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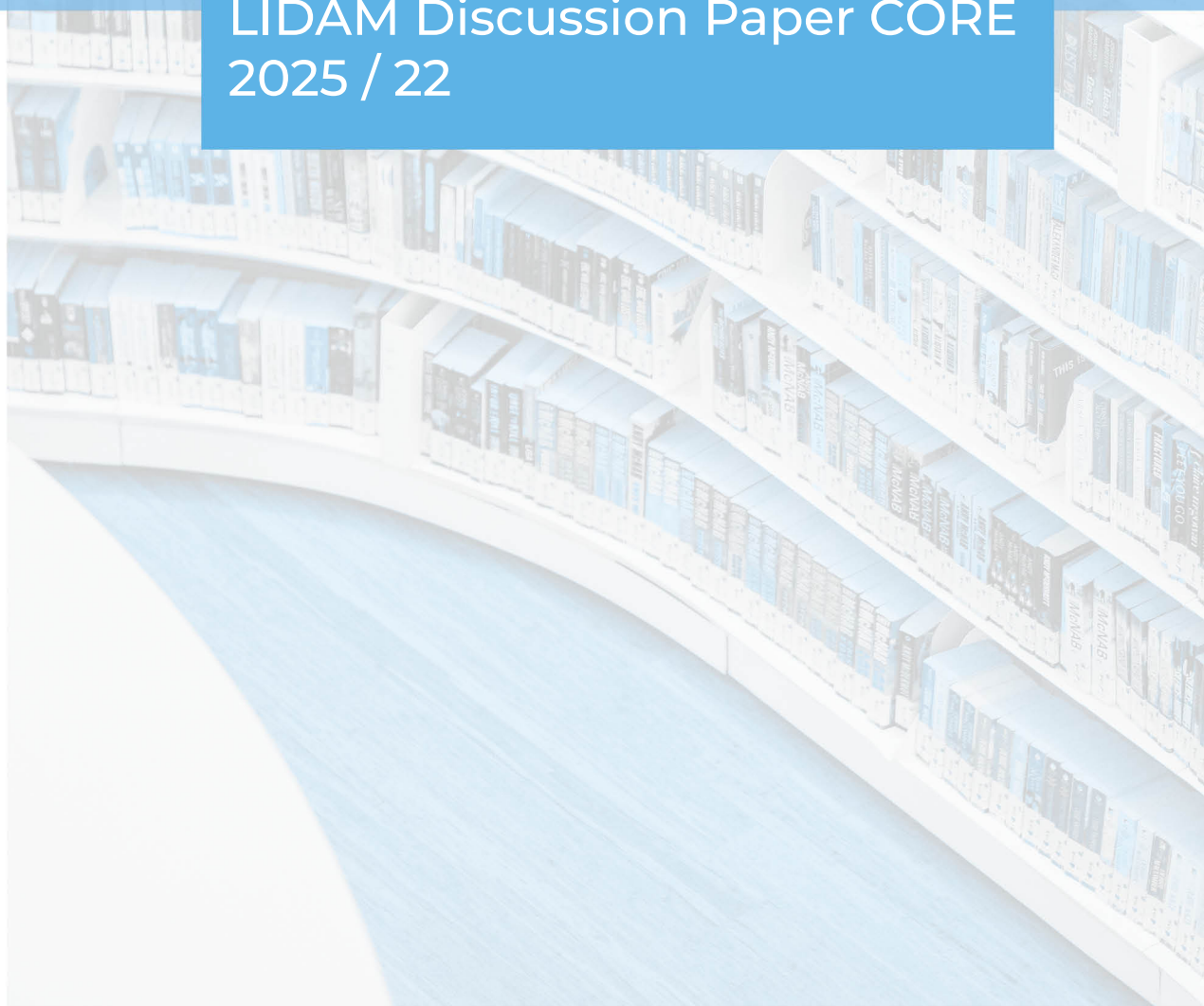

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Tax and Development: Competition for real investment and Profit Shifting

Jean Hindriks* and Yukihiro Nishimura †

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Abstract

We develop a simple conceptual framework of asymmetric countries competing simultaneously for real investment and for profit shifting in the presence of tax haven. Our goal is to identify how this two-dimensional tax competition affects the performance of tax policy, including minimum tax rules. We define a developing country as one with either a narrower tax base or lower tax capacity. The developing country sets a lower tax rate, attracting FDI. We show that policies aimed at promoting FDI competition—such as reducing transaction costs, country risk, or market-entry barriers—do not necessarily benefit the developing country. There exists a critical threshold of real-investment competition beyond which intensified competition harms the developing country (and the developed country as well). We also identify a "tax capacity externality": fighting profit shifting in the developed (high-tax) country always raises revenue in the developing country. Finally, we determine the level of the minimum tax that the developing country prefers. This preferred minimum tax increases with both the intensity of FDI competition and the developing country tax capacity.

Keywords: Profit shifting; FDI competition, Tax competition; Minimum tax;

JEL Classification: C72, F23, F68, H25, H87.

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1 Introduction

Separating real investment relocation from accounting/profit-shifting is central to develop a tax competition framework susceptible of empirical verification. Micro-level empirical studies of profit shifting suggest that firm-level identification strategies that jointly model FDI location and reported profits are needed (Delis et al. (2025), Johannesen et al. (2020). The reason is that some tax incentives and preferential regimes (e.g., patent boxes, IP regimes, special low-rate regimes) create opportunities for profit shifting even when they aim to attract real investment. Combining real investment relocation to profit shifting is also needed to assess properly the impact of the GMT (Global Minimum Tax) (Haufler et al. (2025)).

In this paper we model the interaction between profit shifting and real investment reallocation in a model of tax competition with heterogeneity either in market size (small versus large tax bases) or in tax capacity (OECD vs Developing countries), in the presence of tax haven.

Tax capacity asymmetry refers to differences across jurisdictions in their ability to raise revenue — due to administrative capacity, institutional quality, economic structure (informality), and exposure to mobile tax bases. Lower capacity amplifies vulnerability to tax competition and profit shifting. Johannesen et al. (2020) show that developing countries, more exposed to profit shifting, set lower taxes even though they face greater pressure on revenue constraint. In our model we will consider that developing country differs either in size (smaller) or tax capacity (lower tax capacity). We will show that in either case, developing countries cut taxes aggressively to attract FDI and to limit profit shifting in tax haven, reducing their own potential revenue.

Our modeling builds upon Agrawal and Wildasin (2020) showing that technology can influence how firms respond to taxes both by shifting profits and relocating activity. Their contribution is especially relevant for modern economies where e-commerce is important. It shows that technological change can reshape fiscal competition in non-obvious ways — not just eroding tax bases uniformly, but redistributing tax capacity and tax base strength across jurisdictions. It is widely considered that developing countries are more

vulnerable to profit shifting than developed countries (Crivelli et al. (2016), Fuest et al. (2011), Jansky and Palansky (2019), and Garcia-Bernardos and Jansky (2022) and UNCTAD (2015), Hohmann et al. (2024)).

A more open question is how much tax competition reflects real investment competition or accounting/profit-shifting? Mongrain et al. (2023) show that lenient profit shifting rules can be optimal to attract FDI. In response to stricter transfer pricing regulations and other BEPS (Base Erosion Profit Shifting) initiatives to combat profit shifting, multinational enterprises (MNEs) have increasingly turned to a different strategy: relocating real economic activity across borders in response to tax rate differences (Agrawal and Wildasin (2020)). UNCTAD (2015) indicates that FDI through Offshore Financial Centers and Special Purpose Entities is increasing in low-tax countries. Hebous et al. (2024) show that global minimum tax has profound effects on countries' incentives to raise tax rates and MNE's FDI strategies and tax revenue retention in low-tax countries. The question we address is how the cost (market access) of real investment reallocation (activity/location shifting) interacts with profit shifting and tax rates. Difference in country risk matters for real investment mobility. Mardan and Stimmelmayr (2020) show that high-risk country (developing country) sets lower (higher) tax rate if profit shifting is costly (easy). Haufler et al. (2018), Juranek et al. (2023) study several policy instruments to target profit shifting vs. FDI. Haufler et al. (2025) show that adding competition for FDI to pure profit shifting models reverses the benefit of GMT: tax rates and tax revenues may fall, if competition for FDI is sufficiently severe. Chen and Sun (2025) show that the low-tax country may undercut the minimum tax when set too high, in order to attract investment.

