tax sparing credit at home without further re-investing in developing countries. As a result when using tax sparing, source country needs to make a balance between attracting new foreign investment and obtaining further re-investment of existing foreign firms (OECD, 1998, p. 23). Lastly, Surrey (1958a.) points out that tax sparing would cause a number of administrative problems to the U.S. such as identifying amount of "deemed" paid tax, types of concession, eligible taxpayers and devel-

oping countries whom the U.S. should agrees tax sparing with. In addition, it would open a ground of intense lobbying by US overseas investors and foreign governments over favourable term of treaties (Surrey, 1958b, p. 86).

To Summarise Surrey's point of view, the U.S. concerns on tax sparing ranges from sovereignty of tax policy to economic rationales and difficulty in implementation. All in all it was determined on a ground to protect the U.S. tax base. However, academics and politicians have since reassessed the efficiency of the U.S. international tax policy and challenged it's underlying doctrines. On 22 June 2006 Professor James R. Hines provided a testimony before the Subcommittee on Select Revenue Measures of the House Committee on Ways and Means regarding the impact of international tax reform on US competitiveness. He express a view that the current U.S. residence-based taxation and the system of limited foreign tax credit actually impair the American competitiveness abroad and reduce the U.S. tax base. In his testimony, Hines states that *"If the United States imposes a heavy tax on the foreign incomes of firms resident in the United States, then over time American firms will not flourish to the same extent as firms resident in other countries"* . Hines' s testimony indirectly, if not obviously, suggests that tax treatment which reduces or even exempts tax burden on foreign income of American companies operating overseas, such as exemption of foreign income from domestic tax base and provision of tax sparing, would improve the U.S. welfare and tax base.

3.2 From those who support tax sparing

For the developing countries tax sparing would enhance effectiveness of their tax incentives to attract foreign investment inflow. Without tax sparing, their revenues are transferred to the developed countries. The developing countries realise an importance of tax sparing and, as a result, try to persuade investor countries to agree on tax sparing especially when those countries apply tax credit method[3].

[3]Tax sparing has minimal effect when investing country uses exemption method as foreign income of residential companies is exempt from home taxation. Exemption method normally applies

Regardless of the U.S. negative view on tax sparing, other developed countries have been continually granted tax sparing to developing countries. Tax sparing is also agreed between developed countries such as among OECD members (OECD, 1998, pp. 63- 65). This emphasises that tax sparing highly likely to generates benefits for both developed capital-exporting and developed capital-importing countries. Thuronyi (2003) finds that since 2000 one-third of tax treaties contains tax sparing provision. So, if the American practice is the right way, why do others negotiate tax sparing with their treaty partners?. Here are some possible reasons why countries grant tax sparing.

Firstly, tax sparing is viewed as an economic aid. Even if tax sparing reduces tax revenue of capital-exporting country, most developed countries has negotiated tax sparing with developing countries. Those countries consider it as economic aids to developing country (OECD, 1998, p. 19) because tax sparing reduces foreign firm's cost of investment and, as a result, it facilitates more investment into targeted industries which developing country aims to promote. However, using tax sparing as a foreign aid receives criticism due to lack of developed country's control and involvement in assessing, monitoring and evaluation of investment projects entitled to tax sparing (OECD, 1998, p. 22). In effect, the decision on whom and how much tax sparing to be given is left to the discretion of developing country. Furthermore, for tax sparing to be effectively use as transferred economic aid, investment decision of multinational firm has to be influenced by tax sparing. This assumption, however, is widely debated over the years.

Secondly, tax sparing enhances global competitiveness. Tax sparing also helps developed country's investors because by granting tax sparing developed country enhances competitiveness of its residential companies in developing market particularly when resident country uses credit method. Some OECD, who use credit method, use tax sparing as part of their international tax strategy to

to foreign subsidiary of residential firm (OECD, 1998, p.11). However, once foreign income is paid to residential (parent) companies as dividend, interest or royalty, those incomes are subjected to home income tax and withholding tax at the source country.

strengthen its resident investors' competitiveness against local and other foreign competitors who could fully enjoy benefit of lower tax burden (OECD, 1998, p. 19). Competitiveness is extremely important especially in today's complex world where international transactions can be completed in a second and sellers are easier to find than buyers. According to Hines (testimony 2003, p. 3) when a firm operates in a low-tax country, it will benefit the most from tax granted by low-tax country if its resident country exempts foreign income of its resident companies. On the other hand, the firm might preserve very little tax benefits if its resident country gives foreign tax credit. As a result, firms from exemption-country would prefer to invest in a low-tax country while firms from credit-country prefer to invest in a high-tax country to obtain larger foreign tax credit. This could result in multinational companies' being unable to expand into certain markets due to competitive disadvantage. As mentioned earlier, a firm benefits the most from tax sparing when its residential country allows foreign tax credit. Because of that, the country with credit method should also allow tax sparing credit in order to help its residential firms to further expand and compete in the world market, especially when others provide tax exemption. Countries that exempt most of foreign incomes of its resident company are, for example, Germany, France, Canada and the Netherlands (Hines, testimony, 2006).

