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Tax competition and phantom FDI[*]

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Abstract

Offshore financial centers are almost never the final destination of the foreign direct investments (FDIs) they receive. A large portion of these investments are *phantom FDIs*, which ultimately flow to third countries or return back to the source country in a process called *round-tripping*. This paper develops a model in which onshore countries compete internationally with tax instruments to attract capital from abroad, in the presence of an offshore financial center that encourages phantom FDI. We show that the presence of offshore financial centers is beneficial to technologically advanced countries, whereas it is detrimental to others. Finally, we use this framework to analyze the effectiveness of Controlled Foreign Company rules against profit shifting recently implemented in Europe and the associated loss of tax base.

Keywords: International tax competition; Offshore financial centers; Round-tripping; Profit shifting; Phantom FDI

JEL Classification: F21, H26, H25 , F23.

1   Introduction

Offshore financial centers (OFCs) are typically not the final destination of the foreign investments they attract. A large portion of offshored capital flows to these jurisdictions—usually for tax avoidance purposes—before being either invested in other countries or redirected back to the source country in a process known as *round-tripping*. Therefore, these capital flows do not represent final investments but rather *phantom FDI* (Damgaard *et al.*, 2019).

Accordingly, in this paper, we analyze the tax competition of homogeneous and heterogeneous onshore countries in the presence of an offshore financial center, which attracts phantom FDI. Our final aim is to explore which countries actually benefit from the presence of an offshore financial center and phantom FDI.

Offshore financial centers play a significant role in global foreign direct investment (FDI). Already in 2012, about 8 percent of total cross-border investments took place in these jurisdictions (UNCTAD, 2015), and more recently Damgaard *et al.* (2019) reported that more than 40 percent of global FDI is hosted in well-known international financial centers such as the Netherlands, Luxembourg, Hong Kong SAR, Switzerland, Singapore, Ireland, Bermuda, the British Virgin Island, and the Cayman Islands. These disproportionate capital flows are central to the policy debate in taxation, and in particular concerning tax avoidance activities, which have led to several measures stemming tax-motivated financial flows (see OECD, 2013a; OECD, 2013b; OECD, 2014; and European Commission, 2016a).

However, a large portion of FDI inflows is not invested in projects based in OFCs. As an example, UNCTAD (2013) reported that "[..] the top three destinations of FDI flows from the Russian Federation - Cyprus, the Netherlands and the British Virgin Islands - coincide with the top three investors in the Russian Federation [..] ". Moreover, UNCTAD (2015) documented that "in 2012, the British Virgin Islands were the fifth-largest FDI recipient globally with inflows at $72 billion [..]" and that "outflows from the British Virgin Islands, at $64 billion, were disproportionally high compared with the size of the economy".

This is also confirmed by Damgaard *et al.* (2019), who find that a large part of the outward FDI from main offshore financial centers is ultimately owned by investors in other economies. They show that *round-tripping* is most significant for in-transition economies, such as China and Russia, where about 25 percent of real FDI is owned by domestic investors, and that countries with large real FDI positions are more exposed to phantom FDI (e.g., the USA and China).

To route capital through an offshore financial center, investors use conduit companies known as "special purpose entities" (SPEs) set up for different purposes. Very often, SPEs facilitate profit shifting.[1] There is ample evidence that multinational corporations engage in international tax planning and profit shifting using offshore financial centers (Hines & Rice (1994), Huizinga & Laeven (2008), Dischinger & Riedel (2011),

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[1] Public debates and media reports (see The Financial Times (2016) for an overview of the recent release of the "Panama Papers" that clarifies how taxation was avoided through offshore financial centers) argue that the function of these conduits is to receive capital and (a portion of) corporate income, which is thus shifted away from high-tax countries for purposes of tax avoidance.

Karkinsky & Riedel (2012), Dharmapala & Riedel (2013)), with corresponding detrimental effects on tax revenues of onshore countries.[2]

The previous literature has nonetheless neglected one aspect. What is the final destination of capital flows from offshore financial centers? What countries ultimately benefit from these flows? This paper develops a theoretical framework to answer these questions. Using a classical *round-tripping* scheme, a firm incorporates a company in an offshore financial center and transfers some funds from the home country to this company and back. Funds are converted from domestic to foreign investment since they take the citizenship of the offshore financial center in which the company has been incorporated. The main motivation behind this scheme is to avoid home taxation and/or benefit from special home incentives only offered to foreign agents. As a result, the home tax base is eroded but there is no capital loss since capital returns in the form of investment after being offshored. By contrast, capital investments may be sensibly shrunk when the offshored capital is not *round-tripped* but rather invested in a third country. Hence, although the ultimate destination of the offshored capital does not concern the OFC, these two schemes may affect the behavior of onshore countries differently.[3] We believe a theoretical analysis of these phantom FDIs is crucial to better qualify the effects of international tax competition in the presence of offshore financial centers.

Accordingly, we first develop a model of homogeneous and then heterogeneous onshore countries competing with tax instruments to attract real investments but with the presence of an offshore financial center. This jurisdiction encourages phantom FDI, which facilitates profit shifting, eroding the tax base of onshore countries. We consider onshore countries that only differ in the potential profitability of firms located there. This difference in profitability can be due to the productivity of firms located in their territories (the distance of the country's technology from the technological frontier) or any other country-specific characteristics.