Our analysis shows that policies intended to strengthen FDI competition—such as reducing transaction costs, lowering country risk, or easing market-entry barriers—do not necessarily benefit the developing country. We identify a critical threshold of real-investment competition beyond which further intensification becomes detrimental to the developing country (and to the developed country as well).

We also uncover a "tax capacity externality": when the developed (high-tax) country increases its tax capacity, the developing country's revenue rises as a result. Finally, we

characterize the minimum tax rate preferred by the developing country and find that this preferred level increases with both the intensity of FDI competition and the country's own tax capacity. This implies that developing countries are more likely to support a higher minimum tax when real-investment competition is sufficiently strong or when their tax capacity is relatively high.

The structure of the paper is the following. Section 2 presents the basic framework. Section 3 studies the model under tax base inequality. Section 4, studies the model under tax capacity inequality. Section 5 presents the implications of the minimum tax rule when countries differ in their tax capacity. Section 6 concludes with the main findings.

2 Model

There is a tax-haven country denoted by 0, and two (non-haven) countries, denoted by 1 and 2. Tax haven is a zero-tax, zero-activity jurisdiction $t_0 = 0 = e_0$. Non-havens 1 and 2 will set (pure) profit tax, typically $t_1 > t_2 > 0$.[1]

A multinational enterprise (MNE) has branches in each country. From the production decisions in country $i = 1, 2$, the firm generates π_i in country i. Given the pure profit tax, there is production efficiency,total pre-shifting profit is fixed (normalized to one) and distributed as follows

$$\pi_1 = \frac{1+\epsilon}{2},\ \pi_2 = \frac{1-\epsilon}{2},\ \epsilon \in [0,1) \tag{1}$$

$\epsilon \geq 0$ is the usual parameter for the country size asymmetry, where country 1 has the larger pre-tax tax base.[2]

Then, at some cost, the MNE shifts profits between branches to minimize its total tax

[1]Chen and Hindriks (2023), Chen and Sun (2025) present tax competition model with partial cost deductibility and production distortion.

[2]Our basic specification of the profit tax competition resembles the basic setup of the commodity tax competition model in Nielsen (2001) with cross-border shopping. Agrawal and Wildasin (2020) use a similar specification of asymmetry to draw the parallel between profit-shifting and cross-border shopping models. It is usual to refer to the large country with capital letter and to the small country with small letter. We prefer to use numbers because we add a third country.

liability. In other words, it decides how much profit accrued in country i to divert to country j, subject to quadratic and non fiscally-deductible shifting cost. As in Hebous and Keen (2023), we consider that the shifting cost depends on the total amount shifted out from country i ($i = 1, 2$). [3]

$$C_i\left(\sum_{j\neq i} s_{ij}\right) = \delta_i\left(\sum_{j\neq i} s_{ij}\right)^2.$$

where s_{ij} is the profit shifted from country i to country j and δ_i is a reduced-form of country i tax capacity relative to profit shifting. We will consider tax capacity asymmetry with $\delta_1 > \delta_2$ to compare taxes and revenues between low and high-tax capacity countries. The idea is to model tax competition between developing country with low-tax capacity (δ_2) and developed country with high-tax capacity (δ_1). Tax capacity is exogenous.[4]

Following Agrawal and Wildasin (2020), we also consider the potential relocation of production activities in response to a change in corporate tax rates (see also Suarez Serrato (2019), Altshuler and Grubert (2016), Dharmapala (2020)). In practice, in addition to the profit-shifting, the MNE can use activity shifting (FDI) across branches to minimize its tax liability.

Given profit shifting, the MNE has the tax base $\tilde{\pi}_1$ in high-tax country with tax liability $t_1\tilde{\pi}_1$. By relocating some activity to the low-tax country 2, the MNE can reduce further its tax liability by $(t_1 - t_2)\beta$, subject to a cost of activity relocation $\Delta\beta^2$. A key feature of our model is that there is no activity in the tax haven, and activity shifting is restricted to non-haven countries (unlike profit shifting).

We consider a two-stage game with the following sequence of events. In the first stage, both countries set their taxes t_1 and t_2, with $t_0 = 0$ so as to maximize their own revenue. In the second stage, the multinational enterprise chooses the amount of profit to be shifted, and the amount of activity shifting between (non-haven) countries 1 and 2.

Each country i (i=1,2) chooses tax rate t_i to maximize its revenue, anticipating profit shifting s_{ij} $(j \neq i)$, and activity-shifting $\beta > 0$ from the high-tax affiliate to the low-tax

[3]The quadratic specification is widely used. See for example, Peralta et al. (2006), Devereux et al. (2008), and Keen and Konrad (2013). See also Huizinga and Laeven (2008) for a slightly different specification.

[4]Hindriks and Nishimura (2021) and Hindriks and Nishimura (2025a), study the cooperative and non-cooperative choice of tax capacity.

affiliate. Revenue in country i is, for $\beta_i = \beta$ if $t_i < t_j$ $(i, j = 1, 2)$ and $\beta_i = -\beta$ if $t_i > t_j$:

$$R_i = t_i \left(\pi_i - \sum_{j \neq i} s_{ij} + \beta_i \right), \tag{2}$$

We consider revenue-maximizing governments and do not include the welfare of the firm owners in the objective function as in Johannesen et al. (2020) or Hebous and Keen (2023). The objective is to strip down the model from peripheral effects to concentrate on tax capacity asymmetry, and isolate clearly the interactions between activity and profit shifting.[5]

3 Tax base inequality ($\epsilon > 0$)

Let $\delta_1 = \delta_2 = \delta$ and consider that $t_1 \geq t_2$. The MNE chooses to shift profits $s_{12} \geq 0$ and to move activities $\beta \geq 0$ to a low tax country, as well as to shift profits s_{10} and s_{20} to the tax haven to minimize its total tax liability net of the activity and profit shifting costs.

$$Max \sum_{i=1,2} ((1 - t_i)\pi_i + t_i s_{i0}) + (t_1 - t_2)(s_{12} + \beta) - \Delta\beta^2 - \delta(s_{10} + s_{12})^2 - \delta(s_{20})^2 \tag{3}$$

The equilibrium activity shifting is given by $\beta = \frac{t_1 - t_2}{2\Delta}$. And the equilibrium profit shifting is $s_{12} = 0$ and $s_{i0} = \dfrac{t_i}{2\delta}$ $(i = 1, 2)$. Profit is is only shifted to the lowest tax destination (the tax haven). This is because, the shifting cost is non separable across destinations. It depends on the total amount of profit shifted. The tax revenue in country 1 is given by

$$R_1 = t_1 \left(\frac{1 + \epsilon}{2} - \frac{t_1}{2\delta} - \frac{t_1 - t_2}{2\Delta} \right)$$

The first-order condition (FOC) of the tax stage is:

$$\frac{\partial R_1}{\partial t_1} = \frac{1 + \epsilon}{2} - t_1 \left(\frac{1}{\Delta} + \frac{1}{\delta} \right) + t_2 \left(\frac{1}{2\Delta} \right) = 0.$$

[5]The implication of capital ownership in tax competition model are discussed in Hindriks and Nishimura (2017).