Thirdly, tax sparing opens investment opportunity. Small countries with limited domestic investment opportunities but with a number of resident multinational companies are more willing to agree on tax sparing with developing countries (OECD, 1998, p. 20) because tax sparing would facilitate low-cost investment expansion for residential firms in the treaty partner countries. Tax sparing provides a ground for global expansion of residential firms. In this countries, investment abroad of resident company is a complement to domestic investment. An example is Japan who reasons that it applies tax sparing credit system in order to preserve effect of tax incentives provided by developing countries (Ministry of Finance of Japan, 2005).

Finally, tax sparing can be used as a negotiating tools. It is obvious that

tax sparing is beneficial to capital-importing country as more foreign investment inflow is expected from tax sparing. As a result, in tax treaty negotiation sometimes developing country insists on developed country provision of tax sparing as a condition for tax treaty to be agreed. Tax sparing becomes a necessary condition for many OECD countries to get tax treaty agreed (OECD, 1998, pp. 19- 20). Nonetheless, strategy to use tax sparing as a negotiating tool does not seems to bear fruit especially when negotiating with the US. On the other hand, because granting tax sparing reduces tax revenue of resident country, as a result in exchange for provision of tax sparing, resident country normally requires reduction of withholding tax on interest, royalty and dividend from another treaty country (OECD, 1998, p. 19). One reason for failure to use tax sparing as a negotiating tool is that capital exporting country does not convince that treaty with tax sparing can influence overseas investment by its domestic firms. In America *"It is generally agreed that tax sparing will not increase United States investment abroad"* (Surrey, 1958a, p. 164). So, it is doubtful that American firm's global competitiveness will be improved by tax sparing. However, American companies, whose businesses are in countries that can not conclude tax treaty with the US due to tax sparing provision, begin to complain that their further investments in those countries are affected more by lack of country's tax treaty with the US than lack of tax sparing provision in the treaty (OECD, 1998, P. 25). Just like in other negotiating games, tax sparing can be a successful negotiating tool if its benefits, such as reduction in withholding taxes on repatriated incomes or increase in tax incentives for foreign investment, is worthy for another party to sacrifice their tax revenue.

4 Review of current literatures

Literature on tax sparing is limited and mainly focuses on effects of tax sparing agreement on foreign investments to developing country by developed country. Mucchielli, Azémar and Desbordes (2003) empirically find that Japanese busi-

nesses invest three times more in countries that have tax sparing agreements with Japan than in countries without such agreements. Hines (1998) states that tax sparing influences multinational company's choice of location and willingness of the host government to provide tax incentive. He compares Japanese and American foreign investment patterns and finds that Japanese companies invest more in the developing countries with whom Japan has tax sparing agreement and pay lower tax rate than their American competitors in those countries.

In contrast to the above two papers, Single (1999) finds that tax sparing has minimal effects on making tax holiday attractive to foreign investors. He studies the location decision of the U.S. multinational companies in relation with tax holiday provided by the host country. He provides an experimental case study of an electronic company's location decision between the two tax-holiday- giving host countries, one with tax sparing ratified with the U.S., the other without. Based on subject's responds, Single find that the host country's corporate tax rate and tax holiday are close in their relative importance in the company's location decision. In addition, the host country with tax holiday and tax sparing agreement is more attractive to the U.S. company even if that company can not immediately enjoy tax credit benefits. From his finding, nonetheless, he concludes that the results do not suggest that tax sparing would significantly increase an importance of the host country's tax holiday in the eye of the US investors and that the host country could be better off by introducing other investment incentives rather than trying to convince the U.S. to agree on tax sparing.

Moreover, some literature casts doubts on economic benefits of tax sparing to both host and home countries. Tanzi (2000) suggests that developing country's cost of revenue forgone from tax incentives can outweigh the incremental investment benefits that it expects to obtain as a result of tax incentives. In addition, difficulties in measuring economic costs and benefits of tax sparing and risks of tax avoidance make developed countries sceptical in giving tax sparing (Tanzi, 2000, p. 315). The possibility of tax sparing to be used as aggressive tax avoidance tools by multinational firms leads OECD to make recommendations to

its members regarding scopes and limitations of tax sparing to be agreed with developing countries (OECD, 1998 in Toaze (2001) p. 880). Furthermore, Blonigen and Davies (2002) find that foreign direct investment (FDI) even decreases after new treaties are ratified.

Empirical evidences from Hines (1998) and Mucchielli, Azémar and Desbordes (2003) show that there is a significant relationship between tax sparing and investment. However, most tax sparing literatures do not theoretically discuss why countries engage in tax sparing agreement in the first place, particularly economic reasons for tax sparing except that of Hines (1998). According to Hines, an introduction of tax sparing by home government stimulates host government to reduce tax rate and substitutes tax for non-tax investment incentives. However, his model does not explicitly show how tax sparing are determined. To fill this gap in the literature, we build our tax sparing models in order to explain how and when tax sparing exists.

In the next section we presents four different scenarios of tax sparing agreement emerging between two countries, home and host. Both countries compete for a fixed investment of a multinational firm. By having the home government compete for the firm's investment, we try to reflex the US fear of loosing its tax base to the host government. We want to investigate under what circumstances that tax sparing agreement can exist with this investment competition.

