The Anti-Tax-Avoidance Directive: An Initiative To Successfully Curb Profit Shifting? [*]

Nora Alice Paulus[†]

July 9, 2021

Abstract

On July 16th 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 analyses 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
JEL classification: F21, H21, H26, H87

1 Introduction

Over the past years, the 'harmful' tax avoidance practices of multinational firms (like Starbucks, Google, and Amazon among others) have been the subject of numerous political debates. Indeed, 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[1]. 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 whether 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 Haufler 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 *interest limitation rule* of the ATAD aims at tackling the problems associated with debt-financing.

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 that is 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 Haufler et al. (2018)).

While the ATAD proposes the same interest-limitation rule for all the EU member states,

---

[1] For further information, see G20 Leaders' Declaration at Los Cabos, Mexico (18-19 June 2012), p.48.

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 either 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[2]. 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

---

[2]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)).

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 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 contains a brief literature review of related research. Section 3 presents the general setting of the model. In Section 4 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   Related Literature

Countries offering zero or low taxation have attracted a considerable amount of foreign direct investment (FDI) over the past years. Such countries are often referred to as tax havens. Dharmapala (2008) defines tax havens as "*countries and territories that offer favourable tax regimes for foreign investors*". Dharmapala (2008) gives a broad overview of the existing theroetical and empirical literature dealing with the impact of the existence of tax havens on non-haven countries. The author concludes that the measures contained in the OECD Harmful Tax Practices Initiative, were insufficient to mitigate offshore profit shifting and that non-havens might benefit from the existence of tax havens. Along the same line, Keen (2001), Hong and Smart (2007) and Johannesen (2010) argue that the presence of tax havens can, under certain circumstances, be beneficial for the host countries of the multinationals.

While one can debate whether the OECD Harmful Tax Practice Initiative was successful in combatting tax havens, the existing literature emphasizes that some of the measures

contained in the ATAD, namely the interest limitation and the CFC rules, are indeed effective in curbing offshore profit shifting.

Although, there is no literature on the effectiveness of the ATAD interest limitation rule, one can draw conclusions on its effectiveness in curbing profit shifting by analysing the already existing *thin-capitalization rule*. Indeed, according to Collier et al. (2018), the interest limitation rule proposed in the ATAD is similar to the thin-capitalization rule in Germany, which was introduced 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 effectiveness of CFC rules has first been discussed by Altshuler and Hubbard **(2003)**. The authors analyse 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 a tightening of these rules reduced the incentive of multinational firms to lower their tax base by intra-company loans. Using German data, Ruf and Weichenrieder (2012) show that the German CFC rules significantly decrease the amount of passive assets held in subsidiaries of German-based multinationals. Mutti and Grubert (2009) identify possible loopholes for multinationals to circumvent the United States' CFC rule in order to lower their tax liabilities. They find an increased use of hybrid arrangements which facilitate the multinationals' tax avoidance practices[3]. Egger and Wamser(2015) investigate the role of CFC rules on real investment abroad. They find that CFC rules lead to an increase in capital costs and decrease real investment in low tax jurisdictions. Dharmapala (2019) argues that CFC rules reduce the incentive of multinationals to shift profits to countries with a tax rate below the control threshold defined by the host country. Along the same line, Clifford (2019) shows that CFC rules induce multinationals to redirect profits away from low tax countries to higher tax countries with a tax rate just above the CFC control threshold specified by the host country. Indeed, these results suggest that CFC regulations are successful in mitigating offshore profit shifting.

According to Haufler et al.(2018), "*the existing literature on CFC rules is almost exclusively empirical.*" Indeed, the only theoretical studies on CFC rules are the contributions of Weichenrieder (1996) and Haufler et al.(2018). Weichenrieder (1996) demonstrates that CFC rules can increase real investments abroad, leading to the distortion of investment allocations. The author thus concludes that "*the main message for jurisdictions contemplating whether to embark on anti-tax-avoidance provisions is that there may be a significant tradeoff*

---

[3]Note that the introduction of the "check-the-box" regulation in 1997 made it easier for U.S. multinationals to implement tax-saving strategies by using hybrid entities. According to a survey of the Bureau of Economic Analysis (BEA), the income held in holding firms abroad increased significantly after the introduction of the "check-the-box" rules (see Altshuler and Grubert (2005)).

between the collection of taxes on foreign income and the amount of direct investment abroad". Haufler et al. (2018) analyze the effects of CFC and thin-capitalization rules on firms' decisions and optimal tax policies. They demonstrate that a decrease in the transaction costs of FDI induces governments to opt for a relatively loose CFC rule. However, a decrease in the costs of debt shifting leads to a tightening of the CFC rule. Note that in Haufler et al. (2018) CFC rules are not binding. These authors derive conditions under which policymakers should make use of CFC rules to fight profit shifting.

