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## The Impact of CFC-Rules on Tax Competition

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# The Impact of CFC-Rules on Tax Competition \*

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## Abstract

On July 16<sup>th</sup> 2016 the Economic and Financial Council of the European Union adopted the Anti-Tax-Avoidance Directive (ATAD). The proposed controlled-foreign-company (CFC) rule in the ATAD requires a minimum tax rate in the host country of a multinational's controlled foreign subsidiary in order to avoid the reattribution of the subsidiary's income to the country of its parent company. The Directive allows member states to remain free to set the CFC threshold autonomously by laying down a minimum standard. Member states can thus either opt for a loose CFC rule by setting the minimum required control threshold (i.e. 50% of the country's own corporate income tax rate) or impose a tight CFC rule by applying a higher threshold.

Against this background, the present paper analyzes the effect of CFC rules on tax competition for foreign direct investments. It appears that, although CFC rules are effective in curbing offshore profit shifting, they can induce non-havens to compete aggressively for mobile capital. In this context, CFC rules can exacerbate capital outflows from the large to the small country to a larger extent than in standard models of tax competition. Moreover, the paper highlights that governments choose between two extreme options when deciding on their CFC rule. Either they opt for the lowest or the highest possible control threshold.

**Keywords:** Tax Competition, Controlled-Foreign-Company Rules

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# 1 Introduction

Over the past years, the ‘harmful’ tax avoidance practices of multinational firms (like Starbucks, Google, and Amazon among others) have been widely covered and criticized in the media. Consequently, more and more countries have seen a need to react to the tax avoidance practices of multinationals by questioning the current tax regimes. In June 2012, the heads of states and governments of the G20 countries urged the OECD to pursue its work in fighting harmful tax competition between jurisdictions and to implement an action plan against base erosion and profit shifting<sup>1</sup>. One year later, the OECD published its Action Plan on Base Erosion and Profit Shifting (BEPS), addressing the perceived deficiencies regarding current tax regimes. However, the rules released in the BEPS Action Plan were recommendations and the member states could decide to implement them into domestic law, or not.

On July 16th 2016 the Economic and Financial Affairs Council of the European Union adopted the Anti-Tax-Avoidance Directive (ATAD). Unlike BEPS, the ATAD is a supranational law and EU Member States had to implement the according measures into domestic law by January 1st 2019. The ATAD comprises five anti-abuse measures that are, *interest limitation rules*, *controlled-foreign-company (CFC) rules*, *the exit tax*, *the general anti-abuse rule (GAAR)*, and *anti-hybrid rules*. The focus of the present paper is on the two first ATAD measures.

The *interest limitation rule* denies the deduction of net interest payments to an affiliate that exceeds 30% of the firm’s earnings before interest, taxes, depreciation and amortizations (EBITDA). Traditionally, tax systems enable interest payments to be deducted from the corporate tax base, while denying the deduction of returns on equity (see Hauffer and Runkel (2012)). Consequently, a firm’s affiliate, located in a tax haven, can operate as an “internal” bank, providing loans to the parent firm in high-tax countries. The firm can thus reduce its taxable profit by increasing the level of intracompany loans. The OECD Committee of Fiscal Affairs already recognized this phenomenon in 1996 and stated “*that it may sometimes, from the tax point of view, be more advantageous to a particular combination of company contributor to arrange the financing of the company by way of loans rather than by way of equity contributions.*”<sup>2</sup> The *interest limitation rule* of the ATAD aims at tackling the problems associated with debt-financing. According to Collier et al. (2018), this rule is similar to the *thin-capitalization rule* in Germany, which was introduced

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<sup>1</sup>For further information, see G20 Leaders’ Declaration at Los Cabos, Mexico (18-19 June 2012), p.48.

<sup>2</sup>OECD Report on “Thin Capitalization” adopted by the OECD Committee on Fiscal Affairs on November 26th 1996, paragraph 10.

in 2008. From an empirical perspective, there is evidence that this regulation has substantially reduced firms' debt-to-equity ratio as well as the amount of interest payments (see Buslei and Simmler (2012) and Dreßler and Scheuering (2012)).

The *controlled-foreign-company (CFC) rule* requires that a firm's controlled foreign subsidiary pays a minimum tax rate in the host country to avoid the reattribution of the subsidiary's profits to its parent company. More precisely, if a firm's affiliate classified as a "controlled-foreign-corporation" operates in a jurisdiction where the tax rate is below the required minimum, the country of the parent firm can deploy CFC rules. It follows that this country can tax the profits generated by the affiliate in the tax haven by adding them to the tax base of the parent firm (see Hauffer et al. (2018)).

Ruf and Weichenrieder (2012) show that the German CFC rules significantly decrease the amount of passive assets held in subsidiaries of German-based multinationals. Altshuler and Hubbard (2003) analyze the implications of the Tax Reform Act of 1986 in the U.S., which led to a tightening of the CFC regulation (known as subpart F provisions). They show that the tightening of these rules reduced the incentive of multinational firms to lower their tax base by intra-company loans. These results suggest that CFC regulations are effective in curbing offshore profit shifting.

While the ATAD proposes the same interest-limitation rule for all the EU member states, it allows them to remain free to set the CFC threshold autonomously by laying down a minimum standard. In this context, each member state is obliged to deny any deduction of net interest payments that exceeds 30% of the firms' EBITDA. However, more flexibility is granted in the implementation of the CFC regulation. So, countries can either opt for a loose CFC rule by setting the minimum required control threshold (50% of the country's own corporate income tax rate) or impose a tighter CFC rule by applying a higher threshold. Against the background that CFC rules don't have to be implemented in a coordinated way across jurisdictions, the following questions arise. What is the effect of CFC rules on tax competition for foreign direct investments? Do countries compete more aggressively via tax rates when CFC-rules are in place? Moreover, have member states an interest to choose between tight or loose CFC rules?