5 Theoretical models

This section is divided into four sub-sections beginning with assumptions and terminology used throughout our analyses. First we present a baseline model without tax sparing. Followed by four tax sparing models. The first two models are based on the assumption that the home government has no limit on foreign tax credit that its resident company can claim. While the following two models assume that the home government puts a limit on foreign tax credit. Finally, we presents conclusions drawn from our models.

5.1 Assumptions and Terminologies

1. A multinational company (here also called 'firm') is a resident company of country X with parent company in country X and a wholly own subsidiary in country Y. The firm decides on its production location between the home country X and the host country Y.

2. The firm's profit function in each countries is defined as

Profit function in host country Y; $\Pi = \Pi(\lambda) = \lambda^{1/2}$

Profit function in home country X; $\Pi = \Pi(1-\lambda) = (1-\lambda)^{1/2}$

where $\lambda \in [0, 1]$ is the proportion of firm's total production allocated to country Y.

4. The firm's total production is pre-determined by the markets and the firm's capacity and does not depends on tax rates.

5. The subsidiary in country Y repatriates all its after-tax profit back to its parent company in country X in terms of dividend payment. This assumption makes our model equivalent to a subsidiary being a foreign branch, when home country taxes worldwide income of its resident firm (residential rules).

6. Country income tax rates are bounded between 0 and 1 and

t_x denotes country X income tax rate,

t_y^* denotes country Y income tax rate before tax concession,

t_y denotes country Y income tax concession rate.

We assumes $t_x > t_y$ and $t_y \leqslant t_y^*$

7. Tax sparing rate $a \in [0, 1]$ is given on corporate income. When there is no tax sparing agreement, $a = 0$.

8. The home country levies income tax on worldwide profit of its resident company and allows foreign tax payment to be used as tax credit against company's tax liability at home. This assumption allows us to investigate the effects of tax sparing on firm's and government's reactions, since under foreign tax credit system tax sparing changes resident company's after-tax profits and government revenue. At the same time, tax sparing is irrelevant for both the firm and the governments when tax exemption is given on foreign income.

9. The home country uses 'credit method' to treat foreign income of its resident companies. Tax credit is normally limited to the lower of the amount of foreign tax paid and the amount of home country tax due on foreign income. The excess tax credit, if any, would normally be carried forward or backward and credited against tax liabilities in other tax years (Melville, 2003,p. 545).

We assume that without tax sparing the home country gives full-tax credit on foreign income of its resident company when $t_x > t_y$.

5.2 Baseline model

Based on the above assumptions, we start off with the case where countries have not agreed on tax sparing and country Y gives tax concession to attract investment (t_y).

Firm's profit before taxes

In country Y, $\Pi(\lambda) = \lambda^{1/2}$

In country X, $\Pi(1-\lambda) = (1-\lambda)^{1/2}$

Firm's profit after taxes

In country Y, $\Pi^y = (1-t_y)\Pi(\lambda) = (1-t_y)\lambda^{1/2}$

In country X, $\Pi^x = (1-t_x)\Pi(1-\lambda) = (1-t_x)(1-\lambda)^{1/2}$

According to our assumptions, a subsidiary in country Y repatriates all of its profit after income tax to the parent company in country X. Generally, the host country levies withholding tax on dividend repatriation of foreign subsidiary. However, we assumes throughout our analysis that the host country has no withholding tax on dividend.

5.2.1 Home treatment of foreign income

The home government taxes worldwide profit of its resident company and allows foreign tax credit. The home government calculates tax base of its resident company as the sum of its gross dividend received from the subsidiary in country Y and

its pre-tax profit at home. Since the subsidiary repatriates all of its after-income tax profits back to home, the home country tax base is,

$$\begin{aligned} \Pi &= \Pi(\lambda) + \Pi(1-\lambda) \\ &= \lambda^{1/2} + (1-\lambda)^{1/2} \end{aligned}$$

5.2.2 Country tax revenue

Since we assume $t_x > t_y$, the home country's tax credit allowance for foreign income of its resident company equals t_y. As a result, the home country tax revenue after foreign tax credit allowance is,

$$X = t_x(1-\lambda)^{1/2} + (t_x - t_y)\lambda^{1/2}$$

And host country tax revenue is, $Y = t_y\lambda^{1/2}$

5.2.3 The firm's maximisation problem

The firm maximises worldwide profit after taxes and tax credit.

$$\max_{0\leq\lambda\leq 1} \Pi = (1-t_x)(1-\lambda)^{1/2} + (1-t_x)\lambda^{1/2}$$

First order condition is,

$$\frac{\partial \Pi}{\partial \lambda} = \frac{0.5(1-t_x)}{\lambda^{1/2}} - \frac{0.5(1-t_x)}{(1-\lambda)^{1/2}} = 0$$

The solution for λ is given by $\lambda^0 = 1/2$.As a result, firm's worldwide profit after tax does not depend on the host country tax rate (t_y). And so, firm maximises its profit after tax by equally allocating its production in country X and Y.

So far there is no tax sparing in our model. In the following models, we introduce tax sparing and investigate if there is an equilibrium with positive tax sparing and country Y's tax reduction.