The main result is that not only does the offshore center benefit from phantom FDI, but so does the technologically advanced country. This comes at the expense of the less advanced onshore economy. The presence of heterogeneous countries increases the incentive for capital to flow to the more advanced economy, which is then able to set even higher corporate taxes than it otherwise would. This is a new result in the literature of international tax competition, which usually sees onshore economies lose from offshore financial centers and phantom FDI. We find that the offshore financial center also benefits from heterogeneity across onshore countries. This is because it can set higher fees to seize part of the efficiency gains that agents in the less advanced

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[2]Hines & Rice (1994) show that in 1982, extremely high profits were reported by American companies for their offshore subsidiaries. Similarly, Huizinga & Laeven (2008) improve the method by taking into account the different tax rates faced by multinational corporations' affiliates. They find that international profit shifting has a redistribution effect on national corporate tax revenues. Dischinger & Riedel (2011) examine intangible fixed assets from firms' balance-sheets since they are one of the primary sources of profit shifting opportunities. They find that the level of intangible assets of a subsidiary located in an offshore financial center increases as the average tax difference from all other affiliates rises. Karkinsky & Riedel (2012) show that (within a multinational group), a patent application is more likely to be filed by an affiliate facing a lower tax rate. These authors consider income shocks experienced by parent firms and show how they propagate among low-tax and high-tax branches. They demonstrate that these shocks are associated with a significant increase in pre-tax profits for low-tax affiliates.

[3]OFCs are not concerned about where the offshored capital is reinvested since they only care about the fees they can collect from the incorporated companies.

country obtain from phantom FDI. Ultimately, the winners of the international tax competition game are the technologically advanced countries and the offshore financial centers, while the less technologically advanced countries lose.

Moreover, we use our framework to explore the effect of the recent international efforts against profit shifting. Among the recent and ongoing policy responses to stem tax-motivated financial flows, the Anti-Tax Avoidance Directive (ATAD) of the European Commission (see European Commission, 2016a), which went into effect on January 1, 2019, appears to be relevant for phantom FDI. This directive has implemented a Controlled Foreign Company (CFC) rule that aims to discourage companies from shifting profit from their parent company in a high-tax country to controlled subsidiaries in low-tax jurisdictions to reduce the overall tax liability.[4] Therefore, profit shifted offshore has to be taxed onshore if the actual corporate tax paid overseas is less than half of that which would have been paid in the home country (the European member state). Using our theoretical setting, we study when this rule may apply and is effective in reducing tax base erosion in source countries. We find that when the return on capital is high, the CFC rule is not applicable and the tax and fee solution remains unchanged. In contrast, when the return on capital is low, the CFC rule increases onshore corporate tax without necessarily reducing future phantom FDI.

Our analysis is related to the literature on the theory of offshore financial centers (see Dharmapala, 2008 and Keen & Konrad, 2013 for a survey). The standard tax competition literature predicts that these jurisdictions reduce welfare in onshore economies since they intensify competition (Slemrod & Wilson, 2009). As in Slemrod & Wilson (2009) and Bucovetsky (2014), we apply the usual simplification that considers tax concealment as the only service offshore financial centers provide. In this interpretation, tax concealment does not involve any movement of a firm's actual production. Bucovetsky (2014) explains how the presence of offshore financial centers may increase tax revenues in onshore countries. The intuition is that these jurisdictions make high-tax countries less willing to set low tax rates and thus mitigate tax competition. Hong & Smart (2010) point out that international tax avoidance schemes erode tax revenues but may also reduce tax burdens on mobile capital, facilitating investments. In particular, they show how income shifting reduces the revenues of high-tax countries, increases tax base elasticities, and tends to make the location of real investment less responsive to tax rate differentials. This allows states to maintain or even increase their tax rates while preventing outflows of FDI. Chu (2014) shows how competition in tax enforcement policies (as an alternative to tax competition) may counter the decline in onshore taxation and thus the under-provision of public goods. We complement this literature by highlighting that not only offshore financial centers but also onshore countries can benefit from mobile tax bases and round-tripping deals. In addition, we depart from the basic model (applied by Slemrod & Wilson, 2009; Johannesen, 2010; and Hong & Smart, 2010) that assumes a system of identical onshore countries that compete for mobile capital. We also endogenize the behavior of the offshore financial center. This allows us

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[4]CFC rules were first introduced in the US in 1962. Their purpose was to tax income earned in low-tax foreign countries (Dharmapala (2019)).

to focus on the impact of heterogeneity on the welfare and tax revenue of onshore countries, given the presence and strategies of an offshore financial center.

Finally, we contribute to the literature on the effects of CFC rules. The increase in the foreign passive income across OECD countries is a signal that CFC rules are becoming used among OECD countries (Dharmapala (2019)). Why has not the CFC rule not been used more widely and earlier in the EU countries? Dharmapala (2019) argues that politicians may have overseen these operations or deals, but as rightly pointed out by the author, this oversight must be quite systematic rather than random.[5] In our setting, we identify which countries win and lose from round-tripping deals. It appears that technologically advanced countries and offshore financial centers benefit from these deals. It is then natural to suspect that the limited use of CFC rules could be attributed to the heterogeneity of countries that are supposed to implement such regulations.

The paper is set out as follows. Section 2 presents the benchmark setting where round-tripping occurs with a single onshore country facing an offshore financial center. Section 3 analyzes what happens when two heterogeneous onshore countries are in the picture. Finally, Section 4 gauges the effectiveness of the ATAD CFC rule, while Section 5 offers some concluding remarks.