To answer these questions, we develop a model with the following features. Two competing onshore jurisdictions which are of asymmetric size and a continuum of tax havens offering preferential tax rates are considered. There are two types of agents living in each jurisdiction, workers and capital owners. The capital owners are endowed with an initial quantity of capital that they can invest at home or abroad in order to set up a firm. Each firm hosted by a country can own a subsidiary

in a tax haven. This allows these multinationals to shift profit to the haven for tax purposes. The governments of the two onshore countries compete in taxes in order to attract mobile capital. It follows that multinationals can lower their tax bill by shifting profit to tax havens or relocate capital to the jurisdiction which taxes less<sup>3</sup>. The governments can mitigate tax revenue losses resulting from profit shifting to offshore countries by imposing CFC as well as interest-limitation rules.

The main results of the paper can be summarized as follows. Although CFC rules are effective in curbing offshore profit shifting they can induce non-havens to compete aggressively for mobile capital. In this context, CFC rules can exacerbate capital outflows from the large to the small country to a larger extent than in standard models of tax competition. In particular, when the smaller country imposes a lower control threshold than its bigger rival, we find that capital outflows can be higher when CFC rules are in place. In this case, a harmonization of the control thresholds among the member states could mitigate capital outflows from the large to the small jurisdiction. However, it can also occur that the small country experiences capital outflows when CFC rules are in place. This happens in particular, when the small country opts for a much smaller control threshold than its larger rival and firms can easily find a haven where profit taxation is consistent with the CFC rule. In that case, the large jurisdiction undercuts the tax rate of the small one in a way that its disadvantage resulting from a tighter CFC rule is overcompensated by the tax advantage it offers.

As we observed above, the jurisdictions have some discretion in deciding on the CFC rate to adopt. Consequently, the question arises about the level of the CFC requirements the jurisdictions will impose. In this paper, we address this question by assuming that the countries impose the level that maximizes their tax revenues. This poses a problem of timing given that the equilibrium tax rates resulting from tax competition are also designed to maximize tax revenues. We consider the following timing. The jurisdictions first determine their CFC rates and then compete in tax rates. This staging is dictated by the fact that changing rules is less flexible than setting tax rates. Solving our model backwardly implies that first we solve the interjurisdictional game for internationally mobile capital and then we determine the CFC thresholds.

We show that jurisdictions either impose the highest or the lowest possible control threshold. Indeed, when it is difficult for a firm to find a haven where profit taxation is consistent with

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<sup>3</sup>These two types of firm responses to inter-jurisdictional tax differentials, namely pure profit shifting and real activity relocation, have been highlighted in the recent literature (e.g., Agrawal and Wildasin (2020) and Pieretti and Pulina (2020)).

the CFC rule, a tightening of this rule increases the equilibrium tax revenue in the firm’s parent country. However, when firms can easily find a haven that checks the CFC rule, the government will optimally choose the lowest possible threshold.

Our paper is organized as follows. The next section presents the general setting of the model. In Section 3 we analyze the impact of controlled-foreign-company rules on tax rates, capital outflows and tax revenues. The last section concludes the paper and discusses possible extensions.

## 2 The Model

Suppose that the world is composed of two jurisdictions (non-havens) and a continuum of tax havens offering preferential tax rates. The two jurisdictions (non-havens) are denoted by  $h$  (home) and  $f$  (foreign). There are two types of agents living in each jurisdiction, workers and capital owners. Labour is internationally immobile while capital is imperfectly mobile. The capital owners are endowed with an initial quantity of capital, which they can invest at home or abroad in order to set up a firm. Note that each firm hosted by country  $i = h, f$  can own a subsidiary in a tax haven. As in Hauffer et al. (2018), the subsidiary doesn’t carry out any substantive economic activity and can be considered as an ‘internal bank’ with the only purpose of granting loans to the affiliate in the high-tax country. Let us denote by  $k_i$  the amount of capital owned by an individual in country  $i = h, f$  and  $l_i$  the amount of labor supplied by one worker in country  $i$ . One homogeneous good is produced that is sold in a competitive market at a given price normalized to one. Each firm of country  $i = h, f$  produces  $q_i$  units of this good according to a Leontief production function  $q_i = f(k_i, l_i) = \min \{ak_i, bl_i\}$  with  $k_i$  units of capital and  $l_i$  units of labour and  $a > 0, b > 0$ . Throughout the paper we assume that capital is the limiting factor, which means that  $ak_i < bl_i$ . It follows that labour is provided in excess of demand and the wage rate tends to the lowest bound that equals the level required for subsistence or the legal minimum. In other words, we can write,  $q_i = ak_i$ . Production in excess of capital replacement and tax payments is consumed by the capitalists and the workers.

The capital owners are evenly distributed with unit density on a segment  $[0, 1]$ . The mass of capital owners in country  $h$  is  $s$  and  $1 - s$  in country  $f$ . We shall refer to  $s$  and  $1 - s$  as being the size of countries  $h$  and  $f$ . In the sequel, we set  $s < \frac{1}{2}$ , which means that the home country is small relative to the foreign country. More precisely, the small country extends from 0 to  $s$  and the larger from  $s$  to 1. It follows that the geometric border is given at  $s$  on the interval of unit

length. The individuals are supposed to be heterogeneous in their reluctance to invest capital in a foreign country. The “closer” the investors are to the border separating countries  $h$  and  $f$ , the less they are reluctant to set up a firm abroad. In other words, an individual of type  $x \in [0, 1]$  who invests capital abroad incurs a “moving” cost (disutility)  $|x - s|$ . The difference  $|x - s|$  is the “distance” between the border  $s$  and the individual of type  $x$ .