While these studies focus on the governments' decision whether or not to make use of CFC rules, the underlying work aims at expanding the theoretical literature on the effects of CFC rules on interjurisdictional competition by taking into account the binding nature of the measures contained in the ATAD.

3   The Model

Suppose that the world is composed of two jurisdictions (non-havens) and a continuum of tax havens applying preferential tax rates. As in Haufler et al. (2018), we assume that the effective tax rates t_H offered by the tax havens can be ranked with unit density on a segment $[0, t_H^{max}]$. 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 Haufler 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 firm's headquarter. 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 labour 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 reluctant they are 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:

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

where $r k_i^H$ 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. λk_i). Otherwise deductions for interest payments will be denied. The parameter λ 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 $r k_i^H = \lambda k_i$. 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 τ_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.[4]" 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

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

with $\varepsilon t_H < 1$ and $\varepsilon > 0$. The parameter ε 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[5]. If the minimum tax rate resulting from the CFC rule is τ_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

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

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 ε.

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.

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

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

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

$$\Pi_i = (1 - t_i) + (t_i - \tau_i) \lambda (1 - \varepsilon\tau_i). \tag{2}$$

4   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 Π_h if she invests one unit of capital at home and $\Pi_f - (s - x)k_f$ (with k_f normalized to 1) 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

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

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

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

The two above conditions yield the marginal investor who is indifferent between setting up a firm at home or abroad

$$x = (t_f - t_h) + \lambda \left[(t_h - \tau_h) (1 - \varepsilon\tau_h) - (t_f - \tau_f) (1 - \varepsilon\tau_f) \right] + s. \tag{3}$$

4.1   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 Zanaj (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

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

For country f we have

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

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

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

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

Note that $0 < t_h \leq 1$ and $0 < t_f \leq 1$ for λ 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[6]. Moreover, the more difficult it is for the firms to find a suitable tax haven (a higher ε), the lower 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 ε firms find it more difficult to reduce their tax liability by using tax havens. Consequently, they will try to relocate to 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

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

The effect of a tightening of the CFC rule in the home country (i.e., an increase in τ_h) on

---

[6]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, $\frac{\partial\left|\epsilon_{t_h}^h\right|}{\partial s} < 0$ and $\frac{\partial\left|\epsilon_{t_f}^f\right|}{\partial s} > 0$ with $\left|\epsilon_{t_h}^h\right| = \frac{[1-\lambda(1-\varepsilon\tau_h)]t_h}{(t_f - t_h) + \lambda[(t_h - \tau_h)(1-\varepsilon\tau_h) - (t_f - \tau_f)(1-\varepsilon\tau_f)] + s}$ and $\left|\epsilon_{t_f}^f\right| = \frac{[1-\lambda(1-\varepsilon\tau_f)]t_f}{1 - [(t_f - t_h) + \lambda[(t_h - \tau_h)(1-\varepsilon\tau_h) - (t_f - \tau_f)(1-\varepsilon\tau_f)]] - s}$.

it's tax rate t_h is given by

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

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 $\tau_h > \bar{\tau}_h$[7].
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 it is 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 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 it's tax rate t_f is given by

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

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 $\tau_f > \bar{\tau}_f$[8]. 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.*

---

[7]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 $\tau_f > \frac{1}{2\lambda\varepsilon}(\lambda + \sqrt{4\lambda - 3\lambda^2 - 4\lambda^2\varepsilon^2 - 4\lambda\varepsilon + 8\lambda^2\varepsilon + 4s\lambda\varepsilon})$.