2   Phantom FDI and round-tripping

In this section, consider two *homogeneous* onshore economies denoted by H_z and $z = i, j$ and an offshore financial center F. Countries H_i and H_j levy taxes on profits of firms and use the tax revenue to produce a local public good $G_z, z = i, j$. The offshore center does not have any domestic population and only offers tax avoidance practices to foreign firms. More precisely, conduit companies can be established in the offshore financial center by onshore companies against the payment of a fee f, proportional to the offshored capital.[6] These conduit companies are vehicles serving the sole purpose of avoiding onshore tax. Capital transferred to these companies either returns home in the form of investment in the onshore firms (*round-tripping*) or is invested in a third country.[7]

There is a unit mass of capital owners—entrepreneurs—in each country, distributed along the interval $[0, 1]$. Each agent is endowed with an amount k of capital and owns a firm in which this capital can be invested. Agents are homogeneous in the perception of their home country but heterogeneous in their attitudes towards foreign investment. More precisely, an agent living in H_i or H_j who invests capital in a conduit company

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[5]Another argument is the coordination failure explored in Haufler *et al.* (2018). Using a standard tax competition framework to model the choice of thin capitalization rules, Haufler *et al.* (2018) interestingly find that the Nash equilibrium taxes will be lower than the globally optimal outcomes. Indeed, in the presence of many onshore countries, tax externalities due to mobile tax bases lead to a coordination problem that puts downward pressure on tax policies.

[6]Note that offshore centers may differ with regard to the fees they charge. For instance, the Cayman Islands (no corporate income tax) charge an annual fee that varies (stepwise) with the conduit capitalization. Similarly, conduits established in Gibraltar pay a set-up fee of 0.5% on authorized capital. In Luxembourg, funds have to pay an annual subscription tax (*taxe d'abonnement*) at the rate of 0.05% on their total assets. Other offshore financial centers like Panama or Anguilla charge a flat fee. However, the application of a different fee scheme does not qualitatively affect the results of our model.

[7]Since we aim to analyze international competition among onshore countries and the offshore financial center, we do not consider the possible competition among offshore banks.

located in the offshore financial center incurs a cost, which has the nature of a "transport cost" *à la* Hotelling (1929): $cx_l^i > 0$ for agents living in H_i and $cx_l^j > 0$ for those in H_j, and $l \in [0,1]$. The parameter c can be viewed as an inverse measure of the degree of international financial integration: the lower the c, the more integrated the financial markets.[8] The parameter x captures agent heterogeneity within each country and captures the "distance" between agents and foreign countries. Importantly, x does not only provide a measure of the geographical distance between an agent's location and the offshore financial center or the other onshore country; rather, it reflects the idiosyncratic preferences of agents regarding foreign investment and offshoring their capital. In this context, an agent who faces a high cost displays a strong reluctance to offshore capital to a conduit company. In contrast, an agent bearing a low cost is more likely to offshore her capital. Therefore, capital mobility is imperfect for two main reasons: imperfect financial integration and heterogeneous agents.

In countries H_i and H_j, k units of capital generate a pre-tax profit of Π for the agent owner of the firm. In this benchmark setting, the pre-tax profit is the same in both countries. This is due, for instance, to the use of the same technology by firms operating in both countries. Governments of the onshore economies H_i and H_j levy corporate taxes, T_i and T_j, respectively, on the profit earned in their territory according to the *territorial* taxation principle. The offshore financial center only charges a fee f on the offshored capital. Since we focus on international fiscal competition, for the sake of simplicity we assume that the onshore countries set corporate profit taxes T_i and T_j that are a linear function of their tax on capital, namely $T_z \equiv \lambda t_z$, $z = i, j$, with λ being an exogenous parameter. Hence, finally, all countries compete in capital taxes t_i, t_j, and f.

Governments are benevolent and aim to maximize the amount of the public good, ultimately maximizing tax revenues. Agents maximize their net after-tax income. Each agent chooses between four strategies: (i) invest capital in the firm (s)he runs in the country of residence, H_z, (ii) invest directly in a firm in the other onshore country H_{-z}, or offshoring the initial endowment $k \in R^+$ by creating a conduit company to then either (iii) round-trip the capital or (iv) invest in H_{-z}. We will see later why out of these four options agents will only consider either investing directly in the home firm (i) or round-tripping the investment after having offshored their capital (iii).

Production and consumption occur only in onshore economies H_z, and offshore companies are only used for tax purposes. Profits are generated by home firms with capital from conduit companies accruing, untaxed, to onshore agents, who use it for consumption. Then, agents receive the firm's profit net of taxes, $(1 - \lambda t_z)\Pi$, $z = i, j$.

The timing of these decisions is as follows. First, countries choose capital taxation and offshoring fees. Then, after observing these choices, agents decide whether or not to offshore their capital in conduit companies and the location of their investment. Finally, production occurs and taxes and fees are collected. Because the investment decisions of agents are completely determined by tax rates and fees, we model the competition for mobile agents as a static simultaneous-move Nash game.

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[8]When $c = 0$, there is perfect capital mobility and agents' heterogeneity does not matter.

2.1 Investment decision

In each country $H_z, z = i, j$, agents$l$'s preferences are given by

$$U(C_l, G_z) = C_l + v(G_z), \ l \in [0,1] \ \text{and} \ z = i, j, \tag{1}$$

where $C_l(\cdot)$ represents agent l's private consumption while $v(G_z)$ is the net benefit derived from the public good G_z. An agents' private consumption C_l is the sum of the net profit accruing from their own firm $\Pi(1 - T_z)$, $z = i, j$.

