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A NOTE ON KANBUR AND KEEN: TRANSFERS TO SUSTAIN FISCAL COOPERATION*

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Abstract

We analyze the two-country model of fiscal competition of Kanbur and Keen (1993) where countries differ in size and use a commodity tax to reach their objective of revenue maximization. Due to fiscal externalities, the non-cooperative outcome is inefficient. Besides, the international optimum could be individually irrational for the smaller country compared to the non-cooperative equilibrium.

The purpose of this paper is to examine whether the international optimum can be reached and sustained by means of financial transfers between the countries as suggested in another context by Chander and Tulkens (1995, 1997).

We show that with transfers of a specific form internationally optimal fiscal cooperation is indeed individually rational for both countries and, in that sense, sustainable. Furthermore, we show that these transfers can be such that the optimal outcome is, under some conditions, a dominant strategy for both countries.

Keywords: Indirect Taxation, Asymmetric Countries, Tax Competition, Transfers, Cooperation, Nash Equilibrium
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1 Introduction

We analyze a two-country model of fiscal competition where countries differ in size and use a commodity tax to reach their objective of revenue maximization. At the Nash equilibrium the small country undercuts the tax rate of the large country and aggregate tax revenue is smaller than the level that would be reached at the international optimum. Indeed, fiscal externalities are a source of inefficiency. This model illustrates the problem of harmful tax competition and emphasizes the role of country size in the existence of tax heavens.

Kanbur and Keen (1991, 1993) have examined two forms of tax coordination to reduce such inefficiency: tax harmonization (a common tax rate is set between the two Nash equilibrium tax rates) and agreement on a minimal tax rate. Although in both cases joint revenue is higher than at the Nash equilibrium, it is still lower than at the international optimum. Furthermore, the first solution would never be accepted by the small country as it yields lower tax revenue to her than at the Nash equilibrium.

The purpose of this paper is to examine if the international optimum can be reached and sustained when introducing the possibility of financial transfers between the countries: this possibility was not taken into account by Kanbur and Keen (1991, 1993), but it is suggested in the context of environmental externalities by Chander and Tulkens (1995, 1997).

Several authors (Boadway and Flatters (1982), Köthenbürger (2002) and Bucovetsky and Smart (2003)) have examined the role of equalization transfers to correct fiscal externalities in different models of tax competition. They present the result that the collective optimum can be restored, but as they do not examine if the resulting solution is individually rational, one can not conclude that the optimum is sustainable. It is important to note that their models consider tax competition and financial transfers between regions of a federation. This explains why they are not interested in the individual rationality of such corrective mechanisms. Indeed, for such mechanisms to be accepted, and therefore to be sustained, it is important to take into account the alternative behavior that the players can adopt, or in other words to know what their fall-back position is. If a region of a federation is not better off with the introduction of financial transfers than in a context of tax competition without transfers, the only way to escape is to secede. And we know that secession is costly and constrains, up to a certain point, the country to cooperate. If we turn to tax competition between sovereign countries, like in the European Community for instance, the story is quite different. The goal is now to convince, through a mechanism of financial transfers, all countries to cooperate in a way to reach the international optimum. For the mechanism to be accepted, all countries should be better off with the transfer scheme because the fall-back position is simply the status quo which is costless. Therefore, in an international context, and contrarily to a federal context, individual rationality is crucial.

We show that transfers of a specific form can make fiscal cooperation individually rational and, in that sense, sustainable: the internationally optimal tax rates are set and joint revenue is at its maximum. Furthermore, we show that these transfers can be such that optimal tax rates are, under some condition, a dominant strategy for both countries.

The paper is organized in five further sections. Section 2 deals with fiscal competition and fiscal cooperation between symmetric countries. Section 3 shows how the results of the model are modified when asymmetry is introduced. It examines competition, cooperation and especially the case where fiscal cooperation is not individually rational for one of the countries. Section 4 defines transfers that would insure individually rational fiscal cooperation. Section 5 determines the condition under which a specific form of transfers induces the optimal outcome as a dominant strategy. Section 6 concludes.

2 The case of two symmetric countries

2.1 Fiscal competition

The model, based on the model of Kanbur and Keen (1991, 1993), is a partial-equilibrium one of tax competition between two countries with a single taxed good. The two countries, "home" and "foreign", lie on the interval $[-1, 1]$ with a border between them at the origin. Within each country, the population is distributed uniformly and the two populations h and H are equal in size. Each store charges the tax rate of the country in which it is located.