The tax responses are

$$\tau_1(t_2) = (\frac{1+\epsilon}{2})(\frac{\delta\Delta}{\delta+\Delta}) + (\frac{\delta}{\delta+\Delta})\frac{t_2}{2}, \quad \tau_2(t_1) = (\frac{1-\epsilon}{2})(\frac{\delta\Delta}{\delta+\Delta}) + (\frac{\delta}{\delta+\Delta})\frac{t_1}{2} \tag{4}$$

where the slope of tax response $s = \frac{1}{2}\frac{\delta}{\delta+\Delta} \in (0, \frac{1}{2})$ is the same for both countries. Tax response is steeper for high tax capacity and low activity shifting cost. Solving gives the tax equilibrium

$$t_1^N = \frac{\delta}{2}\left(\frac{1}{1+\frac{\delta}{2\Delta}} + \frac{\epsilon}{1+\frac{3\delta}{2\Delta}}\right), \quad t_2^N = \frac{\delta}{2}\left(\frac{1}{1+\frac{\delta}{2\Delta}} - \frac{\epsilon}{1+\frac{3\delta}{2\Delta}}\right) \tag{5}$$

Thus $t_1^N \geq t_2^N \iff \epsilon \geq 0$, the country with smaller tax base taxes less (because its tax base is more elastic). From (5), t_1^N increases with Δ and δ. Less intensive tax competition for either investment or profit leads the large country to tax more. As for the low-tax country 2, it is ambiguous because of the incentive of attracting investment by taxing less. From (5) we can show that

$$\frac{\partial t_2^N}{\partial \Delta} \geq 0 \iff \epsilon \leq \overline{\epsilon} = \frac{1}{3}\left(\frac{3+2\Delta/\delta}{1+2\Delta/\delta}\right)^2$$

or equivalently

$$\frac{\partial t_2^N}{\partial \Delta} \geq 0 \iff \Delta \leq \overline{\Delta} = \frac{\delta}{2}\left(\frac{\sqrt{3\epsilon}-3}{1-\sqrt{3\epsilon}}\right)$$

Thus, if the extent of asymmetry is small $\epsilon \leq \overline{\epsilon}$, (or equivalently the cost of activity shifting is low $\Delta < \overline{\Delta}$) the low tax country will also set higher tax in response to higher cost of activity shifting. The strategic complementarity in taxes dominates the FDI incentives. However when asymmetry is high enough, this effect is reversed: the low-tax country will set lower tax in response to higher cost of activity shifting to preserve the FDI inflow from the high-tax country. The extent of activity shifting depends on the tax gap which is given by

$$t_1^N - t_2^N = \frac{\delta\epsilon}{1+3\delta/2\Delta}, \quad \beta^N = \frac{\epsilon}{3+2\Delta/\delta} \tag{6}$$

The tax gap is proportional to the tax base asymmetry ϵ, and increasing both with the profit shifting cost δ and the activity shifting cost Δ. Activity shifting in equilibrium is proportional to the extent of asymmetry (ϵ) and inversely proportional to the cost of activity shifting relative to profit shifting cost ($\frac{2\Delta}{\delta}$). The reason is that activity shifting provides an alternative channel for tax avoidance for the MNE. When the cost of shifting profits to the tax haven increases, the MNE compensates by engaging in more activity shifting. A key distinction between the two channels is that activity shifting merely redistributes tax bases among non-haven countries (a zero-sum game), whereas profits shifted to the tax haven represent a loss for all non-haven countries involved (a negative-sum game).

From (6), we have $\frac{\partial \beta^N}{\partial \Delta} < 0$. Higher cost of activity shifting increases the tax gap (by a second-order effect) and reduces activity shifting (by a first-order effect).

$$t_1^N + t_2^N = \frac{\delta}{1 + \delta/2\Delta}, \quad \pi_0^N = \frac{1/2}{1 + \delta/2\Delta} \tag{7}$$

Interestingly, the profit shifted to the tax haven is independent of the country asymmetry. It only depends on the relative cost of profit shifting and activity shifting δ/Δ. Increasing the relative cost of profit shifting reduces profit shifting and increase activity shifting. Thus with lower activity shifting cost, less profit would be shifted to the tax haven (smaller π_0^N), non-haven countries would benefit from larger tax base (larger $1 - \pi_0^N$), and low-tax country would benefit from additional investment (larger β^N).

The following proposition summarizes our tax results with tax base asymmetry.

Proposition 1. Under tax base asymmetry, $\epsilon > 0$, for all activity shifting cost $\Delta > 0$ and profit shifting cost $\delta > 0$, the asymmetric taxes $t_1^N > t_2^N$ satisfy:
(i) $\frac{\partial t_1^N}{\partial \Delta} > 0$, $\frac{\partial t_1^N - t_2^N}{\partial \Delta} > 0$, $\frac{\partial \beta^N}{\partial \Delta} < 0$, $\frac{\partial \pi_0^N}{\partial \Delta} > 0$;
(ii) $\frac{\partial t_2^N}{\partial \Delta} \geq 0 \iff \epsilon \leq \overline{\epsilon}$ or equivalently $\Delta \leq \overline{\Delta}$

A key feature of the model is that both countries have common interest to combat profit shifting, but they face opposite interest to limit activity shifting. Changing the relative cost of the two channels of tax competition has different consequences on the revenue of the low and high-tax countries.

The question we address is whether the low-tax country 2 could benefit from promoting

activity shifting. Indeed Proposition 1 (i) indicates that lower cost of activity shifting increases activity shifting β^N into the low-tax country, with ambiguous effect on its tax rate. To answer that question, let us consider the equilibrium tax revenue

$$R_1^N = t_1^N \left(\frac{1+\epsilon}{2} - \frac{t_1^N}{2\delta} - \frac{t_1^N - t_2^N}{2\Delta} \right), \quad R_2^N = t_2^N \left(\frac{1-\epsilon}{2} - \frac{t_2^N}{2\delta} + \frac{t_1^N - t_2^N}{2\Delta} \right) \tag{8}$$

Defining $\rho = \delta/2\Delta$ and plugging (5) into (8) yield

$$R_1^N = \delta \frac{A_1}{2} \left(\frac{1+\epsilon}{2} - \frac{A_1}{4} - \frac{\epsilon\rho}{1+3\rho} \right)$$
$$R_2^N = \delta \frac{A_2}{2} \left(\frac{1-\epsilon}{2} - \frac{A_2}{4} + \frac{\epsilon\rho}{1+3\rho} \right)$$

where $A_1 = \frac{1}{1+\rho} + \frac{\epsilon}{1+3\rho} > A_2 = \frac{1}{1+\rho} - \frac{\epsilon}{1+3\rho}$.

In the limit of tax base symmetry, $\epsilon \to 0$, $A_i \to A = \frac{1}{1+\rho}$, the revenue is $R_i^N \to R^N = \frac{\delta}{4}(A - A^2)$ which is increasing in A for all $A < 1$. Under symmetry revenue is always decreasing in ρ when holding δ fixed. Using $\rho = \frac{\delta}{2\Delta}$, it follows that increasing activity shifting cost (holding profit shifting cost fixed) always increases revenue under symmetry. When $\epsilon > 0$, it is unclear whether both countries still benefit from higher activity shifting cost. Less activity shifting benefits the high-tax country and hurts the low-tax country. Also higher cost of activity shifting triggers tax cut from the low-tax country when $\epsilon > \overline{\epsilon}$ which in turn harms the high-tax country.