Normalizing private good prices to one, agents have four investment alternatives that yield the following levels of utility:

i) Investing at home $U_l^h(C_l, G)$:

$$U_l^h(C_l, G) = \Pi(1 - T_z) + v(G_z), l \in [0,1] \ \text{and} \ z = i, j,$$

where the first term indicates net profits, with $T_z = \lambda t_z$, and the second term the utility accruing from public services.

ii) Investing directly in the foreign onshore economy $U_l^d(C_l, G)$:

$$U_l^d(C_l, G) = \Pi(1 - T_j) + v(G_i) - cx_l, \ l \in [0,1],$$

where x_l is agent l's individual cost of offshoring capital and $c \in R^+$ is the degree of integration of the financial markets.

iii) Investing in the foreign onshore economy through an offshore financial center $U_l^o(C_l, G)$:

$$U_l^o(C_l, G) = \Pi - fk + v(G_z) - cx_l, l \in [0,1] \ \text{and} \ z = i, j, \tag{2}$$

where kf is the total offshoring fee.

iv) Round-tripping the capital through an offshore financial center, $U_l^r(C_l, G)$:

$$U_l^r(C_l, G) = \Pi - kf + v(G_z) - cx_l, l \in [0,1] \ \text{and} \ z = i, j.$$

The level of capital supply in each country is determined by the comparison of the level of utility of the above four expressions. Given that firm profits are constant across onshore countries and there is a possibility to avoid paying onshore taxes, we have that: if the capital is offshored, it will always be round-tripped because alternatives (iii) and (iv) give exactly the same level of utility.

It remains to be determined whether agents living in country i will invest directly in country H_j or round-trip home their capital. For this, we need to compare the levels of utility under alternatives (ii) and (iii). It can be easily checked that alternative (iii) is preferred to alternative (ii) as long as $f < \frac{T_j}{k}\Pi$ holds. In other words, agents living in H_i will first offshore their capital and then invest in H_j—rather than investing directly in H_j—when the offshoring fee is quite small compared to the net profit in H_j. As we can easily check (see footnote 10), at equilibrium taxes and fee, the condition $f < \frac{T_j}{k}\Pi$ always holds.

To summarize, agents in each country H_z will compare alternative **i)** with **iii)–iv)** to decide whether to invest at home directly or round-trip the capital before investing. This comparison implies that the marginal consumer in each country is

$$\tilde{x}_z = \frac{\lambda t_z \Pi - fk}{c} \text{ with } z = i, j. \tag{3}$$

Accordingly, the tax base in countries H_z is due to the agents in the intervals $[\tilde{x}_i; 1]$ and $[\tilde{x}_j; 1]$. Agents in the intervals $(0, \tilde{x}_z)$ offshore their capital in conduit companies, avoiding taxes, and finally invest in their home countries.

As expected, the number of agents willing to offshore increases with the tax gains and with the initial endowment k, while it decreases with the moving cost c.

2.2 Tax choices

Countries interact in a simultaneous Nash game. Governments in the onshore countries select tax rates to maximize revenues derived from taxes on profits and fees. These revenues are entirely allocated to the production of the domestic public good. This assumption is consistent with maximizing the welfare of domestic residents assigning a high weight to the consumption of the public good.[9] The offshore financial center maximizes the total amount of collected fees W_F by charging a fee on offshored capital. We remain silent about the use of such resources in the offshore financial center.

Given the marginal consumers expressions above, the objective functions are

$$W_z = (1 - \tilde{x}_z)(\Pi * T_z), \quad z = i, j \quad \text{and} \quad W_F = \sum_z \tilde{x}_z kf. \tag{4}$$

With the concavity conditions satisfied, the following first-order conditions yield the best responses of the onshore country and the offshore financial center:

$$t_z(f) = \frac{c + fk}{2\lambda\Pi}, \quad z = i, j \quad and \quad f(t) = \frac{t_z \lambda \Pi}{2k}. \tag{5}$$

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[9]Similarly to Kanbur & Keen (1993), the onshore government in our paper does not have as its primary interest to maximize tax revenues in order to raise rents/bribes or to enhance the power of government officials. The government taxes to provide the essential public goods G such as schools, transport infrastructure, or hospitals, namely, public goods that positively affect the welfare of citizens.

The best onshore response shifts upward when agents become more captive, i.e., c increases, or f increases, or λ decreases. Evoking symmetry and solving the system of best response functions relative to the endogenous variables (t_i, t_j, f) of the model yields the following results:[10]

$$
\begin{aligned}
t_i^* &= t_j^* \equiv t^* = \frac{2}{3}\frac{c}{\lambda\Pi} \text{ and } f^* = \frac{1}{3}\frac{c}{k} & (6) \\
T_i^* &= T_j^* = \lambda t^*. & (7)
\end{aligned}
$$

Consequently,

$$
x_i^* = x_j^* \equiv x^* = \frac{1}{3}. \tag{8}
$$

In order to get an interior solution, i.e., $t^* < 1$ and $f^* < 1$, the following condition needs to be satisfied:

$$
0 < c < \bar{c},
$$

where

$$
\bar{c} = \begin{cases} \frac{3\lambda\Pi}{2} & if \quad \frac{\Pi}{k} < \frac{2}{\lambda} , \\ 3k & otherwise . \end{cases} \tag{9}
$$

Accordingly, from now on we assume that the mobility cost c satisfies (9), i.e., offshoring capital is neither too hard nor too easy.

The presence of an offshore financial center in this setting may be detrimental because it allows the round-tripping of capital, which decreases the tax revenue available for the production of the public good G (schools, parks, telecommunication and transportation infrastructure, etc.).[11] Through tax avoidance, round-tripping certainly also increases the opportunities of private consumption. In our simple setting that only focus on consumption, the overall impact of offshore activity on onshore economies finally depends on the marginal utility of the public good versus that of private consumption.[12]

To summarize, when onshore countries are homogeneous, fiscal competition in the presence of an OFC is detrimental because it reduces public goods. Tax competition among onshore countries is damaging for the same reason. Still, the presence of an OFC intensifies the horizontal tax externalities, aggravating the detrimental effects. This parasitic effect of the OFC is the classical result in the fiscal competition literature (see, among others, Slemrod & Wilson, 2009).