[8]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 $\tau_h > \frac{1}{2\lambda\varepsilon}(\lambda + \sqrt{4\lambda - 3\lambda^2 - 4\lambda^2\varepsilon^2 + 8\lambda\varepsilon - 4s\lambda\varepsilon})$.

4.2 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:

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

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

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

In the following, we consider three different cases.

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.[9] 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 ε, 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

---

[9]This is in line with standard findings (see Bucovetsky, 1991, Kanbur and Keen, 1993, and Trandel, 1994).

can only be the case because the small jurisdiction undercuts the tax rate of its bigger rival. Indeed, it can be demonstrated[10] 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 longer compensate the disadvantage resulting from a tighter CFC rule.[11]

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 ε, 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 $x - s > 0$.

---

[10] 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.

[11] 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 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 looser 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 looser 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 Δ. 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 $x - s < 0$.

4.3 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 address this question by assuming that countries impose the CFC level that maximizes their tax revenues. However,

this poses 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.[12] This staging is dictated by the fact that changing rules is less flexible than setting tax rates.[13] 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 τ_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 τ_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

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

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

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[14]. 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 and highest values of τ_i $(i = h, f)$ are respectively τ_i^{min} and τ_i^{max}.

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

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

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

---

[12]Note that the model can also include tax havens with an active role in decision making. For this purpose a third stage can be added to the tax game. We thus assume that the tax havens first choose the specific advantages offered to the investors. In a second stage, the non haven countries determine their CFC threshold rates. In a last stage, the non havens compete in tax rates to attract mobile capital. The model can then be solved by backward induction. By assuming tax havens to have an active role in decision making, strategic interaction can be observed between non-havens and havens. See Appendix A for a detailed elaboration of this problem.

[13]Indeed, as in Han et al. (2017), the choice of sequentiality thus follows the rule that the most irreversible choice must be made in the first stage of the game.

[14]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 $\frac{\partial^2 T_f^*}{\partial \tau_f^2} = \frac{4}{9}\lambda\varepsilon(2 - s + \lambda [\tau_h(1 - \varepsilon\tau_h) - \tau_f(1 - \varepsilon\tau_f)]) + \frac{2}{9}\lambda^2(2\varepsilon\tau_f - 1)^2 > 0$.

level τ_h increases the equilibrium tax revenue T_h^*. Consequently, if the coefficient ε 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 τ_f on it's equilibrium tax revenue T_h^* is given by

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

Again, we can show that $\frac{\partial T_f^*}{\partial \tau_f} > 0$ for $\varepsilon > \frac{1}{2\tau_f}$ and $\frac{\partial T_f^*}{\partial \tau_f} < 0$ 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 $\tau_i = \tau_i^{min}$.*

5 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 on 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. Moreover, 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.

References

[1] Agrawal D. and D. Wildasin. 2020. Technology and Tax Systems. *Journal of Public Economics*, forthcoming.

[2] Altshuler R. and Grubert, H. 2005. The Three Parties in the Race to the Bottom: Host Governments, Home Governments and Multinational Companies. *Florida Tax Revenue*, 7, 153

[3] Altshuler R. and Hubbard G. 2003. The Effect of the Tax Reform Act of 1986 on the Location of Assets in Financial Services Firms. *Journal of Public Economics*, 87, 109-127.

[4] Bucovetsky S. and Smart M. 2006. The Efficiency Consequences of Local Revenue Equalization: Tax Competition and Tax Distortions. *Journal of Public Economic Theory*, 8, 119-144.

[5] Buslei H. and Simmler M. 2012. The Impact of Introducing an Interest Barrier - Evidence from the German Corporation Tax Reform 2008. *DIW Discussion Papers 1215*, Berlin.

[6] Clifford, S. 2019. Taxing Multinationals Beyond Borders:Financial and Locational Responses to CFC Rules. *Journal of Public Economics*, 173, 44-71.

[7] Collier R., Kari S., Ropponen O., Simmler M., and Todtenhaupt M. 2018. Dissecting the EU's Recent Anti-Tax Avoidance Measures: Merits and Problems. *EconPol Policy Report 08. European Network for Economic and Fiscal Policy Research*

[8] Dharmapala D. 2008. What Problems and Opportunities are created by Tax Havens? *Oxford Review of Economic Policy*, 24(4), 661-679.