First, consider the high-tax country. The revenue effect of activity shifting cost can be decomposed as follows.

$$\frac{\partial R_1^N}{\partial \Delta} = \left(\frac{\partial R_1^N}{\partial t_1^N} \frac{\partial t_1^N}{\partial \Delta} \right)_{t_2^N} + \left(\frac{\partial R_1^N}{\partial t_2^N} \frac{\partial t_2^N}{\partial \Delta} \right)_{t_1^N} + \left(\frac{\partial R_1^N}{\partial \Delta} \right)_{t_1^N, t_2^N}$$

By the envelope theorem, the first term is zero : the indirect revenue effect of the parameter Δ on t_1^N is zero when evaluated at the revenue maximizing tax. The two others terms represent the direct impact of that parameter on revenue, as if t_1^N was held constant.

The second term is the product of (i) the impact of Δ on t_2^N which by proposition 1 is positive if $\epsilon < \bar{\epsilon}$, and (ii) the positive tax externality, $\frac{\partial R_1^N}{\partial t_2^N} > 0$. The third term is the direct impact of the parameter on revenue, holding taxes t_1^N, t_2^N constant. This term is positive because fixing $t_1^N > t_2^N$, and increasing Δ reduces the amount of activity shifting β^N and increases R_1^N by $\left(\frac{\partial R_1^N}{\partial \Delta}\right)_{t_1^N, t_2^N} = (\frac{t_1^N - t_2^N}{2\Delta^2}) t_1^N > 0$.

Given this reasoning, we have that revenue in the high-tax country is increasing with the cost of activity shifting when the asymmetry is not too high.

$$\frac{\partial R_1^N}{\partial \Delta} > 0 \quad for \quad \epsilon < \bar{\epsilon}$$

This is a sufficient but not necessary condition. The necessary condition is to complicated to obtain a closed-form solution (polynomial of degree 4).

As for the low-tax country, the revenue effect of activity shifting cost can be decomposed as follows

$$\frac{\partial R_2^N}{\partial \Delta} = \left(\frac{\partial R_2^N}{\partial t_2^N}\frac{\partial t_2^N}{\partial \Delta}\right)_{t_1^N} + \left(\frac{\partial R_2^N}{\partial t_1^N}\frac{\partial t_1^N}{\partial \Delta}\right)_{t_2^N} + \left(\frac{\partial R_2^N}{\partial \Delta}\right)_{t_1^N, t_2^N}$$

where the first term is zero by the envelope theorem. The second term is positive due to the positive tax externality, and from proposition 1, $\frac{\partial t_1^N}{\partial \Delta} > 0$. The third term is the impact of the parameter on activity shifting, holding taxes constant at the Nash equilibrium. This term has the opposite sign (albeit different magnitude) to the high-tax country. Fixing $t_1^N > t_2^N$, $\left(\frac{\partial R_2^N}{\partial \Delta}\right)_{t_1, t_2} = -(\frac{t_1^N - t_2^N}{2\Delta^2}) t_2^N < 0$. Thus fixing taxes $t_1^N > t_2^N$, higher cost of activity shifting increases more revenue in the high tax country than the revenue loss in the low-tax country. Rearranging the decomposition equation gives

$$\frac{\partial R_2^N}{\partial \Delta} = \frac{t_2^N}{2\Delta}\frac{\partial t_1^N}{\partial \Delta} - (\frac{t_1^N - t_2^N}{2\Delta^2}) t_2^N = \frac{t_2^N}{2\Delta}\left(\frac{\partial t_1^N}{\partial \Delta} - \frac{t_1^N - t_2^N}{\Delta}\right)$$

The first term is the tax revenue gain from the positive tax externality. The second term is the revenue loss from restricted activity shifting β^N. The revenue effect of Δ in the low-tax country simplifies to

$$\frac{\partial R_2^N}{\partial \Delta} \geq 0 \iff (\frac{\partial t_1^N}{\partial \Delta})(\frac{\Delta}{t_1^N - t_2^N}) \geq 1$$

The tax elasticity condition is implicit condition. To obtain explicit condition, we substitute $\frac{t_1^N - t_2^N}{\Delta} = \frac{2\epsilon}{3+2\Delta/\delta}$ and the derivative $\frac{\partial t_1^N}{\partial \Delta} = \frac{\delta^2}{4\Delta^2}\left(\frac{1}{(1+\frac{\delta}{2\Delta})^2} + \frac{3\epsilon}{(1+3\frac{\delta}{2\Delta})^2}\right) > 0$. Using $\rho = \frac{\delta}{2\Delta}$ yields the explicit tax elasticity condition as a function of ρ and ϵ

$$(\frac{\partial t_1^N}{\partial \Delta})(\frac{\Delta}{t_1^N - t_2^N}) = \rho^2\left(\frac{1}{(1+\rho)^2} + \frac{3\epsilon}{(1+3\rho)^2}\right)(\frac{1+3\rho}{2\epsilon\rho}) \geq 1$$

Simplifying this explicit condition yields a threshold condition on ρ as a function of ϵ

$$(\frac{\partial t_1^N}{\partial \Delta})(\frac{\Delta}{t_1^N - t_2^N}) \geq 1 \iff \rho > \rho_c(\epsilon)$$

where $(9-3\epsilon)\rho_c^3 + (6-8\epsilon)\rho_c^2 + (1-7\epsilon)\rho_c - 2\epsilon = 0$ Using $\rho = \delta/2\Delta$, the threshold condition on ρ translates into inverse threshold condition on Δ such that $(\frac{\partial t_1^N}{\partial \Delta})(\frac{\Delta}{t_1^N - t_2^N}) \geq 1 \iff \Delta < \Delta_c(\epsilon)$.

Proposition 2. Under tax base asymmetry $\epsilon > 0$, activity shifting cost $\Delta > 0$ and profit shifting cost $\delta > 0$:
(i) The activity shifting cost Δ increases tax revenue R_1^N in the high-tax country for $\epsilon \leq \overline{\epsilon}$.
(ii) The activity shifting cost increases tax revenue R_2^N in the low-tax country if and only if the tax elasticity with respect to the activity shifting cost in the high-tax country is greater than one: $(\frac{\partial t_1^N}{\partial \Delta})(\frac{\Delta}{t_1^N - t_2^N}) \geq 1 \iff \Delta < \Delta_c(\epsilon)$

Proposition 2 (i) states that increasing activity shifting cost raises revenue in the high tax country if (necessary condition) the low-tax country increases its tax in response. This tax increase in the low-tax country requires sufficiently small tax base asymmetry $\epsilon < \overline{\epsilon}$ (proposition 1 (iii)). As for revenue impact in the low-tax country, Proposition 2 (ii) reveals that *increasing activity shifting cost is initially beneficial to the low-tax country (when $\Delta < \Delta_c$) but beyond a critical threshold it hurts the low-tax country*.

We illustrate in Figure 1 the low-tax country's revenue R_2^N as a function of $\rho = \frac{\delta}{2\Delta}$, and the market asymmetry $\epsilon = \frac{1}{4}, \frac{1}{2}$, fixing $\delta = 1$. Given that δ is fixed, higher ρ is equivalent to lower Δ where $\rho = 0$ for $\Delta = \infty$ and $\rho = 2$ for $\Delta = \frac{1}{4}$. We fix the asymmetry parameter to

either $\epsilon = \frac{1}{4}$ (pre-tax profit shares $\frac{5}{8}$, $\frac{3}{8}$) or $\epsilon = \frac{1}{2}$ (pre-tax profit shares $\frac{3}{4}$, $\frac{1}{4}$).

The revenue in the low-tax country is hump-shaped function in $\rho \in (0,2)$, with the peak $\rho*$ increasing in the extent of asymmetry. On the downward-sloping side, competition for activity dominates over competition for profit. Raising the cost of activity shifting eases the intensity of this competition, leading to higher revenue in both the low-tax and high-tax countries. On the upward-sloping side, the balance of tax competition shifts in favor of profit shifting, reversing the effect: revenue in the low-tax country increases as the cost of activity shifting (relative to profit shifting) decreases. The reason is that more intense competition for investment enables the low-tax country to compensate the profit shifting loss by attracting more activity from the high-tax country.