Each consumer buys one unit of the commodity if the price she pays is less than or equal to her reservation price; otherwise she buys none. Reservation price v is identical in both countries. The producer price of the commodity is constant and the same in both countries. Defining the reservation price net of this producer price, the consumer price charged at any store can be taken to be the tax imposed in that jurisdiction. These taxes (in unit form) are denoted t and T.

The decision problem of a consumer in the home country is to purchase in her own country at price t or to travel to the border and purchase it at price T. Traveling to the border (and back) entails a cost of $\delta > 0$ per unit distance from the frontier. If a consumer is located at a distance s from the border, she will cross-border shop if and only if two conditions are satisfied:

$$T + \delta s < t \tag{1}$$

and

$$v - T - \delta s > 0. \tag{2}$$

If $v > t > T$, all residents of the home country living farther than $(t - T)/\delta$ from the border shop at home while the rest cross-border shop. So long as $v \geq T$, all foreign consumers purchase in their own country.

Having described the economy, we can define a game where the players are the governments of the two countries, the strategies are their respective commodity taxes (t, T) and the payoffs are their tax revenues (r, R).

Given (1), the revenue of the home country is:

$$r(t,T) = \begin{cases} th\{1 - (\frac{t-T}{\delta})\} & t \geq T \\ \\ th + tH(\frac{T-t}{\delta}) & t \leq T. \end{cases} \tag{3}$$

Maximizing $r(t, T)$, taking as given the tax rate of the foreign country, the form of the home country's reaction function is :

$$t(T) = \frac{1}{2}(\delta + T). \tag{4}$$

Because the two countries are symmetric, a symmetric function holds for the foreign country, namely:

$$T(t) = \frac{1}{2}(\delta + t). \tag{5}$$

Assuming $v = +\infty$, there exists a unique Nash equilibrium (t^N, T^N) such that:

$$t^N = T^N = \delta. \tag{6}$$

The same pair (t^N, T^N) is the unique Nash equilibrium when reservation prices are finite, under the assumption that $\delta < v$. This means that if the good were to be given away free in one country, then all consumers would derive positive surplus by travelling to the border to collect it (see Kanbur and Keen (1991) for the proof).

Because tax rates are identical at the Nash equilibrium with symmetric countries, no cross-border shopping takes place and the payoffs, obtained from (3) and (6), are:

$$r^N = \delta h = \delta H = R^N \tag{7}$$

2.2 Fiscal cooperation

If the two countries were to cooperate, they would maximize joint revenue subject to $t \leq v$ and $T \leq v$ (setting the tax rate higher than the reservation price would lead to zero revenue). The nature of the cooperative symmetric optimum is then immediate: each government will extract all the surplus of its own citizens by setting its tax at the level of the reservation price; that is:

$$t^C = T^C = v.$$

As a consequence:

$$r^C = v.h \qquad \text{and} \qquad R^C = v.H. \tag{8}$$

Such a cooperation agreement strictly increases joint revenue as well as both individual revenues because from (7) and (8), remembering $\delta < v$, we have:

$$r^C + R^C = vh + vH \quad > \quad r^N + R^N = \delta h + \delta H.$$

Thus, in the case of symmetric countries, fiscal cooperation is individually rational and, in that sense, sustainable.

3 The case of two countries asymmetric w.r.t. population size

We now turn to the case of asymmetric countries, which differ in their population size. Note that the reservation price remains uniform across countries[1].

We examine how the model is changed by introducing $\frac{h}{H} = \theta < 1$. This means that the home country has a smaller population than the foreign country.

[1]For a discussion of the effects of asymmetric reservation prices, see the fifth section of Kanbur and Keen (1993). In that paper, the authors drop the convention that $\theta < 1$. Therefore, their results on that point are of little interest to us.

3.1 Fiscal competition

The expression of tax revenues in (3) remains exactly the same, but the reaction function of the smaller home country becomes

$$t(T) = \begin{cases} \frac{1}{2}(\delta + T) & T \leq \delta\sqrt{\theta} \\ \\ \frac{1}{2}(\delta\theta + T) & T \geq \delta\sqrt{\theta} \end{cases}$$

and the reaction function of the larger foreign country becomes

$$T(t) = \begin{cases} \frac{1}{2}(\delta + t) & t \leq \delta \\ \\ t & \delta \leq t \leq \delta/\theta \\ \\ \frac{1}{2}(\delta/\theta + t) & t \geq \delta/\theta. \end{cases}$$

There is a fundamental asymmetry between the reaction functions of the small country and the large country (see Kanbur and Keen (1991) for the proof).