The government of country  $i = h, f$  levies a tax  $t_i$  that is proportional to the profits generated within its jurisdiction. As in Haufler et al. (2018), the governments can mitigate tax losses resulting from profit shifting by deploying CFC as well as interest-limitation rules.

The production function of any firm (located in  $h$  or  $f$ ) is given by

$$q_i = f(k_i) = ak_i \quad (i = h, f),$$

with  $k_i = k_i^H + k_i^E$ , where  $k_i^H$  is the amount of capital shifted to the subsidiary located in the tax haven and  $k_i^E$  is the amount of equity located in the jurisdiction which hosts the firm’s headquarter. For the sake of simplicity we normalize  $a$  to 1.

The interest-limitation rule applied by the governments following the Anti-Tax-Avoidance Directive can be formalized in the following way:

$$rk_i^H \leq \lambda k_i,$$

where  $rk_i^H$  denotes the interest payment for the internal loan granted by the subsidiary acting as an internal bank for the headquarter located in the high-tax country. This amount should not exceed a specified percentage share of the firms’s EBITDA (i.e.  $\lambda k_i$ ). Otherwise deductions for interest payments will be denied. The parameter  $\lambda$  defines the permitted share of deductible intra-company interest payments. As in Haufler et al. (2018), we assume that, given the tax savings, affiliates will always find it optimal to grant internal loans until the maximum amount of tax-deductible interest payments is reached. In other word, we impose that  $rk_i^H = \lambda k_i$ . This means that the amount of capital shifted to the tax-haven depends on the share of internal debt that is tax-deductible under the interest-limitation rule.

In addition to the interest-limitation rule, governments also enforce CFC rules to minimize tax revenue losses. We assume that the tighter the CFC rule of the HQ’s country (i.e. the higher the minimum tax rate required by the home country), the lesser capital will be offshored for tax planning purposes. So, the offshored capital  $k_i^H$  from country  $i = h, f$  decreases with  $t_H$ , the tax

rate of the haven that taxes above the minimal rate  $\tau_i$  required by country  $i = h, f$ .

This is due to the fact that most tax havens apply very low corporate tax rates. Indeed, “over a third of the countries ranked by the Tax Haven Index offer a zero percent lowest available corporate tax rate.”<sup>4</sup> It follows that a higher control threshold requires more effort to find a suitable haven and firms become more reluctant to shift profit abroad. Moreover, the higher the control threshold, the smaller the firms’ tax advantage through profit shifting will be. Considering the CFC rule and the interest-limitation rule, the amount of capital transferred to the haven with the only purpose of granting loans to the HQ equals

$$k_i^H = \frac{\lambda}{r} k_i (1 - \varepsilon t_H),$$

with  $\varepsilon t_H < 1$  and  $\varepsilon > 0$ . The parameter  $\varepsilon$  accounts for the difficulty to find a suitable tax haven consistent with the CFC rule, assuming that the haven taxes local profits at a given rate  $t_H$ .

As in Haufler et al. (2018), we assume that the firm will always set up a subsidiary (acting as an internal bank) in a tax haven where the tax rate equals the lowest level that just avoids the CFC rules. If the minimum tax rate resulting from the CFC rule is  $\tau_i$  in country  $i = h, f$ , the firm will establish a subsidiary in the haven where the tax rate equals  $t_H$  with  $t_H = \tau_i$ . We thus can write

$$k_i^H = \frac{\lambda}{r} k_i (1 - \varepsilon \tau_i), \tag{1}$$

Hence, the amount of capital placed in the tax haven is a decreasing function of the CFC threshold imposed by the government and of the parameter  $\varepsilon$ .

Generally, tax systems enable interest payments to be deducted from the corporate tax base, while the returns on equity are non-deductible (see Haufler and Runkel (2008)). So the subsidiary located in the tax haven, grants an internal loan to the HQ located in the high-tax country. The HQ can deduct from its tax base, the amount of interest paid for the internal loan granted by its offshore subsidiary. These interest payments will however be taxed at a lower rate in the tax haven.

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<sup>4</sup><https://www.taxjustice.net/2019/05/28/new-ranking-reveals-corporate-tax-havens-behind-breakdown-of-global-corporate-tax-system-toll-of-uks-tax-war-exposed/>

Consequently, the profit function of a firm located in  $i = h, f$  is given by

$$\begin{aligned}\Pi_i &= (1 - t_i) [f(k_i) - rk_i^H] + (1 - \tau_i) rk_i^H \\ &= (1 - t_i) k_i + (t_i - \tau_i) \lambda k_i (1 - \varepsilon \tau_i).\end{aligned}$$

It follows that a firm headquartered in country  $i = h, f$  having a subsidiary in a tax haven realizes a total amount of tax savings of  $(t_i - \tau_i) \lambda k_i (1 - \varepsilon \tau_i)$ .

We now assume that the amount of capital owned by an individual in country  $i = h, f$  is given. In the following, we normalize  $k_i$  to 1. The profit function can thus be rewritten as

$$\Pi_i = (1 - t_i) + (t_i - \tau_i) \lambda (1 - \varepsilon \tau_i). \quad (2)$$

### 3 The Effects of the CFC Rule

We assume that the capital owners decide where to invest their capital in order to run a firm. An investor of type  $x \in [0, 1]$  who lives, for example in country  $h$ , earns  $\Pi_h$  if she invests one unit of capital at home and  $\Pi_f - (s - x)c$  if this capital is invested in country  $f$ . Note that  $(s - x)$  is the disutility incurred by a capital owner who invests abroad.