[9] Dharmapala D. 2019. Profit Shifting in a Globalized World. *AEA Papers and Proceedings*, 109, 488-492.

[10] Dreßler, D. and Scheuering, U. 2012. Empirical Evaluation of Interest Barrier Effects. *ZEW Discussion Paper No. 12-046*.

[11] Egger, P and Wamser, G. 2015. The Impact of Controlled Foreign Company Legislation on Real Investments Abroad. A multi-Dimensional Regression Discontinuity Design. *Journal of Public Economics*, 129, 77-91

[12] Eggert W. and Itaya J. 2014. Tax Rate Harmonization, Renegotiation, and Asymmetric Tax Competition for Profits with Repeated Interaction. *Journal of Public Economic Theory*, 16(5), 796-823.

[13] G20 Leader's Declaration at Los Cabos, Mexico. 2012. https://www.consilium.europa.eu/uedocs/cms_-data/docs/pressdata/en/ec/131069.pdf.

[14] Han Y., Pieretti P. and Zou B. 2017. On the Desirability of Tax Coordination when Countries compete in Taxes and Infrastructure. *Economic Inquiry*, 55(2), 682-694.

[15] Haufler A. and Runkel M. 2012. Firms' Financial Choices and Thin-capitalization Rules under Corporate Tax Competition. *European Economic Review*, 56, 1087-1103.

[16] Haufler A., Mardan M. and Schindler D. 2018. Double Tax Discrimination to attract FDI and fight Profit Shifting: The Role of CFC Rules. *Journal of International Economics*, 114, 25-43.

[17] Hong Q. and Smart M. 2010. In Praise of Tax Havens: International Tax Planning and Foreign Direct Investment. *European Economic Review*, 54(1), 82-95.

[18] Johannesen N. 2010. Imperfect Tax Competition for Profits, Asymmetric Equilibrium and Beneficial Tax Havens. *Journal of International Economics*, 81, 253-264.

[19] Kanbur, R. and Keen, M. 1993. Jeux Sans Frontières: Tax Competition and Tax Coordination when Countries differ in Size. *American Economic Review*, 83(4), 877-893.

[20] Keen M. 2001. Preferential Regimes Can Make Tax Competition Less Harmful. *National Tax Journal*, 54, 757-762

[21] Mutti, J. and Grubert, H. 2009. The Effect of Tax Royalities and the Migration of Intangible Assets Abroad. *Pages 111-137 of: International Trade in Services and Intangibles in the Era of Globalization.* University of Chicago Press.

[22] OECD .1996. OECD Controlled-Foreign-Company Legislation. *Studies in Taxation of Foreign Source Income*, OECD Publishing, Paris.

[23] Pieretti, P. and Zanaj, S. 2011. On Tax Competition, Public Goods Provision and Jurisdictions' Size. *Journal of International Economics*, 84(1), 124-130.

[24] Pieretti, P. and Pulina G. 2020. Does eliminating International Profit Shifting increase Tax Revenue in high-tax Countries? *Economic Modelling*, forthcoming.

[25] Ruf M. and Weichenrieder A.J. 2012. The Taxation of Passive Foreign Investments: Lessons from German Experience. *Canadian Journal of Economics*, 45, 1504-1528.

[26] Trandel, G. 1994. Interstate Commodity Tax Differentials and the Distribution of Residents. *Journal of Public Economics*, 53, 435-457.

A   Appendix: Tax Havens As Active Decision Makers

The proposed theoretical model can be extended by assuming tax havens to have an active role in decision making and to interact with the onshore countries.

Let us consider a continuum of tax havens, which do not only offer preferential tax rates t_H, but also a differentiated service to the investors. This service can be interpreted as a set of advantages offered to investors, including zero or low withholding taxes, bank secrecy laws (i.e., a high level of client confidentiality), tax rulings or other preferential regulatory criteria[15].