The discontinuity in the reaction function of the small country makes the existence of a Nash equilibrium problematic. Nevertheless, Kanbur and Keen state (and prove) the following results.

a) Assuming $v = +\infty$, there exists a unique Nash equilibrium. The equilibrium taxes are

$$t^N = \delta \left[\frac{1}{3} + (\frac{2}{3})\ \theta\right] \tag{9}$$

$$T^N = \delta \left[\frac{2}{3} + (\frac{1}{3})\ \theta\right] \tag{10}$$

b) To dispense with the assumption of an infinite reservation price, it is sufficient to introduce the assumption that $\delta < v$ and then for any reservation price satisfying this assumption, the same pair (t^N, T^N) as (9) and (10) is the unique Nash equilibrium.

In equilibrium, the small country strictly undercuts the large country as is shown by

$$T^N - t^N = \frac{\delta}{3}\ (1 - \theta) > 0.$$

And the tax revenues at the Nash equilibrium are:

$$r^N = \delta H \left(\frac{1 + 2\theta}{3} \right)^2 \tag{11}$$

$$R^N = \delta H \left(\frac{2 + \theta}{3} \right)^2 . \tag{12}$$

The intuition behind this result is simple. Starting from a situation of uniform tax rates, for each countries a decrease in their tax rate compared to the rate of the foreign country reduces the tax revenue paid by its own citizens. But in the small country, and up to a certain point, this reduction is overcompensated by the tax revenue paid by additional cross-border shoppers. For the large country this is not the case. This difference explains why the small country has an incentive to undercut the tax rate of the large one.

3.2 Fiscal cooperation: Is it collectively rational?

If the two asymmetric countries were to cooperate (i.e. to choose together t and T so as to maximize joint fiscal revenue), they would choose tax rates at the same level as in the case of cooperating symmetric countries[2]: $t^C = T^C = v$. As a consequence, the cooperative solution leads to the following tax revenues:

$$r^C = v.h \tag{13}$$

$$R^C = v.H \tag{14}$$

Does fiscal cooperation lead to higher aggregate tax revenue than at the Nash equilibrium? This would be true if:

$$(r^C + R^C) - (r^N + R^N) > 0, \tag{15}$$

that is, if cooperation leads to a positive collective surplus.We thus have to show that, using (11) to (14):

[2]Proof that $t = T = v$ maximizes $r + R$.
If $t = T = v$, then $r + R = vh + vH$.
If $t = T < v$, then $r + R = th + TH < vh + vH$.
If $t < T = v$, then $r + R = th + vH - \frac{H}{\delta}(v - t)^2 < th + vH < vh + vH$.
If $t > T = v$, then $r + R = vH < vh + vH$.
If $t < T < v$, then $r + R = th + TH - \frac{H}{\delta}(T - t)^2 < th + TH < vh + vH$.

$$(vh + vH) - \delta H \left[\left(\frac{1+2\theta}{3} \right)^2 + \left(\frac{2+\theta}{3} \right)^2 \right] > 0,$$

which is equivalent to

$$v(1+\theta) > \delta \left[\left(\frac{1+2\theta}{3} \right)^2 + \left(\frac{2+\theta}{3} \right)^2 \right].$$

Having in mind the condition that $v > \delta$, this inequality holds if

$$(1+\theta) \geq \left[\left(\frac{1+2\theta}{3} \right)^2 + \left(\frac{2+\theta}{3} \right)^2 \right],$$

or

$$4 + \theta - 5\theta^2 \geq 0.$$

This is always true when $\theta \in [0, 1]$, which is the case considered here.

We may thus conclude that, in this model, fiscal cooperation at the international level is collectively beneficial.

3.3 Is fiscal cooperation individually rational?

Although aggregate tax revenue is higher at the cooperative solution, is it the case that *both* countries are better off ?