The framework developed in this section serves as a benchmark comparison to the setup developed in the next, in which two *heterogeneous* onshore countries compete to attract mobile capital in the presence of an offshore financial center. Our aim is to stress the role of heterogeneity of onshore economies.

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[10]Notice that the condition $f < \frac{T_j}{k}\Pi$ boils down to $\frac{1}{3}\frac{c}{k} < \frac{2}{3}\frac{c}{k}$, which is always satisfied.

[11]There are certainly ethical reasons related to tax avoidance that are relevant, but these are outside the scope of our economic analysis.

[12]It is easy to determine whether or not the presence of an offshore financial center increases overall onshore welfare. These calculations are available upon request.

3 Phantom FDI and heterogeneous countries

Now consider two *heterogeneous* onshore economies H_i and H_j that face the offshore center F. Our aim is to analyze the effects of competition for capital in the presence of an offshore center, when offshored capital ultimately gets invested in a third country. Onshore countries only differ regarding the profitability of firms located in each economy $\Pi_z > 0$, $z = i, j$. A greater value of profit implies a higher profit per firm and may indicate that the technology used in the country is closer to the world technology frontier.[13] Without loss of generality, we assume that $\Pi_j > \Pi_i$: country H_j is more technologically advanced than H_i. As explained before, each country is populated by a unit mass of individuals each having the same capital endowment of k, and agents are heterogeneous with respect to their home attachment $x_l, l \in [0, 1]$ to the onshore countries H_i and H_j, respectively. Agents have to choose where and how to invest their capital considering the profit net of cost of capital in the different onshore countries, Π_z with $z = i, j$. Even when onshore countries are heterogeneous, agents still have four alternatives for investment that yield the following levels of utility:

i) Invest their capital at home:

$$U_z^h = \Pi_z(1 - \lambda t_z) + vG_z; \tag{10}$$

ii) Invest their capital directly in the other onshore country H_{-z}:

$$U_z^d = \Pi_{-z}(1 - \lambda t_{-z}) + vG_z - cx_z; \tag{11}$$

iii) Invest in the other onshore country through the OFC:

$$U_z^o = \Pi_{-z} - fk + vG_z - cx_z; \tag{12}$$

iv) Round-trip the capital through the OFC:

$$U_z^r = \Pi_z - fk + vG_z - cx_z, \tag{13}$$

where the first element in all four alternatives is the firm's net profit. In equations (10) and (13), the firm is located in country H_z and is thus taxed at $T_z = \lambda t_z$, while in (11) and (12) the firm is located in country H_{-z}, thus it is taxed at $T_{-z} = \lambda t_{-z}$. The second component represents the utility accruing from the public good G_z. Finally, when capital is offshored, a further element cx_z captures the disutility from offshoring.

The level of capital supply in each country is determined by the comparison of the level of utility of the above four expressions. Given the difference in profitability between onshore countries and the possibility of avoiding onshore taxes, we have that if the capital is offshored, then re-investing it in the country with the highest profitability (i.e., H_j) is a dominant strategy. As a consequence, agents x_j living in country H_j prefer

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[13]A similar assumption is made in Hindriks *et al.* (2008).

to round-trip the capital rather than investing in H_i. For these agents, the payoff of alternative (iv) exceeds that of alternative (iii).

Importantly, agents living in H_i prefer to invest in H_j compared to round-tripping their capital. This is because the payoff they get from alternative (iii) exceeds that of (iv). Agents living in country H_i will invest in country H_j directly or through the OFC. To this end, we need to compare the payoff of alternatives (ii) and (iii). It can easily be checked that alternative (iii) is preferred to alternative (ii) as long as $f < \frac{\lambda \Pi_j}{k} t_j$ holds. In the Appendix, we analyze the alternative scenario in which $f > \frac{\lambda \Pi_j}{k} t_j$ and show that it never arises. Direct investment from country H_i to country H_j is never a Nash equilibrium strategy if an OFC exists. This implies that the OFC will always set a fee so that offshoring is an attractive option.

To summarize, we have that

1. Home agents in country H_i (the less advanced country) may only invest in country H_j through the OFC. They compare alternatives **i)** and **iii)**. This implies that their decision depends on the tax gains $\lambda t_i \Pi_i - fk$ and on the efficiency gains, $\Pi_j - \Pi_i$,

$$x_i = \frac{(\lambda t_i \Pi_i - fk) + (\Pi_j - \Pi_i)}{c}; \tag{14}$$

2. Home agents in country H_j only aim to lower their tax liabilities, and thus they only consider round-tripping. Hence, they compare alternatives **i)** and **iv)**, which yields

$$x_j = \frac{\Pi_j \lambda t_j - fk}{c} . \tag{15}$$

Finally, the tax base in country H_i depends on the number of agents distributed along the interval $[x_i; 1]$, whereas that of country H_j is given by the agents distributed along the interval $[x_j; 1]$. Agents distributed along the intervals $(0, x_i)$ and $(0, x_j)$ offshore their capital.