In the following, let us denote by Θ_H the level of preferential services offered to investors by a haven H. Remember that the amount of capital transferred to the haven with the only purpose of granting loans to the HQ equals

$$k_i^H = \frac{\lambda}{r} k_i \left(1 - \varepsilon t_H\right). \tag{15}$$

We normalize k_i to 1. We can now introduce tax havens as active decision makers by replacing the exogenously given parameter ε by $\varepsilon_H = \frac{1}{\Theta_H}$, reflecting the preferential services provided to foreign investors by a respective haven. In other words, the higher Θ_H, the easier it is for the firm to find a suitable tax haven and to shift profits to the haven for tax purposes (due to the preferential regulatory criteria). We can thus re-write equation (15) as follows

$$k_i^H = \frac{\lambda}{r} \left(1 - \varepsilon_H t_H\right). \tag{16}$$

Each tax haven H is assumed to maximise its tax revenue, net of the cost of providing the preferential services. The policymakers' objective functions are thus given by

$$T_H = t_H \left(\frac{\lambda}{r} \left(1 - \frac{1}{\Theta_H} t_H \right) \right) - \frac{c_H}{2} \Theta_H^2, \tag{17}$$

where the second term reflects the cost of providing preferential services, which is given by a quadratic cost function. Note that the parameter c_H is a haven-specific efficiency parameter. More precisely, the higher the parameter c_H, the higher the costs related to the provision of preferential services. It is straightforward to show that the objective function of the policymakers is strictly concave in the level of preferential services provided to the investors. The first order conditions thus yield the the optimal service:

$$\hat{\Theta}_H = \sqrt[3]{\frac{\lambda t_H^2}{r c_H}}. \tag{18}$$

---

[15]See Dharmapala (2008) for a detailed overview of favourable tax regimes offered by havens.

This strategic decision on the optimal level of preferential services provided by the tax havens can thus be incorporated into the tax game described in Section 4. For this purpose, we can assume that the tax havens first choose the level of preferential services offered to investors. If we then assume that the non-havens determine their CFC thresholds in the second stage, and compete in taxes in the last stage, the game can be solved by backward induction (see Section 4.1 and 4.3).

Note that, by assuming tax havens to have an active role in decision making, strategic interaction can be observed between non-havens and havens. Indeed, the tax havens choose the optimal level of services provided to foreign investors, while the non-havens compete in tax rates. In that case, we can see that the tax rate applied in the onshore county has an effect on the level of preferential services provided in offshore country. Using equations (4) and (5) and replacing the exogenously given parameter ε by a haven-specific parameter $\varepsilon_H = \frac{1}{\Theta_H}$, we can calculate the total differential

$$d\varepsilon_H = \frac{\partial \varepsilon_H}{\partial t_h} dt_h + \frac{\partial \varepsilon_H}{\partial t_f} dt_f. \tag{19}$$

By the the definition of the partial derivative, $\frac{\partial \varepsilon_H}{\partial t_h}$ is independent of t_f and vice versa. Hence, using the inverse function theorem, it is straightforward to show that

$$\frac{\partial \varepsilon_H}{\partial t_h} = \frac{1}{\frac{dt_h}{d\varepsilon_H}} < 0, \tag{20}$$

$$\frac{\partial \varepsilon_H}{\partial t_f} = \frac{1}{\frac{dt_f}{d\varepsilon_H}} < 0. \tag{21}$$

As already shown in *Section 3.1*, with increasing ε_H, the firms find it more difficult to reduce their tax liability by using tax havens (i.e., $\frac{dt_h}{d\varepsilon_H} < 0$ and $\frac{dt_f}{d\varepsilon_H} < 0$). Consequently, the firms will try to relocate in a lower tax country. This forces the jurisdiction to compete more aggressively in taxes and as a result, tax rates decrease.

Using the inverse function theorem, we can thus show that $\frac{\partial \varepsilon_H}{\partial t_h} < 0$ and $\frac{\partial \varepsilon_H}{\partial t_h} < 0$. As $\varepsilon_H = \frac{1}{\Theta_H}$, the higher the tax rate in the non-haven, the lower the preferential service provided by the haven. The intuition behind this result can be explained as follows. The higher the tax rate in the jurisdiction where the firm is headquartered, the more inclined this firm is to reduce its tax liability by relocating in a lower tax country. If the firm relocates to a lower tax country, a different CFC threshold rate applies. As a consequence, the tax haven needs to increase the level of preferential services provided in order to attract mobile capital from offshore countries, which could otherwise be shifted to tax havens applying lower tax rates.