Hence, an investor living in country  $h$  is indifferent between setting up a firm in country  $f$  or in  $h$  if

$$\Pi_f - (s - x)c = \Pi_h.$$

An agent living in country  $f$  is indifferent between setting up a firm in country  $h$  or in  $f$  if

$$\Pi_h - (x - s)c = \Pi_f.$$

For the sake of simplicity, we normalize  $c$  to 1. The two above conditions yield the marginal investor who is indifferent between setting up a firm at home or abroad

$$x = (t_f - t_h) + \lambda [(t_h - \tau_h) (1 - \varepsilon \tau_h) - (t_f - \tau_f) (1 - \varepsilon \tau_f)] + s. \quad (3)$$

### 3.1 The Impact of CFC Rules on Tax Competition

Assume that the jurisdictions try to attract productive capital (firms) by competing in taxes. The policymakers of the competing jurisdictions choose non-cooperatively the tax rates that maximize their respective tax revenue  $T_i$ . The assumption that the governments pursue such an objective can also be found in Kanbur and Keen (1993), Trandel (1994), and Pieretti and Zana (2011). This is consistent with a welfarist view in which individuals put a very high marginal valuation on public goods that are financed by tax revenue (see Kanbur and Keen, 1993). The tax revenue in country  $h$  is given by

$$\begin{aligned} T_h &= xt_h (f(\bar{k}_h) - \lambda \bar{k}_h (1 - \varepsilon \tau_h)) \\ &= xt_h (1 - \lambda (1 - \varepsilon \tau_h)) \\ &= [(t_f - t_h) + \lambda [(t_h - \tau_h) (1 - \varepsilon \tau_h) - (t_f - \tau_f) (1 - \varepsilon \tau_f)] + s] t_h (1 - \lambda (1 - \varepsilon \tau_h)). \end{aligned}$$

For country  $f$  we have

$$T_f = (1 - x) t_f (1 - \lambda (1 - \varepsilon \tau_f)).$$

Because the objective functions of the policymakers are concave in their own tax rates, the first order conditions yield the following equilibrium tax rates

$$t_h = \frac{1 + s + \lambda [\tau_f (1 - \varepsilon \tau_f) - \tau_h (1 - \varepsilon \tau_h)]}{3(1 - \lambda(1 - \varepsilon \tau_h))}, \quad (4)$$

$$t_f = \frac{2 - s + \lambda [\tau_h (1 - \varepsilon \tau_h) - \tau_f (1 - \varepsilon \tau_f)]}{3(1 - \lambda(1 - \varepsilon \tau_f))}. \quad (5)$$

Note that  $0 < t_h \leq 1$  and  $0 < t_f \leq 1$  for  $\lambda$  such that  $0 < \lambda < \frac{1+s}{3+(\tau_h(1-\varepsilon\tau_h))}$ . It is straightforward to show that a higher size asymmetry (lower  $s$ ) between the competing jurisdictions results in a tax increase in the large jurisdiction  $f$  and a tax decrease in the small jurisdiction  $h$ . Consequently, a higher size asymmetry increases the tax gap between the jurisdictions. The reason is that the tax elasticity of the tax base decreases with  $s$  in the large country and increases in the small country<sup>5</sup>. Moreover, the more difficult it is for the firms to find a suitable tax haven (a higher  $\varepsilon$ ), the lower

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<sup>5</sup>If  $\epsilon_{t_h}^h$  and  $\epsilon_{t_f}^f$  are the tax elasticities in countries  $h$  and  $f$  respectively, it is convenient to show that for given tax rates,  $\frac{\partial |\epsilon_{t_h}^h|}{\partial s} < 0$  and  $\frac{\partial |\epsilon_{t_f}^f|}{\partial s} > 0$  with  $|\epsilon_{t_h}^h| = \frac{[1-\lambda(1-\varepsilon\tau_h)]t_h}{(t_f-t_h)+\lambda[(t_h-\tau_h)(1-\varepsilon\tau_h)-(t_f-\tau_f)(1-\varepsilon\tau_f)]+s}$  and  $|\epsilon_{t_f}^f| = \frac{[1-\lambda(1-\varepsilon\tau_f)]t_f}{1-[(t_f-t_h)+\lambda[(t_h-\tau_h)(1-\varepsilon\tau_h)-(t_f-\tau_f)(1-\varepsilon\tau_f)]]-s}$ .

the tax rates will be. Formally, we have  $\frac{\partial t_h}{\partial \varepsilon} < 0$  and  $\frac{\partial t_f}{\partial \varepsilon} < 0$ . This can be explained as follows. With increasing  $\varepsilon$  firms find it more difficult to reduce their tax liability by using tax havens. Consequently, they will try to relocate in a lower tax country. This forces the jurisdictions to compete more aggressively in taxes and as a result, tax rates decrease.

After setting  $\Delta = \tau_f - \tau_h$  and  $\Phi = \tau_f + \tau_h$ , we obtain the tax difference

$$t_f - t_h = \frac{(2 - s - \lambda\Delta(1 - \varepsilon\Phi))(1 - \lambda(1 - \varepsilon\tau_h)) - (1 + s + \lambda\Delta(1 - \varepsilon\Phi))(1 - \lambda(1 - \varepsilon\tau_f))}{3(1 - \lambda(1 - \varepsilon\tau_f))(1 - \lambda(1 - \varepsilon\tau_h))}. \quad (6)$$

The effect of a tightening of the CFC rule in the home country (i.e., an increase in  $\tau_h$ ) on its tax rate  $t_h$  is given by

$$\frac{\partial t_h}{\partial \tau_h} = \frac{1}{3}\lambda \frac{\varepsilon\tau_h [2 - \lambda(2 - \varepsilon\tau_h)] - \lambda\varepsilon\tau_f(1 - \varepsilon\tau_f) - \varepsilon(1 + s) - 1 + \lambda}{(1 - \lambda(1 - \varepsilon\tau_h))^2}. \quad (7)$$

It is straightforward to show that  $\frac{\partial t_h}{\partial \tau_h} < 0$  for  $\tau_h < \bar{\tau}_h$  and  $\frac{\partial t_h}{\partial \tau_h} > 0$  for  $\tau_h > \bar{\tau}_h$ <sup>6</sup>.