3.1 Tax decision

Similar to Section (2), onshore countries maximize tax revenues and the OFC maximizes the collected fees. The objective functions are

$$W_{H_i} = (1 - x_i)(\Pi_i * T_i), \quad W_{H_j} = (1 - x_j)(\Pi_j * T_j), \quad W_F = (x_i + x_j)kf. \tag{16}$$

Maximizing W_{H_i}, W_{H_j}, and W_F, the optimal tax choices (t_i^{**}, t_j^{**}) are

$$t_i^{**} = \frac{8c + 5\Pi_i - 5\Pi_j}{12\lambda\Pi_i} \text{ and } t_j^{**} = \frac{1}{12} \frac{8c - \Pi_i + \Pi_j}{\lambda\Pi_j}, \tag{17}$$

$$T_i^{**} = \lambda t_i^{**} \text{ and } T_j^{**} = \lambda t_j^{**}, \tag{18}$$

and the optimal fee selected by the OFC is

$$f^{**} = \frac{2c - \Pi_i + \Pi_j}{6k}.$$

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Consequently, the marginal agents in country H_i and country H_j are correspondingly given by

$$x_i^{**} = \frac{1}{12}\frac{4c - 5\Pi_i + 5\Pi_j}{c} \quad \text{and} \quad x_j^{**} = \frac{1}{12}\frac{4c + \Pi_i - \Pi_j}{c}. \qquad (19)$$

In order to have an interior solution ($0 < t_i^{**}, t_j^{**} < 1$; and $0 < x_i^{**}, x_j^{**} < 1$ and $f^* < \frac{\lambda\Pi_j}{k}t_j^*$), c has to satisfy the following condition:

$$\frac{\Pi_j - \Pi_i}{4} < c < \tilde{c},$$

where $\tilde{c} = \min\left\{\frac{5(\Pi_j - \Pi_i) + 12\lambda\Pi_i}{8}, \frac{\Pi_i - \Pi_j + 12\lambda\Pi_j}{8}, \frac{6k - (\Pi_j - \Pi_i)}{2}\right\}$.

We can now analyze the equilibrium choices of agents and governments. We first compare the optimal taxes and fees in this heterogeneous case to the benchmark with homogeneous countries solved in Section 2. We find the following results.

Proposition 1 *Assume heterogeneous onshore countries. The technologically advanced country and the OFC set higher corporate taxes and fees, respectively, than they would in the presence of homogeneous economies.*

Proof. By direct inspection of equations 6 and 17, we obtain $\Delta t_i = t_i^{**} - t^* = \frac{5}{12}\frac{\Pi_i - \Pi_j}{\lambda\Pi_i} < 0; \Delta t_j = t_j^{**} - t^* = \frac{1}{12}\frac{\Pi_i - \Pi_j}{-\lambda\Pi_j} > 0; \Delta f = -\frac{1}{6}\frac{\Pi_i - \Pi_j}{k} > 0.$ ∎

Furthermore, comparing the capital flows towards the offshore center, we show that

Corollary *The offshore center amplifies the flow of capital invested in the technologically advanced onshore country at the expense of the less advanced economy. The advanced country is able to attract additional capital from abroad, but also to retain more of its domestic capital.*

Proof. By direct inspection of equations 8 and 19, we obtain $\Delta x_i = x_i^{**} - x^* = -\frac{5}{12c}(\Pi_i - \Pi_j) > 0$ and $\Delta x_j = x_j^{**} - x^* = -\frac{1}{12c}(\Pi_j - \Pi_i) < 0.$ ∎

A close inspection of the equilibrium rates of this and the benchmark scenario reveals that technological heterogeneity benefits both the more technologically advanced economy and the offshore financial center by increasing the amount of capital they attract and their tax rate and offshoring fee. The reason is that the presence of heterogeneous onshore countries opens the door to efficiency gains for agents living in the less profitable economy. This heterogeneity in profitability affects the offshore financial center's behavior and thus the offshoring fees, reflecting the effort of the OFC to appropriate part of agents' efficiency gains (in addition to the tax gains) when offshoring capital. Hence, the incentive of agents in the less profitable country, i.e., to invest in the more profitable country and to avoid paying taxes, increases offshoring fees and taxes in the technologically advanced country. Both the offshore financial center and the technologically advanced onshore economy benefit from the offshored tax base lost by the less advanced economy.

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The technologically advanced country H_j is in a winner-takes-all position. Fewer agents living in H_j offshore their capital, despite the increase in tax rates. This is because they have no efficiency to gain from offshoring. As a consequence, those who offshore their capital round-trip it back home. These agents only respond to variations in the tax gain. This tax gain ultimately depends on two opposing effects triggered by the efficiency gain possibilities (due to onshore heterogeneity, as explained above): on the one hand, a negative effect determined by the increasing offshoring fee, and on the other hand, a positive one due to the increase in the tax rate in onshore country H_j. However, the former effect dominates and thus their tax gain decreases, making offshoring less attractive ($\Delta x_j < 0$). Hence, compared to the benchmark, the less advanced economy sets lower taxes but still loses more capital. Finally, compared to the benchmark, smaller amounts of capital from the most advanced economy are offshored.

It is interesting to investigate how optimal taxes compare between the two onshore countries. Direct comparisons give:

Proposition 2 *In the presence of an offshore financial center and heterogeneous countries, taxes in the least advanced country are higher than those in the most advanced one if and only if offshoring is costly enough, otherwise, the reverse holds true.*

Proof. By direct inspection of equations in 17: $t_i^{**} > t_j^{**}$ $\quad if \quad$ $c > \widehat{c} = \frac{\lambda \Pi_i + 5\lambda \Pi_j}{8\lambda}$. Note that $\widehat{c}$ must be smaller than $\tilde{c}$ to be a meaningful threshold in this setting. This is the case when $\lambda > \frac{1}{2}$ and $k > \frac{3\lambda \Pi_j - \lambda \Pi_i}{8\lambda}$. ∎

When the cost of mobility is high ($c > \widehat{c}$), agents are quite captive. It follows that it is only in this case that country H_i can tax more than country H_j. However, the technologically advanced country benefits from the high degree of financial integration implied by a relatively low mobility cost ($c < \widehat{c}$). In fact, when capital markets are very well integrated, the most advanced economy can tax more than country H_i while still being able to attract significant capital from abroad. In addition, this happens when the profit tax is much higher than the tax on capital gains ($\lambda > \frac{1}{2}$). This result is reminiscent of a particular strand of the existing literature that analyzes why tax rate differentials between competing jurisdictions may persist in equilibrium (Zissimos & Woolders (2008); Hindriks *et al.* (2008); Pieretti & Zanaj (2011)). These papers develop models of tax and public goods competition. Their focus is on the country asymmetry fueled by differences in size or in the level of public investments. Despite the different research focus, Proposition 2 gives an interesting insight into tax differentials between onshore economies in the presence of an offshore financial center.