The large country is always better off with fiscal cooperation than with fiscal competition modeled as a Nash equilibrium. Indeed, because $v > \delta$ and $\theta \in [0, 1]$, we have:

$$R^C - R^N = vH - \delta H \left(\frac{2+\theta}{3} \right)^2 > 0.$$

On the contrary, the small country may get higher tax revenue at the Nash equilibrium than with fiscal cooperation. This is the case if:

$$r^N - r^C = \delta H \left(\frac{1+2\theta}{3} \right)^2 - hv > 0 \tag{16}$$

This inequality is verified if

$$\theta < \frac{1}{8} \left(-4 + 9\frac{v}{\delta} - 3\sqrt{\frac{v}{\delta}} \sqrt{9\frac{v}{\delta} - 8} \right). \tag{17}$$

One interpretation of (17)[3] is that when $\frac{v}{\delta}$ tends to 1, the threshold value of θ under which $r^N > r^C$ tends to 1/4. Or, in other words, when the unitary transport cost tends to the value of the reservation price, the small country prefers the Nash equilibrium to the cooperative solution if its population size is smaller than 1/4 the size of the large country. This result is appealing when we think of the small size of famous tax heavens (Luxembourg, Andorra...). It is common knowledge that it is difficult to convince tax heavens to join in a fiscal cooperation agreement[4]. The reason could be in the spirit of what is shown above.

Thanks to (17) one can also state that the smaller the unitary transport cost, given the reservation price, the lower the threshold will be. According to this analysis one could thus predict that in a world where transport costs are continuously decreasing, countries will be more and more likely to cooperate on indirect taxation if the relative size of the countries remains unchanged.

This result could seem counterintuitive at first sight because the intuition is that reduced transportation costs make it easier for tax heavens to attract cross-border shoppers and to benefit from this increased tax base. This model brings three elements of response. First, the extent of cross-border shopping is independent of transport costs. Indeed, the amount of cross-border shopping is $(T^N - t^N)/\delta$ and T^N and t^N are defined by (9) and (10). Second, while reduced transport costs do not influence the amount of cross-border shopping, it is true that it increases the externalities and reduces tax revenues of each country (see (11) and (12)). Third, tax revenues collected at the cooperative equilibrium are independent of transport costs (see (13) and (14)). It is then easier to understand that when unitary transport costs decrease, Nash equilibrium revenues decrease while cooperative solution revenues remain constant. The incentive to cooperate is thus inversely related to transport costs.

4 Transfers as a solution when fiscal cooperation is not individually rational

Kanbur and Keen (1991, 1993) assert that the international optimum can not be reached. However, they have not considered the possibility of organizing

[3]The RHS of the inequality is always positive when $v > \delta$.

[4]See Haufler (2001), chapter 2, for some convincing figures.

financial transfers between the two asymmetric countries in order to sustain fiscal cooperation. We show here that using this possibility would enable both countries to agree on fiscal cooperation, even if θ is below the threshold under which cooperation is not individually rational to the small country.

The intuition behind the Chander and Tulkens (1995, p.287) transfer scheme, that inspires what follows, is simple: such transfer scheme, combined to optimal tax rates, guarantees to each country (i) that it gets as much tax revenue as it would get at the Nash equilibrium, and (ii) that in addition a positive share is obtained from the collective surplus, identified in (15), made available by cooperation. In this way, fiscal cooperation with transfers is made individually rational for both countries.

4.1 A general formulation

The following form of transfers, respectively to the small and to the large country, is proposed:

$$\begin{aligned} d^* &= -(r^C - r^N) + \alpha\left[(R^C + r^C) - (R^N + r^N)\right] \\ &= (1-\alpha)\left[\delta H\left(\frac{1+2\theta}{3}\right)^2 - vh\right] + \alpha\left[vH - \delta H\left(\frac{2+\theta}{3}\right)^2\right] \end{aligned} \tag{18}$$

and equivalently

$$D^* = -(R^C - R^N) + (1-\alpha)\left[(R^C + r^C) - (R^N + r^N)\right] \tag{19}$$

where $\alpha \in [0,1]$ and r^C, R^C are defined by (13) and (14) and r^N, R^N by (11) and (12). Note that $d^* + D^* = 0$.

At what we will call the *cooperative equilibrium with transfers (CT)* , tax rates are both set at v and the small and the large countries each get r^C and R^C plus, respectively, the transfers d^* and D^* .

$$r^{CT} = r^C + d^*$$

$$R^{CT} = R^C + D^*$$

To interpret (18) and (19) we must distinguish two cases.