In other words, if a country increases the control threshold, this leads to a decrease (increase) in the country's own tax rate if the CFC rule is relatively loose (tight).

The underlying intuition can be explained as follows. Note first that firms have two ways of mitigating their tax bill. They can either use the tax havens for profit shifting or transferring their productive capital to the most tax friendly jurisdiction.

When the existing CFC rule in country  $h$  is loose (i.e.,  $\tau_h < \bar{\tau}_h$ ), profit shifting to a tax haven is relatively attractive. Then, if country  $h$  increases its CFC threshold, firms will have an incentive to reallocate their capital to a more tax attractive jurisdiction. This triggers tax competition for attracting productive capital. As a consequence, the equilibrium tax rate will decrease ( $\frac{\partial t_h}{\partial \tau_h} < 0$ )

When the existing CFC rule in country  $h$  is tight (i.e.,  $\tau_h > \bar{\tau}_h$ ), the amount of profit shifting in country  $h$  is relatively small because unattractive. If country  $h$  increases its CFC threshold, the magnitude of capital reallocation will be insignificant. Accordingly, the competitive pressure on tax rates will be weak. However, capital in country  $h$  becomes more vulnerable for further taxation because profit shifting is now much less attractive and tax competition between jurisdiction does

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<sup>6</sup>with  $\bar{\tau}_h = \frac{\lambda - 1 + \sqrt{1 - \lambda + \lambda\varepsilon(1+s) + \lambda^2\varepsilon\tau_f(1-\varepsilon\tau_f)}}{\lambda\varepsilon} < 1$  when  $\varepsilon > \frac{1}{2\lambda}(s + 2\lambda - 1 + \sqrt{1 - 2s + 4s\lambda + s^2})$  and  $\tau_f < \frac{1}{2\lambda\varepsilon}(\lambda - \sqrt{4\lambda - 3\lambda^2 - 4\lambda^2\varepsilon^2 - 4\lambda\varepsilon + 8\lambda^2\varepsilon + 4s\lambda\varepsilon})$  or  $\tau_f > \frac{1}{2\lambda\varepsilon}(\lambda + \sqrt{4\lambda - 3\lambda^2 - 4\lambda^2\varepsilon^2 - 4\lambda\varepsilon + 8\lambda^2\varepsilon + 4s\lambda\varepsilon})$ .

not become fiercer. As a consequence, the equilibrium tax rate increases in country  $h$  ( $\frac{\partial t_h}{\partial \tau_h} > 0$ ).

The effect of a tightening of the CFC rule in country  $f$  on its tax rate  $t_f$  is given by

$$\frac{\partial t_f}{\partial \tau_f} = \frac{1}{3} \lambda \frac{\varepsilon \tau_f [2 - \lambda(2 - \varepsilon \tau_f)] - \lambda \varepsilon \tau_h (1 - \varepsilon \tau_h) - \varepsilon(2 - s) - 1 + \lambda}{(1 - \lambda(1 - \varepsilon \tau_f))^2}. \quad (8)$$

Again we can show that  $\frac{\partial t_f}{\partial \tau_f} < 0$  for  $\tau_f < \bar{\tau}_f$  and  $\frac{\partial t_f}{\partial \tau_f} > 0$  for  $\tau_f > \bar{\tau}_f$ <sup>7</sup>. The intuition underlying this result is equivalent to the case of country  $h$ . The following proposition can be stated.

**Proposition 1** *When a jurisdiction imposes a rather low CFC rule, an increase in the control threshold decreases its equilibrium tax rate. However, when a jurisdiction imposes a rather tight CFC rule, an increase in the control threshold increases its equilibrium tax rate.*

### 3.2 The Impact of CFC Rules on Capital Flows

By plugging (4) and (5) into (3), we can characterize the marginal investor  $x$  who is indifferent between investing in  $h$  or in  $f$ :

$$x = \frac{1 + s + \lambda [\tau_f(1 - \varepsilon \tau_f) - \tau_h(1 - \varepsilon \tau_h)]}{3} \quad (9)$$

The value of  $x$  reflects at the same time the number of firms headquartered in country  $h$ . Note that we can have  $x > s$  or  $x < s$ . In other words, capital can flow from country  $f$  to country  $h$ , or from country  $h$  to country  $f$ . Consequently, there are  $|x - s|$  investors of country  $i = h, f$  who set up a firm in country  $i' = h, f$  with  $i \neq i'$ .

If we define  $\Delta = \tau_f - \tau_h$  and  $\Phi = \tau_f + \tau_h$ , we can write

$$x - s = \frac{1 - 2s + \lambda \Delta (1 - \varepsilon \Phi)}{3}. \quad (10)$$

In the following, we consider three different cases.

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<sup>7</sup>with  $\bar{\tau}_f = \frac{\lambda - 1 + \sqrt{1 - \lambda + \lambda \varepsilon(2 - s) + \lambda^2 \varepsilon \tau_h (1 - \varepsilon \tau_h)}}{\lambda \varepsilon} < 1$  when  $\varepsilon > \frac{1}{2\lambda}(-s + 2\lambda + \sqrt{4\lambda - 4s\lambda + s^2})$  and  $\tau_h < \frac{1}{2\lambda \varepsilon}(\lambda - \sqrt{4\lambda - 3\lambda^2 - 4\lambda^2 \varepsilon^2 + 8\lambda \varepsilon - 4s\lambda \varepsilon})$  or  $\tau_h > \frac{1}{2\lambda \varepsilon}(\lambda + \sqrt{4\lambda - 3\lambda^2 - 4\lambda^2 \varepsilon^2 + 8\lambda \varepsilon - 4s\lambda \varepsilon})$ .