We believe this last result is relevant in view of the tremendous increase in capital mobility over recent years. Barriers to international capital mobility have fallen continuously due to deregulation policies, accompanied by the development of new technologies in financial markets. This has further fueled financial integration and capital mobility.

Accordingly, our results show that offshore financial centers and more technologically advanced economies have benefited the most from the presence of OFCs and increased capital mobility. In contrast, the effects on

tax revenue and the corresponding public services in less advanced countries appears harmful.

4   The ATAD and CFC rule

In the above sections, we have explored how the presence of an offshore financial center amplifies the amount of capital that flows from less advanced countries to technologically advanced ones. In this section, we turn to evaluating the effectiveness of a famous policy intervention in the European Union aimed at stopping this capital leakage. In 2015, the European Commission adopted the Anti-Tax Avoidance Package, which included a proposal for an Anti-Tax Avoidance Directive (ATAD) (see European Commission, 2016a).[14] This directive was adopted on 20 June, 2016, and all member states applied these measures from 1 January, 2019. The ATAD sets three key anti-avoidance standards, which came into force on 1 January, 2019. These are (i) the Controlled Foreign Company (CFC) rule, to deter profit shifting; (ii) Interest Limitation, to discourage companies from artificial debt arrangements; and (iii) the General Anti-Abuse Rule, to tackle any remaining issues.

The CFC rule is relevant for our setting because if applied, it may change the optimal tax policy of onshore countries as well as the offshoring fee. The CFC rule aims to discourage companies from shifting profit from their parent company in a high-tax country to controlled subsidiaries in low-tax jurisdictions such as offshore financial centers in order to reduce their overall tax liability. This rule ensures that the home country (an EU member state) of the parent company can tax the profits that the company has shifted to a low-tax country. In particular, profit shifted offshore has to be taxed onshore if the actual corporate tax paid overseas is less than half of that which would have been paid in the home country (the European member state).[15] It is worth mentioning that the ATAD being a European directive only, our setting remains unchanged if all countries involved are not EU member states.

To uncover when the CFC rule is applicable and changes the optimal taxes and fees in our setting with round-tripping, we concentrate on the benchmark scenario in which an offshore financial center interacts with two homogeneous onshore economies. How does the CFC rule change the optimal taxes in this case? Interestingly, the optimal choices in (6) and (8) may remain invariant even if a country adopts the ATAD directive. It is easy to show that there exists a constellation of parameters for which the optimal offshoring fee f^* exceeds half of the onshore corporate tax. It is readily verified that $f^* > \frac{1}{2}t^*$ if and only if

$$\frac{\Pi}{k} > \frac{3}{2\lambda}. \tag{20}$$

Hence, if the return on capital Π/k is relatively high, then the CFC is not applicable and the equilibrium

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[14]In addition to the ATAD, the EC package consists of three other documents: a Communication for an External Strategy for Effective Taxation, the amendment to the directive on mutual assistance to apply automatic exchange of information to country-by-country reporting, and the recommendation on tax treaties adding the "genuine economic activity" test to the Principal Purpose Test (PPT) rule (see European Commission, 2016b; European Commission, 2016c; European Commission, 2016d).

[15]Member states can apply stricter rules. The ATAD provides two options under which member states can impose the CFC rule, and it also allows for some exceptions for activities with substance that we do not address in this paper.

discussed in previous sections holds. Whether or not the CFC rule will be applicable depends on the parameter λ, which captures the difference between the tax rate on capital and on profits. The larger the λ, the bigger the gap between the tax on profit and on capital, and the more likely it is that the CFC rule will not be activated. Therefore,

Lemma *The higher the profit tax compared to the capital gains tax, the higher the chance of the CFC rule not applying at all, leaving the tax policy choices unchanged. In contrast, the smaller the differences between the two tax instruments, the greater the chance that the CFC rule is activated.*

In contrast, if the return on employed capital is relatively low, i.e., $\Pi/k < \frac{3}{2\lambda}$, the fee of the onshore center is smaller than 50% of the tax in the onshore economy; therefore, the CFC rule applies and the onshore country will further tax the capital. It follows that the optimal solution in terms of taxes and fees is no longer the interior solution. The choices of the countries adapt to the new regulations. In this set of parameters, the regulations impose a lower bound to the choice of the offshoring fee

$$\bar{f} = \frac{t_z}{2}, \ z = i, j,$$

where we assume for simplicity that the onshore countries exactly apply the lower tax bound requested by the ATAD, the 50% threshold. The onshore jurisdictions require shifted profit to be taxed at a rate that is higher than the rate imposed by ATAD. The best reply of the onshore countries to $\bar{f}$ is

$$t(\bar{f}) \equiv \bar{t}_z = \frac{c}{2\lambda\Pi - k} > 0 \text{ with } \frac{\Pi}{k} > \frac{1}{2\lambda}, z = i, j.$$

Hence, in the set $1/2\lambda < \Pi/k < 3/2\lambda$, the optimal tax and fee solution in the presence of a CFC rule is given by

$$\bar{t}_i = \bar{t}_j = \bar{t} = \frac{c}{2\lambda\Pi - k} \text{ and } \bar{f} = \frac{1}{2} \frac{c}{2\lambda\Pi - k}.$$