First, the case where $\theta < \frac{1}{8}\left(-4 + 9\frac{v}{\delta} - 3\sqrt{\frac{v}{\delta}}\sqrt{9\frac{v}{\delta} - 8}\right)$(we will henceforth use the notation $\widetilde{\theta}$ for this threshold value of θ). In such a case, we have shown in section 3.3 that $r^N > r^C$. And because α and the surplus from cooperation, $\left[(R^C + r^C) - (R^N + r^N)\right]$, are always positive, we know that $d^* > 0$. Because $d^* + D^* = 0$, D^* is necessarily negative. This means that when θ is such that it is a priori not individually rational for the small country to cooperate, cooperation is sustainable if the large country transfers money to the small country. As a consequence, the large country gets less than at the cooperative equilibrium without transfers, but still gets more than at the Nash equilibrium. The small country gets at least as much as at the Nash equilibrium plus the transfer, the importance of the transfer depending on the value of α.

Second, the case where $\theta > \widetilde{\theta}$. In this case, $r^N < r^C$ and the signs of d^* and D^* only depend on the value of α. In any case, as long as $\alpha \in [0, 1]$, cooperation with transfers is individually rational for both countries even if one of them incurs a negative transfer.

4.2 A proposal for a specific value of α

In fact, when $\theta > \widetilde{\theta}$ cooperation is individually rational even without transfers. It is then not anymore necessary to organize transfers. Therefore, we propose a value for α such that the transfers are automatically reduced to 0 when $\theta > \widetilde{\theta}$ but still play their role when $\theta < \widetilde{\theta}$. This is possible by setting

$$\widetilde{\alpha} = \frac{\left| r^C - r^N \right|}{(R^C + r^C) - (R^N + r^N)}.$$

Note that $\widetilde{\alpha}$ always belongs to the interval $[0, 1]$.

By introducing $\widetilde{\alpha}$ in (18) and (19) one verifies that the transfers are canceled when $r^C > r^N$. But when $r^C < r^N$, the transfer is positive for, i.e. is received by, the small country and negative for, and then paid by, the large country.

Because any value of α between 0 and 1 makes cooperation with transfers individually rational, there is no contraindication to choose this specific value for that parameter.

4.3 A more familiar formulation: revenue sharing

The advantage of the form of transfers proposed above is that it brings to the fore the role played by the Nash equilibrium revenues and by the surplus from cooperation. But such a form is quite unusual in the literature on tax cooperation and we propose here a formulation that follows the same reasoning structure as above but sounds more familiar: revenue sharing (see Figuières, Hindriks and Myles (2003) for instance). The principle of revenue sharing (RS) is that the tax revenues of all regions (or countries) are summed up and redistributed according to a specific sharing rule.

In our setting, it is possible to define a sharing rule, where $\beta \in [0,1]$ is the share of the small country and $(1-\beta)$ the share of the large one, having the characteristic that the international optimum is individually rational.

We use the following notation:

$$\begin{aligned} r^{RS} &= \beta(vh+vH) \\ R^{RS} &= (1-\beta)(vh+vH). \end{aligned}$$

For the revenue sharing mechanism to be individually rational, it must verify that $r^{RS} \geq r^N$ and $R^{RS} \geq R^N$, or, using (11) and (12):

$$\begin{aligned} \beta(vh+vH) &\geq \delta H\left(\frac{1+2\theta}{3}\right)^2 \\ (1-\beta)(vh+vH) &\geq \delta H\left(\frac{2+\theta}{3}\right)^2. \end{aligned}$$

We are then able to define the following conditions on β:

$$\frac{\delta H\left(\frac{1+2\theta}{3}\right)^2}{(vh+vH)} \leq \beta \leq 1-\frac{\delta H\left(\frac{2+\theta}{3}\right)^2}{(vh+vH)}. \tag{20}$$

Note that the value of β lies between 0 and 1.

5 Can transfers induce optimal tax rates as a dominant strategy?

The former section assumes that fiscal cooperation works as follows: both countries commit to fix their tax rate at v, and the transfers d^* and D^* are made.

It would be preferable that the form of transfers be such that cooperation be a dominant strategy with no commitment being needed.

We show hereafter that, under the condition that $\delta < v < \frac{\delta}{3}(4+2\theta)$, it is possible that cooperation be a dominant strategy when the transfers have the following form:

$$d^{**} = -(r(t,T)-r^N)+\alpha\left[(R(t,T)+r(t,T))-(R^N+r^N)\right] \tag{21}$$

$$D^{**} = -(R(t,T) - R^N) + (1-\alpha)\left[(R(t,T) + r(t,T)) - (R^N + r^N)\right]. \quad (22)$$

Indeed, the problem of the small country now reads:

$$\max_t \; r(t,T) + d^{**}$$

which is equivalent to maximizing $R(t,T) + r(t,T)$.