As for the high-tax country, fixing the parameter values for $\epsilon = \frac{1}{4}, \frac{1}{2}$ and fixing $\delta = 1$, the equilibrium revenue R_1^N is decreasing with $\rho = \delta/2\Delta$ for all $\rho \in (0,2)$. Hence, fixing the profit shifting cost, revenue in the high-tax country is always increasing with the cost of activity shifting. R_1^N is maximum for $\rho = 0$ ($\Delta = \infty$). This is because competition for FDI from the low-tax country reduces revenue in the high-tax country. The value ρ^* is Pareto efficient because smaller value decreases R_2^N and greater value decreases R_1^N.

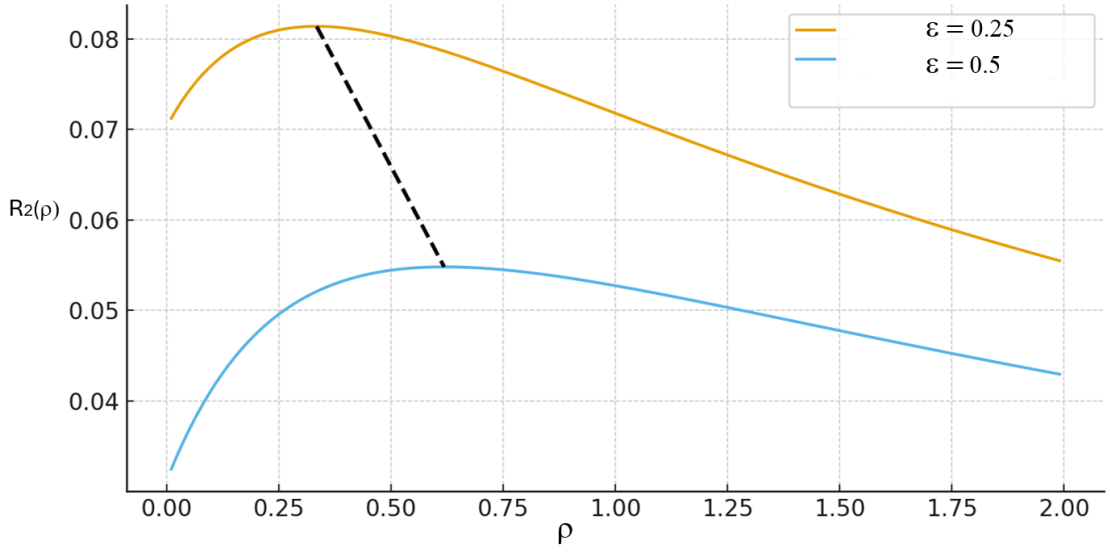

Figure 1: Low-tax country revenue $R_2^N(\rho)$ with $\rho = \frac{\delta}{2\Delta}$ fixing $\delta = 1$ under low $\epsilon = 0.25$ and high market asymmetry $\epsilon = 0.50$

4 Unequal tax capacity

We now allow for different tax capacity between countries. We assume that $\delta_1 > \delta_2 > 0$ and to isolate the effect of tax capacity difference, we assume $\epsilon = 0$. Country 1 is identical to country 2 in all respects except that it has a higher tax capacity. We aim to analyze how this tax-capacity asymmetry affects equilibrium taxes and revenues, as well as the role of activity-shifting costs in this context. Recall that activity-shifting costs can include factors such as country risk, with lower country risk corresponding to lower shifting costs. Our goal is to assess how both the activity-shifting cost and the tax-capacity gap influence equilibrium taxes and revenues. Under tax capacity asymmetry, revenues are

$$R_1 = t_1\left(\frac{1}{2} - \frac{t_1}{2\delta_1} - \frac{t_1 - t_2}{2\Delta}\right), \quad R_2 = t_2\left(\frac{1}{2} - \frac{t_2}{2\delta_2} + \frac{t_1 - t_2}{2\Delta}\right)$$

The tax responses are

$$\tau_1(t_2) = \frac{\Delta\delta_1}{2(\Delta+\delta_1)} + \frac{\delta_1}{2(\Delta+\delta_1)}t_2, \quad \tau_2(t_1) = \frac{\Delta\delta_2}{2(\Delta+\delta_2)} + \frac{\delta_2}{2(\Delta+\delta_2)}t_1 \tag{9}$$

The intercept of the tax response is higher for the high tax capacity country 1. The slope of the tax response is higher for the high tax capacity country 1 $s_1 = \frac{\delta_1}{2(\Delta+\delta_1)} > s_2 = \frac{\delta_2}{2(\Delta+\delta_2)}$. The slope of the tax response represents the intensity of the strategic tax complementarity. For both countries, the slope is decreasing with Δ. Thus lower cost of activity shifting reinforces the strategic tax complementarity. The reason is that competition for activity is added to the competition for profit. When $\Delta \to \infty$, the tax responses are orthogonal. Tax complementarity disappears because non-haven countries now compete independently with the tax haven for profits.

Solving the system of equations gives after simplifications

$$t_1^N = \frac{\Delta\delta_1(2\Delta + 3\delta_2)}{4\Delta^2 + 4\Delta(\delta_1+\delta_2) + 3\delta_1\delta_2}, \quad t_2^N = \frac{\Delta\delta_2(2\Delta + 3\delta_1)}{4\Delta^2 + 4\Delta(\delta_1+\delta_2) + 3\delta_1\delta_2} \tag{10}$$

The denominator is positive for all $\delta_1, \delta_2, \Delta > 0$, so $t_i^N > 0$.

The tax gap is

$$t_1^N - t_2^N = \frac{2\Delta^2(\delta_1 - \delta_2)}{4\Delta^2 + 4\Delta(\delta_1 + \delta_2) + 3\delta_1\delta_2} > 0 \iff \delta_1 \geq \delta_2 \tag{11}$$

4.1 Tax capacity effect on tax

The tax gap $t_1^N - t_2^N$ is clearly increasing in the tax capacity gap $\delta_1 - \delta_2$. However the impact of the tax capacity in each country on its own tax is less obvious. Using (10) and differentiating with respect to own tax capacity gives, after some simplifications, a clean polynomial

$$\frac{\partial t_1^N}{\partial \delta_1} = \frac{4\Delta^2(\Delta + \delta_2)(2\Delta + 3\delta_2)}{D^2} > 0 \quad \forall \delta_1, \delta_2, \Delta > 0$$

and similarly for the low-tax capacity country

$$\frac{\partial t_2^N}{\partial \delta_2} = \frac{4\Delta^2(\Delta + \delta_1)(2\Delta + 3\delta_1)}{D^2} > 0 \quad \forall \delta_1, \delta_2, \Delta > 0$$

where $D := 4\Delta^2 + 4\Delta(\delta_1 + \delta_2) + 3\delta_1\delta_2$. Thus, increasing tax capacity in any country increases its own tax. Furthermore, for $\delta_2 \leq \delta_1$, we have $\frac{\partial t_1^N}{\partial \delta_1} \leq \frac{\partial t_2^N}{\partial \delta_2}$. The tax is less responsive to tax capacity change in the high tax capacity country. The next question is on the cross-derivative of tax capacity. The idea is not only to see whether increasing tax capacity in one country will increase tax in the other country. It is also to see how tax response differs across countries.

$$\frac{\partial t_1^N}{\partial \delta_2} = \frac{2\Delta^2\delta_1(2\Delta + 3\delta_1)}{D^2} > 0 \quad \forall \delta_1, \delta_2, \Delta > 0$$

and similarly for the low-tax capacity country

$$\frac{\partial t_2^N}{\partial \delta_1} = \frac{2\Delta^2\delta_2(2\Delta + 3\delta_2)}{D^2} > 0 \quad \forall \delta_1, \delta_2, \Delta > 0$$