**Case 1: The CFC-rules are the same for both jurisdictions ( $\Delta = \tau_f - \tau_h = 0$ )**

When  $\Delta = 0$ , it is straightforward to show that  $x - s = \frac{1-2s}{3} > 0$ . It follows that there are  $\frac{1-2s}{3}$  investors of the large country  $f$  who set up a firm in the small country  $h$ . The intuition behind this result can be explained as follows. First, we see that when  $\Delta = 0$ , we have  $t_f - t_h > 0$ , which means that the small country undercuts the tax rate of the large country.<sup>8</sup> As a consequence, capital flows from country  $f$  to country  $h$ . Note that capital outflows increase with the size asymmetry ( $s$  decreases) between the competing jurisdictions. This is due to the fact that size disparity makes the small country more tax aggressive. Note that this case is consistent with the standard result of tax competition between non-haven jurisdictions (see in particular, Kanbur and Keen, 1993).

**Case 2: The small country  $h$  imposes a tighter CFC rule than country  $f$  ( $\Delta < 0$ )**

According to the parameter-value  $\varepsilon$ , two subcases are distinguished. First, we assume that firms are able to find a suitable tax haven relatively easily ( $\varepsilon < \frac{1}{\Phi}$ ). Then, we assume that it is relatively difficult to find the suitable haven ( $\varepsilon > \frac{1}{\Phi}$ ).

**a) It is relatively easy to find a tax haven ( $\varepsilon < \frac{1}{\Phi}$ ) that checks the CFC rule.**

In this case, the direction of the capital flow depends on the magnitude of  $|\Delta|$ , the difference between the control thresholds of both governments. If the difference  $|\Delta|$  is small enough ( $|\Delta| < \frac{1-2s}{\lambda(1-\varepsilon\Phi)}$ ), it appears from equation (10) that capital flows from country  $f$  to country  $h$  ( $x - s > 0$ ) that imposes the tightest CFC rule. To understand why, first note that this can only be the case because the small jurisdiction undercuts the tax rate of its bigger rival. Indeed, it can be demonstrated<sup>9</sup> that  $t_h < t_f$  when  $\varepsilon < \frac{1}{\Phi}$  and  $|\Delta| < 0$ . Consequently, country  $h$  attracts capital from  $f$  because the tax advantage that it grants exceeds the disadvantage of imposing a tighter CFC rule.

When the difference between the CFC thresholds of both jurisdictions is relatively large ( $|\Delta| > \frac{1-2s}{\lambda(1-\varepsilon\Phi)}$ ), we have  $x - s < 0$ . In this case, we see from (10) that capital flows from the small country  $h$  to the large country  $f$ . This is because the tax advantage can no more compensate the

<sup>8</sup>This is in line with standard findings (see Bucovetsky, 1991, Kanbur and Keen, 1993, and Trandel, 1994).

<sup>9</sup>We can rewrite the tax differential (6) between both jurisdictions in the following way:  $t_f - t_h = \frac{[(2-s)(1-\lambda(1-\varepsilon\tau_h))-(1+s)(1-\lambda(1-\varepsilon\tau_f))]-[\lambda\Delta(1-\varepsilon\Phi)(2(1-\lambda)+\varepsilon\lambda\Phi)]}{3(1-\lambda(1-\varepsilon\tau_f))(1-\lambda(1-\varepsilon\tau_h))}$ . It is straightforward to show that the denominator is always positive for  $\varepsilon\tau_i < 1$ . The first term in the numerator is also positive for  $s < \frac{1}{2}$  and  $\tau_h > \tau_f$ . The second term is negative for  $\Delta < 0$  and  $\varepsilon < \frac{1}{\Phi}$ . Hence, the difference between the tax rates ( $t_f - t_h$ ) is always positive.

disadvantage resulting from a tighter CFC rule.<sup>10</sup>

**b) It is relatively difficult to find a tax haven ( $\varepsilon > \frac{1}{\Phi}$ ) that checks the CFC rule.**

In this case, it appears from equation (10) that capital flows from the large country  $f$  to the small country  $h$  ( $x - s > 0$ ), irrespective of the magnitude of  $|\Delta|$ . The only reason can be that the tax advantage ( $t_h < t_f$ ) granted by country  $h$  compensates the disadvantage resulting from a tighter CFC rule. As shown in *Section 3.1*, the more difficult it is for firms to find a suitable haven, the lower the tax rates will be. In other words,  $\frac{\partial t_h}{\partial \varepsilon} < 0$  and  $\frac{\partial t_f}{\partial \varepsilon} < 0$ . Hence, the higher  $\varepsilon$ , the more aggressively the jurisdictions compete in tax rates. As a consequence, capital flows to the low-tax country irrespective of its tighter CFC rule.

Moreover, it is straightforward to show that capital outflows from the large country are higher than in Case 1 (benchmark case), where both countries impose the same control thresholds. In other words, CFC rules can exacerbate outflows from the large to the small jurisdiction. In this case, a harmonization of the control thresholds among the member states could mitigate capital outflows.

The following proposition concludes.

**Proposition 2** *Consider the case where  $\Delta < 0$ :*

(I) For  $\varepsilon < \frac{1}{\Phi}$ ,

(I.1) and  $|\Delta| < \frac{1-2s}{\lambda(1-\varepsilon\Phi)}$ , we have  $x - s > 0$ ,

(I.2) and  $|\Delta| > \frac{1-2s}{\lambda(1-\varepsilon\Phi)}$ , we have  $x - s < 0$ .

(II) For  $\varepsilon > \frac{1}{\Phi}$ , we have  $x - s > 0$ .