5.3 Governments take non-cooperative decisions

Our fist tax sparing model calls for a standard tax competition model with two stages game. At the second stage of this non-cooperative game, firm maximises its profit-after-taxes and chooses a proportion λ of its total production allocated to country Y. At the first stage, host country maximises its tax revenue giving firm's best responses. Home country simultaneously maximises its tax revenue and decides on tax sparing rate a given host country and firm's best responses. An equilibrium tax sparing rate is found using backward induction.

With tax sparing, firm maximisation problem becomes,

$$\begin{aligned}\max_{0\leq\lambda\leq 1}\Pi &\equiv (1-t_x)(1-\lambda)^{1/2}+(1-t_x-t_y+(at_y^*+(1-a)t_y))\lambda^{1/2}\\ &= (1-t_x)(1-\lambda)^{1/2}+(1-t_x+at_y^*-at_y)\lambda^{1/2}\end{aligned}$$

First order condition is,

$$\frac{\partial\Pi}{\partial\lambda}=\frac{0.5(1-t_x+at_y^*-at_y)}{\lambda^{1/2}}-\frac{0.5(1-t_x)}{(1-\lambda)^{1/2}}=0$$

The solution for λ is given by,

$$\lambda=\frac{(1-t_x+at_y^*-at_y)^2}{(1-t_x)^2+(1-t_x+at_y^*-at_y)^2} \tag{1}$$

Notice that when tax sparing is not agreed ($a=0$), expression (1) gives the baseline model result ($\lambda=1/2$).

Now, we investigate how the firm's investment decision changes with respect to change in a and t_y by taking partial derivatives of λ.

$$\frac{\partial\lambda}{\partial a}=\delta(t_y^*-t_y)-\frac{\delta^2(t_y^*-t_y)}{2}$$

$$\frac{\partial \lambda}{\partial t_y} = \frac{a\delta^2(1 - t_x + at_y^* - at_y)}{2} - a\delta$$

where $\delta = \frac{2(1-t_x+at_y^*-at_y)}{(1-t_x)^2+(1-t_x+at_y^*-at_y)^2}$

The above derivatives show that for $t_y^* > t_y$ firm's investment in country Y increases with an increase in tax sparing rate, $\frac{\partial \lambda}{\partial a} > 0$.And if firm's profit after taxes for its investment in country Y is positive, $0 < (1 - t_x + at_y^* - at_y) < 1$, and $t_y^* > t_y$ firm's investment in country Y decreases with an increase in country Y tax rate, $\frac{\partial \lambda}{\partial t_y} < 0$.

In the first stage, each government maximises its tax revenue. Country Y maximises its tax revenue and decides on optimal profit tax rate (t_y) given firm's optimal decision (λ) and country X tax rate (t_x). Country Y solves,

$$\max_{0<t_y\leq 1} Y \equiv t_y(\lambda)^{1/2} \tag{2}$$

Substituting (1) for λ gives,

$$\max_{0<t_y\leq 1} Y \equiv t_y \left[\frac{(1 - t_x + at_y^* - at_y)^2}{(1 - t_x)^2 + (1 - t_x + at_y^* - at_y)^2}\right]^{1/2}$$

First order condition is,

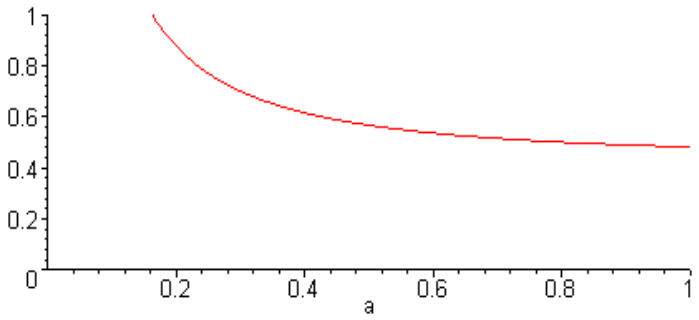
$$\frac{\partial Y}{\partial t_y} = (1 - t_x + at_y^* - at_y)^3 + (1 - t_x + at_y^* - 2at_y)(1 - t_x)^2 = 0 \tag{3}$$

We solve (3) for country Y optimal profit tax rate (t_y). To illustrate the result we consider the following numerical example:$t_x = 0.8$; $t_y^* = 0.5$. With these parameter values, the first order condition has one real-valued and two complex valued solutions for t_y.The real-value solution for t_y is,

$$t_y = \frac{0.033\theta + 0.5a + 0.2}{a} - \frac{0.8}{a\theta} \tag{4}$$

Where $\theta = (-270a - 108 + 10.39\sqrt{236 + 675a^2 + 540a})^{1/3}$

We then plot (4) in order to evaluate t_y corresponding to various tax sparing rate (a), $a \in [0, 1]$.