Thus, tax response to the tax capacity change in other country is always positive. The reason is that increasing tax capacity in one country leads that country to tax more, and by tax strategic complementarity, that leads other country to respond in the same direction,

amplifying the initial effect. Less obvious is the asymmetry of the tax response. Indeed, comparing cross-derivatives gives

$$\frac{\partial t_1^N}{\partial \delta_2} > \frac{\partial t_2^N}{\partial \delta_1} \text{ for } \delta_1 > \delta_2$$

The high-tax country's tax response to a change in the low-tax country's tax capacity is consistently larger than the low-tax country's response to a change in the high-tax country's tax capacity. This implies that increasing tax capacity in the low-tax country is a more effective way to stimulate higher taxes overall. The key mechanism behind this result is the stronger tax-complementarity effect in the high-tax country—its tax rate reacts more strongly to tax changes in the other country than vice versa. To sum up

Proposition 3. (Tax capacity effect on tax) Under $\epsilon = 0$, activity shifting cost $\Delta > 0$ and profit shifting cost $\delta_1 > \delta_2$, the asymmetric equilibrium taxes t_1^N, t_2^N satisfy:
(i) $t_1^N > t_2^N$ and $\frac{\partial t_1^N - t_2^N}{\partial \delta_1 - \delta_2} > 0$
(ii) $\frac{\partial t_2^N}{\partial \delta_2} > \frac{\partial t_1^N}{\partial \delta_1} > 0$
(iii) $\frac{\partial t_1^N}{\partial \delta_2} > \frac{\partial t_2^N}{\partial \delta_1} > 0$

4.2 Activity shifting effect on tax

Another interesting question concerns how the cost of shifting activity—including country risk—affects tax outcomes when countries differ in their tax capacity. Using (10). The derivative of t_1^N with respect to Δ is

$$\frac{\partial t_1^N}{\partial \Delta} = \frac{\delta_1(4\Delta^2(2\delta_1 - \delta_2) + 12\Delta\delta_1\delta_2 + 9\delta_1\delta_2^2)}{D^2} > 0 \quad \forall \delta_1 \geq \delta_2$$

and similarly for t_2^N

$$\frac{\partial t_2^N}{\partial \Delta} = \frac{\delta_2(4\Delta^2(2\delta_2 - \delta_1) + 12\Delta\delta_1\delta_2 + 9\delta_2\delta_1^2)}{D^2} > 0 \quad \forall \quad \frac{\delta_1}{2} \leq \delta_2 \leq \delta_1$$

The cost of activity shifting constrains the flow of real investment from the high-tax country to the low-tax country. As this cost rises, the high-tax country gains a stronger

incentive to increase its tax rate. In contrast, the low-tax country benefits from activity shifting, so it is less obvious that it would raise taxes when shifting becomes more expensive. Interestingly, our results show that both outcomes are possible. The low-tax country's tax rate increases with shifting costs—mirroring the response of the high-tax country—provided the gap in tax capacity is not too large. ($\delta_2 > \delta_1/2$). Since the high-tax country also raises its tax rate, it is natural to ask how higher activity-shifting costs affect the tax gap, which ultimately determines the extent of activity shifting. Computing the derivative of (11) with respect to Δ gives after some simplifications

$$\frac{\partial(t_1^N - t_2^N)}{\partial \Delta} = \frac{2\Delta(\delta_1 - \delta_2)(4\Delta(\delta_1 + \delta_2) + 6\delta_1\delta_2)}{D^2} > 0 \quad \forall \delta_1 \geq \delta_2$$

Using $\beta^N = \frac{t_1^N - t_2^N}{2\Delta}$, yields

$$\frac{\partial \beta^N}{\partial \Delta} = -(\delta_1 - \delta_2)\left(\frac{4\Delta^2 - 3\delta_1\delta_2}{D^2}\right) \geq 0 \iff \Delta \leq \sqrt{\frac{3}{4}\delta_1\delta_2}$$

Activity shifting initially rises as the cost of shifting increases, up to a threshold of $\Delta = \sqrt{\frac{3}{4}\delta_1\delta_2}$ after which it begins to decline. In the upward sloping side of β^N, activity is very responsive to the tax gap, which increases with activity shifting cost. Beyond the threshold, activity becomes less responsive to the tax gap, and the amount of activity shifting is reduced in response to the higher cost. Threshold itself increases with the cost of profit shifting δ_1, δ_2.

As for profit shifting $\pi_0^N = \frac{t_1^N}{2\delta_1} + \frac{t_2^N}{2\delta_1}$, the effect of the cost of activity shifting is unclear because t_1^N is increasing with Δ whereas t_2^N decreases if $\delta_2 < \delta_1/\overline{\delta}$. Differentiating π_0^N with respect to Δ and simplifying gives

$$\frac{\partial \pi_0^N}{\partial \Delta} = \frac{4\Delta^2(\delta_1 + \delta_2) + 24\Delta\delta_1\delta_2 + 9\delta_1\delta_2(\delta_1 + \delta_2)}{2D^2} > 0 \quad \forall \delta_1 \geq \delta_2$$

Thus, profit shifting increases as the cost of activity shifting rises. This mirrors the result in Proposition 1(i) under tax-base asymmetry. A higher activity-shifting cost leads the high-tax country to raise its tax rate, widening the tax gap. In response, the low-tax country may either increase its tax rate or decrease it if its tax capacity is sufficiently limited

($\delta_2 < \delta_1/\overline{\delta}$). Overall, however, more profit is shifted to the tax haven, to the detriment of both countries.

Proposition 4. (Activity shifting effect on tax) Under $\epsilon = 0$, activity shifting cost (country risk) $\Delta > 0$ and profit shifting cost $\delta_1 > \delta_2$, the asymmetric equilibrium taxes t_1^N, t_2^N satisfy:
(i) $\frac{\partial t_1^N}{\partial \Delta} > 0$, and $\frac{\partial t_2^N}{\partial \Delta} \geq 0 \iff \delta_2 \geq \delta_1/\overline{\delta}$ (with $\overline{\delta} > 2$),
(ii) $\frac{\partial t_1^N - t_2^N}{\partial \Delta} > 0$, $\frac{\partial \pi_0^N}{\partial \Delta} > 0$
(iii) $\frac{\partial \beta^N}{\partial \Delta} \leq 0 \iff \Delta \geq \sqrt{\frac{3}{4}\delta_1\delta_2}$

4.3 Tax revenues

Substituting (10) into revenue functions gives

$$R_1^N = \frac{\delta_1\Delta(\Delta+\delta_1)(2\Delta+3\delta_2)^2}{2D^2}, \quad R_2^N = \frac{\delta_2\Delta(\Delta+\delta_2)(2\Delta+3\delta_1)^2}{2D^2} \tag{12}$$

The revenue ratio is

$$\frac{R_1^N}{R_2^N} = \frac{\delta_1(\Delta+\delta_1)(2\Delta+3\delta_2)^2}{\delta_2(\Delta+\delta_2)(2\Delta+3\delta_1)^2}$$

We are now in a position to compare equilibrium revenues between the low and high capacity country as a function of the tax capacity.

From the revenue ratio,

$R_1^N \geq R_2^N \iff \delta_1(\Delta+\delta_1)(2\Delta+3\delta_2)^2 \geq \delta_2(\Delta+\delta_2)(2\Delta+3\delta_1)^2$, which is equivalent to

$\Delta(\delta_1-\delta_2)(4\Delta^2+4\Delta(\delta_1+\delta_2)+3\delta_1\delta_2) \geq 0$.