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<sup>10</sup>It can be demonstrated that a higher difference in the CFC thresholds decreases the tax differential between the jurisdictions:  $\frac{\partial t_f - t_h}{\partial |\Delta|} = \frac{\lambda(1-\varepsilon\Phi)(1-\lambda(1-\varepsilon\tau_h)) + \lambda(1-\varepsilon\Phi)(1-\lambda(1-\varepsilon\tau_f))}{3(1-\lambda(1-\varepsilon\tau_f))(1-\lambda(1-\varepsilon\tau_h))} < 0$ . So, a higher difference in  $|\Delta|$  decreases the tax competitiveness of the small country.

**Case 3: Country  $f$  imposes a tighter CFC rule than country  $h$  (i.e.  $\Delta > 0$ )**

**a) It is relatively easy to find a tax haven ( $\varepsilon < \frac{1}{\Phi}$ ) that checks the CFC rule.**

When it is relatively easy for the firms to find a suitable haven, the small country  $h$  attracts capital from the large country  $f$  ( $x - s > 0$ ). This can be explained as follows. Either the small country undercuts the tax rate of its bigger rival ( $t_f > t_h$ ) in addition to applying a loser CFC rule, or it levies a higher tax rate ( $t_h > t_f$ ), but not high enough to cancel out the advantage resulting from a loser CFC rule.

Again, we can show that capital outflows from the large country are higher than in *Case 1*. Hence, a harmonization of the control thresholds among the member states can mitigate **these** capital outflows.

**b) It is relatively difficult to find a tax haven ( $\varepsilon > \frac{1}{\Phi}$ ) that checks the CFC rule.**

In this case, the direction of capital flows depends on the magnitude of  $\Delta$ . When the difference between the CFC threshold rates is relatively large ( $\Delta > \frac{1-2s}{\lambda(1-\varepsilon\Phi)}$ ), we see from (10) that capital flows from the small country  $h$  to the large country  $f$  ( $x - s < 0$ ). The reason is that the large country undercuts the tax rate of the small country in a way that its disadvantage resulting from a tighter CFC rule is overcompensated by the tax advantage.

When the difference between the control thresholds is relatively small ( $\Delta < \frac{1-2s}{\lambda(\varepsilon\Phi-1)}$ ), the small country  $h$  attracts capital from the large country  $f$  ( $x - s > 0$ ). As in the above case, there are two explanations. Either the small country undercuts the tax rate of its bigger rival ( $t_f > t_h$ ) in addition to applying a loser CFC rule, or it levies a higher tax rate ( $t_h > t_f$ ) but not high enough to impair the advantage resulting from its loser CFC rule.

The following proposition concludes.

**Proposition 3** *Consider the case where  $\Delta > 0$ :*

(I) *For  $\varepsilon < \frac{1}{\Phi}$ , we have  $x - s > 0$ .*

(II) *For  $\varepsilon > \frac{1}{\Phi}$ ,*

(II.1) and  $\Delta < \frac{1-2s}{\lambda(\varepsilon\Phi-1)}$ , we have  $x - s > 0$ ,

(II.2) and  $\Delta > \frac{1-2s}{\lambda(\varepsilon\Phi-1)}$ , we have  $x - s < 0$ .

### 3.3 The choice of CFC thresholds

Until now, we have considered that the jurisdictions determine their tax rates that maximize their respective tax revenues. However, we know that the jurisdictions have some discretion in deciding on the best CFC rate to impose. We now address this question by assuming that the countries impose the CFC level that maximizes their tax revenues. This poses however a problem of timing given that the equilibrium tax rates resulting from tax competition are also designed to maximize tax revenues. For that reason we assume that the countries first determine their CFC rates and then they compete in tax rates. This staging is dictated by the fact that changing rules is less flexible than setting tax rates. Solving our model backwardly explains why we first solve the interjurisdictional game for internationally mobile capital.

In the following, we demonstrate that, for each country  $i = h, f$ , there exists a CFC threshold  $\tau_i$  that maximizes its equilibrium tax revenue  $T_i^*$  independently of the other country. In other words, there is no interaction between the two countries in the best choice of the threshold  $\tau_i$  and consequently, we do not have to consider a game in CFC thresholds.

From the above equilibrium solutions, we can calculate the following tax revenues of countries  $h$  and  $f$

$$T_h^*(\tau_h) = \frac{(1 + s + \lambda[\tau_f(1 - \varepsilon\tau_f) - \tau_h(1 - \varepsilon\tau_h)])^2}{9}, \quad (11)$$

$$T_f^*(\tau_f) = \frac{(2 - s + \lambda[\tau_h(1 - \varepsilon\tau_h) - \tau_f(1 - \varepsilon\tau_f)])^2}{9}. \quad (12)$$

It is easy to check that the the functions  $T_h^*(\tau_h)$  and  $T_f^*(\tau_f)$  are strictly convex in their own CFC thresholds<sup>11</sup>. It follows that the best decision of country  $i = h, f$  is to choose the highest, respectively the lowest possible control threshold. To this purpose, we consider that the lowest

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<sup>11</sup>Indeed,  $\frac{\partial^2 T_h^*}{\partial \tau_h^2} = \frac{4}{9}\lambda\varepsilon(1 + s + \lambda[\tau_f(1 - \varepsilon\tau_f) - \tau_h(1 - \varepsilon\tau_h)]) + \frac{2}{9}\lambda^2(2\varepsilon\tau_h - 1)^2 > 0$  and  $\frac{\partial^2 T_f^*}{\partial \tau_f^2} = \frac{4}{9}\lambda\varepsilon(2 - s + \lambda[\tau_h(1 - \varepsilon\tau_h) - \tau_f(1 - \varepsilon\tau_f)]) + \frac{2}{9}\lambda^2(2\varepsilon\tau_f - 1)^2 > 0$ .

and highest values of  $\tau_i$  ( $i = h, f$ ) are respectively  $\tau_i^{min}$  and  $\tau_i^{max}$ .