The corresponding marginal investor has the following expression:

$$\bar{x} = \frac{1}{2}.$$

We are now in a position to investigate whether the CFC rule achieves its goal by increasing the capital remaining in the onshore economy, thereby reducing offshoring. Direct comparisons lead to the following result:

Proposition 3 *If the return on employed capital is high (i.e., $\Pi/k > 3/2\lambda$), the CFC rule is not applicable and the optimal tax and fee are not affected. In contrast, if the return on capital is low (i.e., $1/2\lambda < \Pi/k < 1/\lambda$), the CFC rule is applied and increases the equilibrium onshore taxes and offshoring fee, but the amount of offshored capital does not decrease.*

Proof. By direct inspection of optimal choices. ∎

It may appear paradoxical that the introduction of a CFC rule does not decrease the amount of offshored capital. However, this result is not at all surprising. If policy decisions are made strategically by rational policymakers, then an increase in the offshoring fee will push up the equilibrium corporate taxes because taxes and fees are strategic complements. A generalized increase in tax rates does not necessarily expand the onshore tax base.

To conclude, the introduction of CFC rules may not affect tax revenues of onshore countries as long as they are not applicable. This scenario occurs when the return on capital is high and, therefore, the potential loss of onshore tax revenue is highest. This calamitous scenario for the onshore economies is more likely when taxes on profits are substantially higher than those on capital. These findings draw attention not just to the effectiveness of CFC rules but also to the optimal tax policy required to make these rules work.

As a final remark, in the setting with two heterogeneous onshore countries, similar results to Proposition 3 hold. The CFC rules may lead to a generalized increase in taxes and fees. Moreover, if the productivity of capital differs greatly across onshore countries, the flow of capital from one economy may altogether stop flowing towards an offshore financial center due to the CFC rule. This outcome resembles the description of the scenario in Proposition 3.

5   Conclusions

A paramount concern of public economics and the political economy literature relates to the fact that tax competition and offshore financial centers may reduce tax revenues, erode tax bases, and have other harmful effects through the inefficient allocation of resources across space. These concerns are exacerbated when tax competition takes place among onshore countries and offshore financial centers. Globalization and the progressive removal of barriers to capital mobility have made it easier for capital to be relocated to offshore financial centers. However, offshore financial centers are typically not the final destination for the foreign investments they attract. The offshored capital represents phantom FDI, which is not invested into projects based in offshore financial centers. Instead, the offshored capital is often reinvested into real operations of firms located in other countries. Onshore capital flows to an offshore financial center, and then it is either invested in high-tax countries or redirected back to the source country, a process known as "round-tripping".

In this paper, we analyze how these schemes affect the welfare and tax revenue in onshore countries when they face an offshore financial center. In particular, we develop a model in which heterogeneous onshore countries compete internationally for mobile capital with an offshore financial center, and compare it to a benchmark that considers a similar competition but with homogeneous onshore regions. We demonstrate that an onshore country engaged in tax competition with an offshore financial center benefits from the presence of a less advanced onshore jurisdiction. This result follows from the heterogeneity between onshore countries. When onshore countries are heterogeneous, the offshore financial center responds by increasing its fees to appropriate

a portion of the efficiency gains that agents in the less advanced country can reap from offshoring.

Finally, we qualify the conditions under which the CFC rules included in EU regulation fighting profit shifting (i.e., the ATAD) can be effective. We find that this CFC rule is less likely to be applicable when the return on capital is high. By contrast, when the return on capital is low, the CFC rule induces higher onshore corporate taxes without necessarily reducing phantom FDI.

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Appendix: Agents in H_i never invest in H_j using the OFC

In this Appendix, we explore the hypothetical scenario in which the OFC selects such a high fee as to induce agents located in country H_i to invest directly in H_j rather than offshoring their capital first. This scenario would happen if

$$f > \frac{\lambda \Pi_j}{k} t_j.$$

In this case, agents in country H_i would prefer alternative (iii) to alternative (ii), meaning that no capital of investors of H_i is offshored ($x_i \leq 0$). Accordingly, these investors will ultimately compare home investment with direct investment in country H_j. The corresponding marginal consumer is

$$\bar{x}_i = \frac{\Pi_j - \Pi_i + \lambda \left(\Pi_i t_i - \Pi_j t_j \right)}{c}.$$

The set of alternatives of investors in country H_j does not change. They would still compare home investment vs. round-tripping.

It follows that the governments' objective functions would be

$$W_{H_i} = (1 - \bar{x}_i) \Pi_i t_i, \tag{21}$$

$$W_{H_j} = (1 - x_j + \bar{x}_i)\Pi_j t_j, \tag{22}$$

$$W_F = x_j k f. \tag{23}$$

Maximizing W_{H_i}, W_{H_j}, and W_F, the optimal government choices would be

$$f^{**} = \frac{(3c - \Pi_i + \Pi_j)}{12k},$$

$$t_i^{**} = \frac{(9c + 5\Pi_i - 5\Pi_j)}{12\lambda \Pi_i},$$

$$t_j^{**} = \frac{(3c - \Pi_i + \Pi_j)}{6\lambda \Pi_j}.$$

However, this equilibrium cannot exist because the fundamental condition $f > \frac{\lambda \Pi_j}{k} t_j$ does not hold for f^{**} and t_j^{**}. Indeed, evaluated at these equilibrium values, the condition boils down to $\frac{1}{12} \frac{-3c + \Pi_i - \Pi_j}{k} > 0$, which is never satisfied as by assumption $\Pi_i < \Pi_j$.