Since we assume $t_y \leqslant t_y^*$ and in our example $t_y^* = 0.5$, we equate (4) to 0.5 and solve for value of a which satisfies $t_y = 0.5$. This is to solve,

$$\frac{0.033\theta + 0.5a + 0.2}{a} - \frac{0.8}{a\theta} = 0.5$$

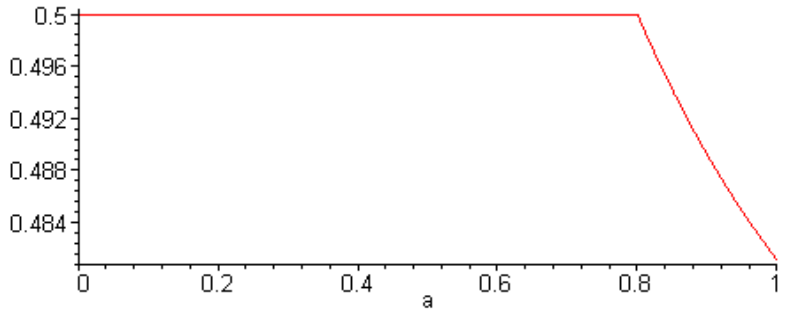
The solution for a which satisfies $a \in [0, 1]$ is,

$$\hat{a} = 0.8 \tag{5}$$

From the condition $t_y \leqslant 0.5$ and (5), the solution for country Y optimal income tax rate can be written as,

$$t_y = \begin{cases} t_y^* = 0.5 \text{ for } a \leqslant \hat{a} \\ \frac{0.033\theta + 0.5a + 0.2}{a} - \frac{0.8}{a\theta} \text{ for } a > \hat{a} \end{cases} \tag{6}$$

A following graph plot (6) against value of tax sparing rate, a.



In this first stage, country X also simultaneously and independently maximises its tax revenue given firm's and country Y's best responses. Country X solve,

$$\max_{0\leq a\leq 1} X \equiv t_x(1-\lambda)^{1/2} + (t_x - at_y^* - t_y + at_y)\lambda^{1/2} \tag{7}$$

Substituting firm's best respond (λ) from (1) into (7), we obtain country X problem,

$$\max_{0\leq a\leq 1} X \equiv \frac{t_x(1-t_x) + (t_x - at_y^* - t_y + at_y)(1 - t_x + at_y^* - at_y)}{\{(1-t_x)^2 + (1 - t_x + at_y^* - at_y)^2\}^{1/2}} \tag{8}$$

From (8) as long as $t_y < t_y^*$ country X revenue is decreasing in a and, so, country X chooses $a = 0$.As a result, tax sparing can not exist in a non-cooperative game.

5.4 Governments negotiate on tax sparing

Our second tax sparing model employs the same assumptions and terminology as the previous model. A major difference from the previous one is that in this model tax sparing ($a \in [0, 1]$) is bargained between countries X and Y in a bilateral tax treaty negotiation. This model appeals to a Nash bargaining process with two-stage game to solve for negotiated tax sparing. In a first stage, country X and Y bargain on tax sparing (a) given firm's optimal profit maximisation condition (λ) and country Y profit tax rate (t_y). In a second stage, firm maximises

global profit after taxes. Equilibrium is found using backward induction.

In the second stage firm maximises worldwide profit after taxes and tax credit and choose the proportion of investment in country Y. Because firm's problem is the same as in the first model, the optimal λ is the same as in (1).

In the first stage of Nash bargaining game, both governments maximise the Nash product of their tax revenues and negotiate on tax sparing rate (a). This maximisation problem is equivalently presented as,

$$a \in N \equiv \arg\max[\gamma \ln(X) + (1-\gamma)\ln(Y)] \tag{9}$$

where $\gamma \in [0,1]$ is a bargaining power of country X.

X is country X tax revenue

Y is country Y tax revenue

Substituting (7) for X and (2) for Y into (9), the objective function becomes,

$$a \in N \equiv \arg\max[\gamma \ln(t_x(1-\lambda)^{1/2} + (t_x - at_y^* - t_y + at_y)\lambda^{1/2}) + (1-\gamma)\ln(t_y\lambda^{1/2})] \tag{10}$$

To observe the change of the objective function with respect to change in tax sparing rate, we take total derivative of Nash product with respect to a.This gives,

$$\frac{dN}{da} = \frac{\partial N}{\partial \lambda}\frac{\partial \lambda}{\partial a} + \frac{\partial N}{\partial t_y}\frac{\partial t_y}{\partial a} + \frac{\partial N}{\partial a} \tag{11}$$

The partial derivatives of the objective function with respect to a and t_y are,

$$\frac{\partial N}{\partial a} = \frac{\gamma(t_y - t_y^*)\lambda^{1/2}}{t_x(1-\lambda)^{1/2} + (t_x - at_y^* - t_y + at_y)\lambda^{1/2}}$$

$$\frac{\partial N}{\partial t_y} = \frac{\gamma(a-1)\lambda^{1/2}}{t_x(1-\lambda)^{1/2} + (t_x - at_y^* - t_y + at_y)\lambda^{1/2}} + \frac{(1-\gamma)}{t_y}$$

From (11) when $t_y^* = t_y$, $\frac{\partial \lambda}{\partial a} = 0$, $\frac{\partial N}{\partial a} = 0$ and $\frac{\partial t_y}{\partial a} = 0$. As a result, the Nash