The effect of a tightening in the home country's CFC rule  $\tau_h$  on its equilibrium tax revenue  $T_h^*$  is

$$\frac{\partial T_h^*}{\partial \tau_h} = \frac{2}{9} \lambda (2\varepsilon\tau_h - 1) (1 + s + \lambda [\tau_f(1 - \varepsilon\tau_f) - \tau_h(1 - \varepsilon\tau_h)]). \quad (13)$$

It is straightforward to show that  $\frac{\partial T_h^*}{\partial \tau_h} > 0$  for  $\varepsilon > \frac{1}{2\tau_h}$  and  $\frac{\partial T_h^*}{\partial \tau_h} < 0$  for  $\varepsilon < \frac{1}{2\tau_h}$ . So, if it is relatively difficult for the firms to find a suitable tax haven, a tightening of the control level  $\tau_h$  increases the equilibrium tax revenue  $T_h^*$ . Consequently, if the coefficient  $\varepsilon$  is high enough, the government optimally chooses the highest possible control threshold to mitigate profit shifting. Formally, if  $\varepsilon > \frac{1}{2\tau_h}$ , country  $h$  optimally chooses  $\tau_h = \tau_h^{max}$  that equals  $t_h$  following ATAD.

If finding a suitable tax haven is relatively easy ( $\varepsilon < \frac{1}{2\tau_h}$ ), a tightening of the CFC rule reduces the equilibrium tax revenue in country  $h$ . Formally, if  $\varepsilon < \frac{1}{2\tau_h}$  country  $h$  chooses  $\tau_h = \tau_h^{min}$  that equals  $\frac{1}{2}t_h$  following ATAD.

The effect of a tightening in country  $f$ 's controlled-foreign company rule  $\tau_f$  on its equilibrium tax revenue  $T_h^*$  is given by

$$\frac{\partial T_h^*}{\partial \tau_f} = \frac{2}{9} \lambda (2\varepsilon\tau_f - 1) (2 - s + \lambda [\tau_h(1 - \varepsilon\tau_h) - \tau_f(1 - \varepsilon\tau_f)]). \quad (14)$$

Again, we can show that  $\frac{\partial T_h^*}{\partial \tau_f} > 0$  for  $\varepsilon > \frac{1}{2\tau_f}$  and  $\frac{\partial T_h^*}{\partial \tau_f} < 0$  for  $\varepsilon < \frac{1}{2\tau_f}$ . The underlying intuition is the same as for country  $h$ .

We can now state the following proposition.

**Proposition 4** *When it is difficult for a firm to find a tax haven where profit taxation is consistent with the CFC rule, a tightening of this rule increases the equilibrium tax revenue in the firm's home country. Then, it is optimal for the government to apply the tightest threshold  $\tau_i = \tau_i^{max}$ . When it is easy for a firm to find a suitable haven, a tightening of the CFC rule decreases the equilibrium tax revenue in the parent country. In that case, the government will optimally choose the lowest threshold  $\tau_i = \tau_i^{min}$ .*

## 4 Conclusion

The Anti-Tax-Avoidance Directive (ATAD) designed to impede tax avoidance by multinationals and accordingly to mitigate base erosion and offshore profit shifting imposes CFC rules to the member states. These rules require that each jurisdiction specifies a minimum tax rate that must be applied to controlled foreign subsidiaries. Hence, if a subsidiary is located in a country taxing profit below the control threshold imposed by the firm's parent country, its profit must be re-attributed and taxed in the parent country. In the present paper, we have exploited the fact that the ATAD allows for some freedom in the implementation of the control thresholds. Consequently, the member states can choose a threshold in accordance with the minimum imposed by the directive. Given that multinationals can lower their tax bill by shifting profit to tax havens or transfer productive capital to the more tax friendly jurisdictions, the focus has been on the impact of the CFC rules on tax competition. We have shown that the impact of a tightening of the CFC thresholds have ambiguous effects on the equilibrium tax rates of the competing jurisdictions. Actually, we have demonstrated that the effect depends on the size of the existing CFC rules.

Moreover, we have focused on the effect of CFC rules on the direction of the capital flows resulting from tax competition. Considering that the competing jurisdictions can be of unequal size, it appeared that CFC rules can cause capital movements from the small to the large country and vice versa. In fact, the direction of the capital movements depends on the difference between the international CFC rates and the ease with which multinationals can find a haven that taxes profit in accordance with the control thresholds. Note that in standard tax competition models, capital flows from the large to the small country. However, when considering CFC rules, it can happen that capital relocations from the large to the small jurisdiction are exacerbated. In this case, harmonizing control thresholds across the jurisdictions can mitigate these excessive outflows.

Unfortunately, the ATAD has not anticipated the impact of CFC rules on competition for mobile capital between non-tax havens. While the CFC rules are well designed for curbing profit shifting, they may not be effective in eliminating base erosion. This is because international tax regulation has not paid adequate attention to induced tax competition and consequently relocation incentives to low tax jurisdictions.

Finally, the paper highlights that governments choose between two extreme options when deciding on their CFC rule. Either they opt for the lowest or the highest possible control threshold. More precisely, when it is difficult (easy) for a firm to find a haven that checks the CFC rule, the government optimally chooses the highest (lowest) threshold.

This paper can be extended in different ways. In the present study, governments are assumed to maximize their respective tax revenue to finance public goods. It would thus be interesting to introduce a more general welfare function that combines both, private and public consumption. The model developed in our paper does not account for a possible game in CFC rules across the jurisdictions. Future research should address this shortcoming in a more elaborate setting.

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