So the condition simplifies to

$$R_1^N \geq R_2^N \iff \delta_1 \geq \delta_2 \quad \forall \Delta > 0$$

Revenue of the high tax capacity country is always higher regardless of the cost of activity shifting. It is impossible for the low tax capacity country to fully compensate its greater exposure to profit shifting by resorting to activity shifting even when activity shifting is almost costless. However $R_2^N \to R_1^N$ for $\Delta \to 0$ for all $\delta_1 > \delta_2$.

We summarize our result in the following proposition

Proposition 5. (Tax revenue gap). Under $\epsilon = 0$, activity shifting cost $\Delta > 0$ and profit shifting cost $\delta_1 \leq \delta_2$, $R_2^N \leq R_1^N$, and $R_2^N \to R_1^N$ for $\Delta \to 0$

Following proposition 5, it is immediately seen that revenue in one country is strictly increasing in its tax capacity: $\partial R_i^N/\partial \delta_i > 0$ for $i = 1, 2$. Less straightforward is the cross effect: how a change in one country's tax capacity influences the equilibrium revenue of the other country. $\partial R_i^N/\partial \delta_j > 0$ for $i \neq j$. We know that an increase in tax capacity in one country prompts both countries to raise their taxes, due to strategic tax complementarity. However, because of country asymmetry, increasing tax capacity in one country may either widen or narrow the tax gap, leading to opposite effects on activity shifting.

We start with $\partial R_2^N/\partial \delta_1$. Using (12), and after computation, the derivatives simplifies to

$$\frac{\partial R_2^N}{\partial \delta_1} = \frac{2\Delta^2 \delta_2(\Delta + \delta_2)(2\Delta + 3\delta_1)(2\Delta + 3\delta_2)}{D^3} > 0 \quad \forall \Delta, \delta_1, \delta_2 > 0$$

Hence, revenue in the low-tax-capacity country rises with δ_1. From the perspective of a developing country, this implies that strengthening tax capacity in the developed country generates a positive revenue externality for the developing country. This occurs because an increase in δ_1 raises taxes in both countries while also widening the tax gap $t_1^N - t_2^N$ resulting in more activity being shifted to the low-tax-capacity country. The next question is whether the reverse also holds. Using (12) and differentiating gives

$$\frac{\partial R_1^N}{\partial \delta_2} = \frac{2\Delta^2 \delta_1(\Delta + \delta_1)(2\Delta + 3\delta_2)(2\Delta + 3\delta_1)}{D^3} > 0 \quad \forall \Delta, \delta_1, \delta_2 > 0$$

Comparing the two cross-derivatives and factoring out the common positive term on the numerator $(2\Delta + 3\delta_2)(2\Delta + 3\delta_1)$, it is readily seen that $\frac{\partial R_1^N}{\partial \delta_2} > \frac{\partial R_2^N}{\partial \delta_1} > 0$ for all $\delta_1 > \delta_2$. Thus, the tax capacity externality is always positive, and its impact is consistently greater for the high-tax country. This outcome stems from the stronger tax complementarity in the high-tax country. $\frac{\partial t_1^N}{\partial \delta_2} > \frac{\partial t_2^N}{\partial \delta_1}$ for $\delta_1 > \delta_2$ (see Proposition 3 (iii)).

We sum up our results in the next proposition.

Proposition 6. (Tax capacity externality). Under $\epsilon = 0$, activity shifting cost $\Delta > 0$ and profit shifting cost $\delta_1 \geq \delta_2$:

(i) $\frac{\partial R_i^N}{\partial \delta_i} > 0 \quad (i = 1, 2)$

(ii) $\frac{\partial R_1^N}{\partial \delta_2} \geq \frac{\partial R_2^N}{\partial \delta_1} > 0$

Turning to the revenue effect of the cost of activity shifting. The issue is whether the low-tax country may benefit from reducing the cost of activity shifting (notably by reducing its country risk to become more attractive for FDI). We know from Proposition 4 that lower Δ involves lower taxes in both countries (if tax capacity asymmetry is not too high), smaller tax gap and more activity shifting ($\frac{\partial \beta^N}{\partial \Delta} < 0$ if $\Delta > \Delta^0$.

Using (12) and differentiating R_2^N with respect to Δ gives

$$\frac{\partial R_2^N}{\partial \Delta} = \frac{\delta_2(2\Delta + 3\delta_1)P(\Delta, \delta_1, \delta_2)}{2D^3}$$

with the cubic polynomial

$$P(\Delta, \delta_1, \delta_2) = 9\delta_1^2\delta_2^2 + 4\Delta^2(2\delta_1^2 + 7\delta_2^2 - \delta_1\delta_2) - 8\Delta^3(\delta_1 - \delta_2)$$

Since the denominator is positive, the sign of $\frac{\partial R_2^N}{\partial \Delta}$ equals the sign of $P(\Delta, \delta_1, \delta_2)$. For sufficiently small positive Δ, we have $P(\Delta, \delta_1, \delta_2) = 9\delta_1^2\delta_2^2 > 0$. Alternatively, for sufficiently high Δ, the leading terms of the cubic polynomial $P(\Delta, \delta_1, \delta_2)$ is negative $-8\Delta^3(\delta_1 - \delta_2) < 0$. Thus for sufficiently large Δ, $P(.) < 0$ and $\frac{\partial R_2^N}{\partial \Delta} < 0$. $P(.)$ is a continuous cubic function of Δ whose value is positive at $\Delta = 0$ and negative for sufficiently large Δ.

We summarize our result in the following

Proposition 7. (Activity shifting effect on revenue). Under $\epsilon = 0$, activity shifting cost $\Delta > 0$ and profit shifting cost $\delta_1 > \delta_2$, there exists a critical value Δ^* such that $\frac{\partial R_2^N}{\partial \Delta} > 0 \iff \Delta \leq \Delta^*$

This non-monotonicity under tax-capacity asymmetry mirrors the non-monotonicity we observed under tax-base asymmetry (Figure 1). The economic intuition is as follows. Consider the cost of activity shifting as representing country risk that limits FDI into the developing country. According to Proposition 7 when country risk is initially high, the potential for activity shifting to the developing country is limited, and revenue is low due to its weak capacity to counter profit shifting to the tax haven. In this context, reducing country risk encourages more activity shifting, which partially compensates for the low

capacity to combat tax haven, thereby increasing revenue. However, beyond a certain point, this effect reverses: the benefits of activity shifting for the low-tax country turn into a "race to the bottom for activity," eroding revenue.

5 Minimum tax with unequal tax capacity

Could the Minimum tax harm developing countries so that they prefer opting out?Mongrain et al. (2023) show that lenient profit-shifting rules can sometimes be optimal for attracting FDI. This creates an "endogenously" low tax enforcement environment in developing countries, contributing to unequal tax capacity. In this context, Haufler et al. (2025) suggest that the GMT could indeed hurt developing countries. They argue that when competition for FDI is intense, the GMT reduces the developing country's ability to attract investment, lowering its tax revenues, while developed countries may benefit. We aim to test the robustness of this result within our model, which incorporates both FDI competition and unequal tax capacity. The parameter Δ represents the intensity of competition for FDI. A lower Δ, corresponds to more intense FDI competition.