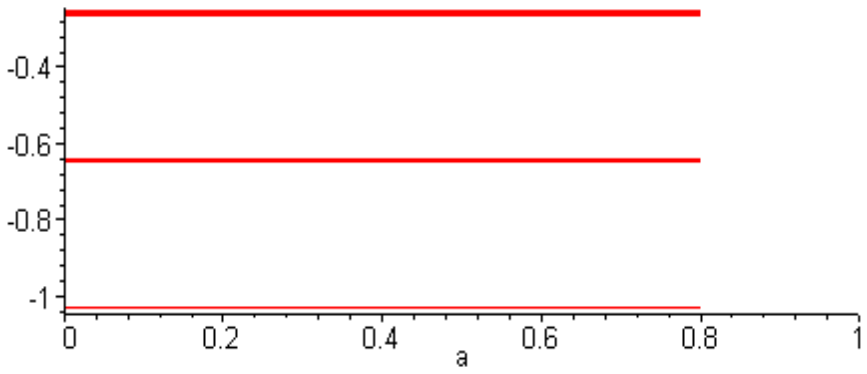
product is unchanged with the change in a.However, when $t_y^* > t_y$ the sign of the expression (11) is indecisive[4].

Before going to the negotiation table, country Y maximises tax revenue (Y) and by choosing the optimal profit tax rate (t_y) given firm's decision on λ and country X profit tax (t_x). Country Y solves,

$$\max_{0<t_y\leq 1} Y \equiv t_y \lambda^{1/2}$$

We continue our example from the previous model by assuming $t_x = 0.8$ and $t_y^* = 0.5$.The solution for optimal t_y is the same as in (6).

To illustrate solution for a we plot the objective function in (10) as a function of a, given $t_x = 0.8$, $t_y^* = 0.5$, λ from (1) and t_y from (6), for $\gamma = 0.1, 0.5$ and 0.99.



In the above graph, the upper the line, the higher γ.The graph shows that the objective function in the Nash bargaining game is not defined for the value of $a > 0.8$. Moreover, it can be inferred from the graph that the objective function increases when country X's bargaining power (γ) increases. The solutions for a for a given value of γ can be represented by each line in the graph.

[4]When $t_y^* > t_y$, $\frac{\partial \lambda}{\partial a} > 0$.
And if $(t_x - at_y^* - t_y + at_y) > 0$ and $\gamma > 0$, $\frac{\partial N}{\partial a} < 0$ and $\frac{\partial N}{\partial t_y} < 0$.

In our second model tax sparing can exist when both host and home country bargain for tax sparing. The agreed rate of tax sparing (a), however, does not depend on the bargaining power (γ) of country X. Moreover, equilibrium tax sparing rate can not be higher than the rate that would trigger country Y to reduce its tax rate, $a \leqslant \hat{a} \approx 0.8$. As a result, country Y tax rate is unchanged after the negotiation, $t_y = t_y^* = 0.5$.

Our example shows that tax sparing can exist in cooperative game between two countries. However, any agreed tax sparing still does not results in country Y tax rate reduction, which contradicts to what we observe in the real world.

In our next two models we assume that the home country put a limit on how much foreign tax credit can relief. We then investigate if, under the new assumption, there is an equilibrium with positive tax sparing and a reduction in country Y tax rate.

5.5 Non-cooperative case when home government puts limit on foreign tax credit

So far we have been assumed that the home government allows both actual and 'deemed' taxation the firm paid to the host government to be used against firm's tax liability at home without limit. In our next two models, however, we assume that the home government has put a limit on how much those actual and 'deemed' taxation can be claimed as a tax credit.

We introduce variable $\alpha \in [0, 1)$ which is defined as a proportion of foreign tax credit (both actual and deemed) that firm can claim against its current tax liability . Another interpretations for α is that when the home country employs 'Averaging foreign tax credit' method, which results in the firm not able to claim all of its foreign tax payment in country Y at the time. And so, the excess foreign tax credit, if any, is carried forward.

Our third model is an extension to the above non-cooperative case. We

start with the second stage of the game where firm maximises its worldwide profit after taxes and tax credit. Other things being equal, firm solves,

$$\max_{0\leq\lambda\leq 1}\Pi \equiv (1-t_x)(1-\lambda)^{1/2} + (1-t_x-t_y+\alpha(at_y^*+t_y-at_y))\lambda^{1/2} \tag{12}$$

First order condition of (12) is,

$$\frac{\partial\Pi}{\partial\lambda} = \frac{0.5(1-t_x-t_y+\alpha(at_y^*+t_y-at_y))}{\lambda^{1/2}} - \frac{0.5(1-t_x)}{(1-\lambda)^{1/2}} = 0$$

The solution for λ is,

$$\lambda = \frac{(1-t_x-t_y+\alpha(at_y^*+t_y-at_y))^2}{(1-t_x)^2+(1-t_x-t_y+\alpha(at_y^*+t_y-at_y))^2} \tag{13}$$

To investigate home firm's investment decision changes with the change in tax sparing rate, host country's tax rate and home country's claiming limitation rule. We take partial differentiations of λ with respect to a, α and t_y. The results show that for $t_y < t_y^*$ firm's investment decision reacts positively with changes in tax spring rate (a) and home country's claim limitation (α), $\frac{\partial\lambda}{\partial a} > 0, \frac{\partial\lambda}{\partial\alpha} > 0$. While it reacts negatively with the host country tax rate (t_y), $\frac{\partial\lambda}{\partial t_y} < 0$.