To this effect, for any given T, the small country has no incentive to set $t < T$ because then, for any $\varepsilon > 0$,

$$r + R = (T - \varepsilon)h + TH - \frac{H}{\delta}\varepsilon^2 < Th + TH.$$

For any given T, the small country has an incentive to set $t > T$ as long as

$$r + R = (T + \varepsilon)h + TH - \frac{h}{\delta}\varepsilon^2 > Th + TH.$$

This is true for $\varepsilon < \delta$.

We are then able to say that the small country sets its tax rate at the international optimum value v if it maximizes $r(t,T) + d^{**}$, and this is true when $v - T = \varepsilon < \delta$, or $T > v - \delta$. This means that there could be a case where T is so low that if the small country sets t equal to v, its tax revenue is smaller than at a lower value of t, but if T is not so low, the international optimum is a dominant strategy of the small country.

How low can T be ? We need to define a fall-back position for a non co-operating country. Let us assume that the lowest tax rate the large country would choose if it was not to cooperate is not lower than T^N as defined by (10). This assumption is similar to the assumption made by Currarini and Tulkens (2004) in a game with environmental externalities. We must then check whether $T^N > v - \delta$, that is whether:

$$T^N = \delta \; \left[\frac{2}{3} + (\frac{1}{3}) \; \theta\right] > v - \delta.$$

This inequality is verified if:

$$v < \frac{(5+\theta)\delta}{3}. \quad (23)$$

We now apply the same reasoning to the large country choosing its tax rate, given the transfer and the tax rate of the small country. We get the following condition for v to be the dominant strategy of the large country:

$$v < \frac{\delta}{3}(4 + 2\theta). \tag{24}$$

When $\theta \in [0, 1]$, this second condition (24) is more restrictive than the former (23). Therefore, this single condition is kept. Remembering the assumption of the model that $v > \delta$, we rewrite the conditions as follows:

$$\delta < v < \frac{\delta}{3}(4 + 2\theta).$$

Thus when the reservation price is larger than the unitary transport cost, but not too large, it is possible to design transfers, d^{**} and D^{**}, such that the optimal tax rates are a dominant strategy[5].

In other words, compared to the game defined in section 2.1 the introduction of transfers changes the payoffs of the players and therefore the game. For the new game with transfers (21) and (22), the players' tax strategies at the non cooperative (Nash) equilibrium appear to be exactly the same as those of the international optimum without transfers. This property reinforces the cooperative nature of such optimum.

6 Conclusion

The first goal of this paper was to show that the international optimum w.r.t. indirect taxation is sustainable when tax rates are set cooperatively and a specific form of international transfers is introduced, because these transfers make fiscal cooperation individually rational. This exercise is complementary to the model of Kanbur and Keen (1993) where transfers were not allowed for and the international optimum could not be reached and sustained. Furthermore, our model shows that with this specific form of transfers, the optimal tax rates can be a dominant strategy in a non cooperative equilibrium. As an additional result we have shown that decreasing transport costs increase the probability of cooperation, and the model enables us to understand this counterintuitive result.

These results suggest that the mechanisms proposed by Chander and Tulkens are of wider scope than environmental externalities and can usefully be applied in the context of fiscal externalities. Of course, the nature

[5] Note that the same reasoning applies to the case of cooperation in the form of revenue sharing (see section 4.3). Indeed, in a context of revenue sharing each countries faces the same problem as in this section, i.e. maximizing aggregate revenue.

of the externalities is different, but the same reasoning structure applies in either case, namely to ensure sustainability of optimality by means of transfers inducing individual rationality. In both cases the interest of introducing transfers lies in the existence of a certain asymmetry. This may be a promising direction of research to tackle the problem of harmful tax heavens.

The second goal of this paper was to clarify the mechanisms at work in a model of fiscal competition and fiscal cooperation with transfers in the case of two asymmetric countries, in order to open up the discussion on an extension to 3 or n countries. In such an extension not only individual rationality of cooperation should be examined but also coalitional rationality. This extension would bring the model closer to the real world but it could imply challenging technical questions, especially with respect to the existence of a Nash equilibrium, due to the peculiar form of the externalities involved, as suggested above.

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