In the first stage, each government maximises its tax revenue. Country Y maximises its tax revenue by choosing the optimal profit tax rate (t_y) given firm's optimal decision (λ) and country X tax rate (t_x). Country Y solves,

$$\max_{0<t_y\leq 1} Y \equiv t_y(\lambda)^{1/2}$$

Substituting (13) for λ gives,

$$\max_{0<t_y\leq 1} Y \equiv t_y \frac{1-t_x-t_y+\alpha(at_y^*+t_y-at_y)}{\left[(1-t_x)^2+(1-t_x-t_y+\alpha(at_y^*+t_y-at_y))^2\right]^{1/2}} \tag{14}$$

First order condition is,

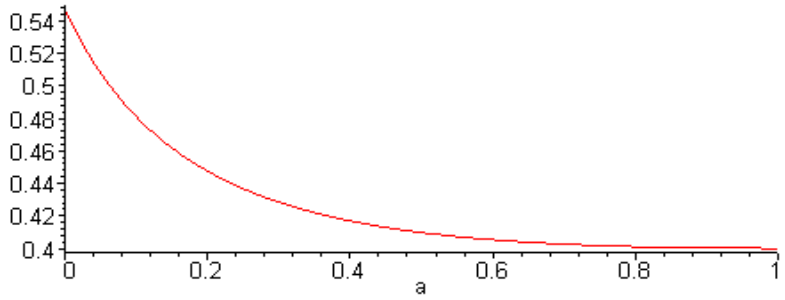
$$\frac{\partial Y}{\partial t_y} = (1-t_x-t_y+\alpha(at_y^*+t_y-at_y))^3+(1-t_x)^2(1-t_x-t_y+\alpha(at_y^*+t_y-at_y)-t_y+\alpha t_y-a\alpha t_y) = 0 \tag{15}$$

To illustrate solution for t_y , we consider the following numerical example: $\alpha = 0.8; t_x = 0.8$ and $t_y^* = 0.5$.With these parameter values, the first order condition has one real-valued and two complex-valued solutions for t_y.The real-valued solution for t_y is,

$$t_y = \frac{0.16\beta}{(64a^3+48a^2+12a+1)^{1/3}} - \frac{4(64a^3+48a^2+12a+1)^{2/3}}{(4a+1)^2\beta} + \frac{(2a+1)}{(4a+1)} \tag{16}$$

Where $\beta = (-216a-108+20.78\sqrt{108a^2+108a+59})^{1/3}$

We plot (16) in order to evaluate t_y corresponding to various tax sparing rate (a), $a \in [0,1]$.This shows,



Since we assume $t_y \leqslant t_y^*$ and in our example $t_y^* = 0.5$, we equate (16) to 0.5 and solve for value of a which satisfies $t_y = 0.5$. This is to solve,

$$\frac{0.16\beta}{(64a^3+48a^2+12a+1)^{1/3}} - \frac{4(64a^3+48a^2+12a+1)^{2/3}}{(4a+1)^2\beta} + \frac{(2a+1)}{(4a+1)} = 0.5 \tag{17}$$

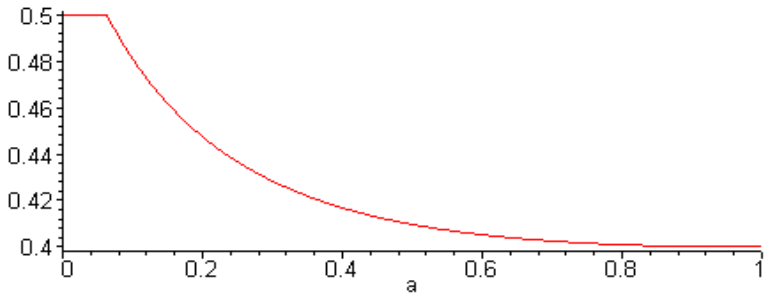
Solving (17) gives,

$$\hat{a} = 0.06 \tag{18}$$

From the condition $t_y \leqslant 0.5$ and (18), the solution for country Y income tax rate can be written as,

$$t_y = \begin{cases} t_y^* = 0.5 \text{ for } a \leqslant 0.06 \\ \frac{0.16\beta}{(64a^3+48a^2+12a+1)^{1/3}} - \frac{4(64a^3+48a^2+12a+1)^{2/3}}{(4a+1)^2\beta} + \frac{(2a+1)}{(4a+1)} \text{ for } a > 0.06 \end{cases} \tag{19}$$

A following graph show t_y as a function of a.



In this first stage, country X simultaneously and independently maximises its tax revenue given firm's and country Y's best responses. Country X solves,

$$\begin{aligned} \max_{0\leq a\leq 1} X &\equiv t_x(1-\lambda)^{1/2} + (t_x - \alpha(at_y^* + t_y - at_y))\lambda^{1/2} \\ &= \frac{t_x(1-t_x) + [(t_x - \alpha(at_y^* + t_y - at_y)(1 - t_x - t_y + \alpha(at_y^* + t_y - at_y)]}{[(1-t_x)^2 + (1 - t_x - t_y + \alpha(at_y^* + t_y - at_y))^2]^{1/2}} \end{aligned} \tag{20}$$

From (20) for$t_y < t_y^*$, country X revenue is decreasing in a and, again, country X chooses $a = 0$. Moreover, when $t_y = 0.5$, country X revenue equals 0.89 and is irrelevant of value of a.As a result, tax sparing can not exist in a non-cooperative game.

5.6 Negotiation case when home government puts limit on foreign tax credit

The last model is an extension of our second model where home and host countries negotiate on tax sparing rate. Like in the third model, other things being equal, the home government put limit on firm's claimed foreign tax credit (α). This model appeals a Nash bargaining process with two-stage game to solve for negotiated tax sparing. Equilibrium is found using backward induction.

In the second stage, firm maximises worldwide profit after taxes and tax credit and chooses the amount of capital to invest in country Y. The firm's problem is the same as in the previous model which expresses in (12). As a result, firm's optimal λ is also the same as shown in (13).

Before going to the negotiation table, in the first stage of the game, country Y maximises tax revenue and decides on optimal profit tax rate (t_y). Country Y maximisation problem is the same with the previous model and is expressed in (14).

Also in the first stage of Nash bargaining game, both governments maximise the Nash product of their tax revenues and negotiate on tax sparing rate (a). This maximisation problem is algebraically presented as,

$$a \in \arg\max[\gamma \ln(X) + (1-\gamma)\ln(Y)]$$

where γ is a bargaining power and defines between $[0, 1]$.

X is country X tax revenue

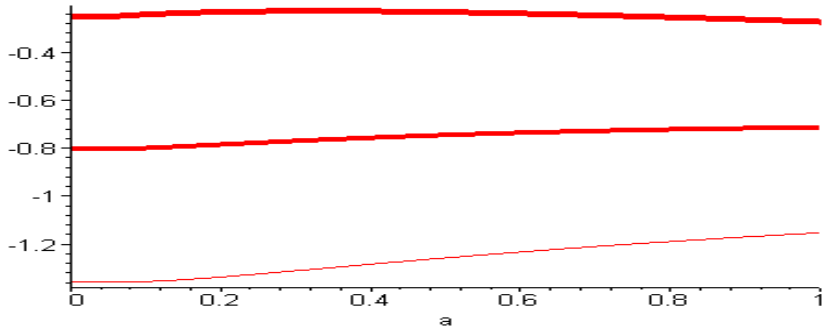
Y is country Y tax revenue

Substituting (20) for X and (14) for Y, the above objective function becomes,

$$\begin{aligned} a \in \arg\max[\gamma \ln & \left(\frac{t_x(1-t_x) + [(t_x - \alpha(at_y^* + t_y - at_y)(1 - t_x - t_y + \alpha(at_y^* + t_y - at_y)]}{[(1-t_x)^2 + (1 - t_x - t_y + \alpha(at_y^* + t_y - at_y))^2]^{1/2}} \right) \\ & + (1-\gamma)\ln \left(t_y \frac{1 - t_x - t_y + \alpha(at_y^* + t_y - at_y)}{\left[(1-t_x)^2 + (1 - t_x - t_y + \alpha(at_y^* + t_y - at_y))^2\right]^{1/2}} \right) \end{aligned} \tag{21}$$

In line with numerical examples presented in our previous model, now we consider a case where $\alpha = 0.8$, $t_x = 0.8$ and $t_y^* = 0.5$. As a result, country Y optimal tax rate is the same as in (19) and also the tax sparing rate ($\hat{a}$) which triggers country Y tax rate reduction equals to $\hat{a} = 0.06$.

To find solution for a we plot the objective function shown in (21) as a function of a given $\alpha = 0.8$, $t_x = 0.8$, $t_y^* = 0.5$ and $t_y =$ (19) for $\gamma = 0.1, 0.5$ and 0.9. This shows,



The thicker the line, the higher γ. The above graph shows that the higher country X's bargaining power (γ), the lower equilibrium tax sparing rate. And in all cases, the equilibrium tax sparing rates are higher than 0.06 even when country X has most of the bargaining power ($\gamma = 0.9$). As a result,it is possible to have a solution for tax sparing which triggers country Y tax rate reduction.

6 Conclusions

We observe tax sparing provision in bilateral tax treaty between developed and developing countries. However, it seems that there has never been theoretically explained why the developed country who are the source or investor's country agrees on tax sparing. Even if it means losing its tax base at home. As a result, this paper is trying to shed some light on this issue.

From our models, we conclude that the equilibrium tax sparing with host country's tax rate reduction can exist in the world with cooperative negotiation between two countries where the home country put a limit on the proportion of foreign tax credit that its resident company can claim against its tax liability at home. The United Kingdom, the U.S., Japan, Denmark, Portugal and Spain are among countries who limit foreign tax credit allowance to be not greater than domestic tax liabilities. German and Ireland offer a choice between tax deduction and limited tax credit (note. 3 in Scharf, 2001,p. 466). Besides tax sparing is provided under bilateral tax treaty. As a result, our conclusions are not far from the real world phenomenon. Lastly, the higher the home country's bargaining power, the lower equilibrium tax sparing.

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