Consider minimum tax as follows

$$t_2^M = t_2^N + \lambda(t_1^N - t_2^N) \tag{13}$$

The minimum tax parameter is $\lambda \in [0, 1]$. Plugging (10) into (13) gives

$$t_2^M = \frac{\Delta\delta_2(2\Delta + 3\delta_1)}{D} + 2\lambda\frac{(\delta_1 - \delta_2)\Delta^2}{D} \tag{14}$$

where the first term is t_2^N and the second term is the tax increase resulting from the minimum tax parameter λ. Thus the minimum tax induces a tax increase in the low-tax capacity country that is linear to the tax capacity gap, and quadratic to the cost of activity shifting Δ. This tax increase in country 2 prompts country 1 to raise its taxes as well. Substituting (14) in (9) gives after simplifications and rearrangements

$$t_1^M = \frac{\Delta\delta_1(2\Delta + 3\delta_2)}{D} + \lambda\left(\frac{\delta_1}{\delta_1 + \Delta}\right)\frac{(\delta_1 - \delta_2)\Delta^2}{D} \tag{15}$$

The expression for t_1^M is nicely decomposed in two terms. The first term is the initial Nash equilibrium t_1^N for $\lambda = 0$. The second term represents the additional tax in response to the tax increase in country 2 triggered by the minimum tax. It can be decomposed into the slope of t_1 in response to t_2 which is $s_1 = \frac{\delta_1}{\delta_1+\Delta}$, and the change of t_2 which is $\lambda(\delta_1 - \delta_2)\Delta^2/D$. Interestingly increasing the tax capacity of country 1 (δ_1) increases its tax response to the minimum tax λ. Also, the lower the cost of activity shifting, the higher the slope s_1. Thus, more intense FDI competition amplifies strategic complementarity, making the high-tax country's tax rate more responsive to the GMT.

The tax gap under minimum tax is

$$t_1^M - t_2^M = \frac{2\Delta^2(\delta_1 - \delta_2)}{D}\left(1 - \lambda(\frac{\delta_1 + 2\Delta}{\delta_1 + \Delta})\right) \tag{16}$$

and the activity shifting is

$$\beta^M = \frac{\Delta(\delta_1 - \delta_2)}{D}\left(1 - \lambda(\frac{\delta_1 + 2\Delta}{\delta_1 + \Delta})\right) \tag{17}$$

Thus the minimum tax lowers the tax gap and the activity shifted to the low tax country. As for the profit shifted in the tax haven, using (15) and (14) and $\pi_0^M = \frac{t_1^M}{2\delta_1} + \frac{t_2^M}{2\delta_2}$ gives

$$\pi_0^M = \frac{\Delta(4\Delta + 3(\delta_1 + \delta_2))}{2D} + \lambda\left(\frac{2}{\delta_2} + \frac{1}{\delta_1 + \Delta}\right)\left(\frac{(\delta_1 - \delta_2)\Delta^2}{2D}\right) \tag{18}$$

The profit shifting increases in response to the minimum tax. Minimum tax λ increases t_2^M by the amount $(\delta_1 - \delta_2)\Delta^2/D$, inducing profit shifting to tax haven inversely proportional to its tax capacity $1/\delta_2$. The tax response of t_1 is proportional to the slope $s_1 = \frac{\delta_1}{\delta_1+\Delta}$ inducing profit shifting to tax haven is inversely related to its tax capacity $1/2\delta_1$.

What about the revenue impact of the minimum tax? The high-tax country always benefits from the minimum tax, as it curbs costly competition for activity with the low-tax country and allows for higher taxation. Although more profit is shifted to the tax haven, this is more than offset by the reduced activity shifting and the higher tax revenue.

The situation differs for the low-tax country, where the "forced" tax increase triggers

less activity and more profit shifting, potentially offsetting the gains from the higher tax. Substituting t_1^N and t_2^N into R_2^N gives revenue of the low-tax country as a quadratic function of λ.

$$R_2^M - R_2^N = A\lambda + B\lambda^2 \tag{19}$$

with the coefficients given by

$$A = C_2\left(\frac{1}{2} - \frac{t_2^N}{2\delta_2} + \frac{t_1^N - t_2^N}{2\Delta}\right) - t_2^N\left(\frac{C_2}{2\delta_2} + \frac{C_2 - C_1}{2\Delta}\right)$$

$$B = -C_2\left(\frac{C_2}{2\delta_2} + \frac{C_2 - C_1}{2\Delta}\right) < 0$$

$$C_1 = \frac{\delta_1}{\delta_1 + \Delta}\frac{C_2}{2} > 0$$

$$C_2 = \frac{2\Delta^2(\delta_1 - \delta_2)}{D} > 0$$

where $C_2 - C_1 > 0$. C_2 denotes the increase of t_2 induced by the minimum tax λ. C_1 denotes the tax response to the minimum tax of country 1 (given the tax response slope $s_1 = \frac{\delta_1}{\delta_1+\Delta}$). $C_2 - C_1 > 0$ represents the reduction of the tax gap $t_1 - t_2$ as a result of the minimum tax. Coefficient A is the revenue gain from higher tax $t_2^M - t_2^N > 0$ (evaluated at the initial Nash tax base level $\tilde{\pi}_2^N + \beta^N$), minus the tax base loss (evaluated at the initial Nash tax rate t_2^N). Coefficient $B < 0$ is the interaction effect of tax rate increases and tax base loss for country 2.

We now verify that the coefficient $A > 0$ for all $\Delta > 0$, $\delta_1 > 0$ and $\delta_2 > 0$. Since coefficient $B < 0$, we will have that $R_2^M - R_2^N = A\lambda + B\lambda^2$ is strictly increasing concave in the minimum tax. The minimum tax will, if not pushed too far, benefit to the low-tax country. Intuitively, we know that a very small minimum tax $\lambda \to 0$ cannot harm the low-tax country. While it induces only a second-order revenue effect from the tax change in the low-tax country itself, it prompts the high-tax country to raise its tax, generating a positive first-order effect on the low-tax country's tax base through activity shifting.

Substituting t_1^N, t_2^N, C_1 and C_2 into the expression of the coefficient A we obtain that

$$A = \frac{(\delta_1 - \delta_2)\Delta^2}{D^2}\Phi(\Delta, \delta_1, \delta_2) \tag{20}$$

where

$$\Phi(\Delta, \delta_1, \delta_2) = 4(\Delta + \delta_1)(\Delta + \delta_2) - \delta_1\delta_2 + 2\Delta(\delta_1 - \delta_2) - (2\Delta + 3\delta_1)(2\Delta + \delta_2\frac{\delta_1 + 2\Delta}{2\delta_1 + 2\Delta})$$

Bringing expression $\Phi(.)$ over common factor $2(\delta_1 + \Delta)$ and simplifying yields

$$\Phi(\Delta, \delta_1, \delta_2) = \frac{\delta_1\delta_2(2\Delta + 3\delta_1)}{2(\Delta + \delta_1)} > 0 \tag{21}$$

It follows from (20) and (21) that $A > 0$ for all parameter values. The expression $R_2^M - R_2^N$ in (19) with coefficients $A > 0$ and $B < 0$ is strictly concave in λ. There exists a Pareto optimal minimum tax λ^* that will maximize R_2^M, given that R_1^M is strictly increasing with λ.

5.1 Pareto optimal minimum tax

Using (19), the Pareto optimal minimum tax is

$$\lambda^* = \frac{-A}{2B} \tag{22}$$

where (20) and (21) yield

$$A = \frac{(\delta_1 - \delta_2)\Delta^2}{D^2}\left(\frac{\delta_1\delta_2(2\Delta + 3\delta_1)}{2(\Delta + \delta_1)}\right) > 0 \tag{23}$$

Using expression of B with substitution for C_1 and C_2 yields

$$B = \frac{-1}{2}\left(\frac{2(\delta_1 - \delta_2)\Delta^2}{D}\right)^2\left(\frac{1}{\delta_2} + \frac{1}{\Delta}(\frac{\delta_1 + 2\Delta}{2\delta_1 + 2\Delta})\right) < 0 \tag{24}$$

Substituting those expressions for the coefficients A and B into (22) yields

$$\lambda^* = \frac{\delta_1\delta_2^2(3\delta_1 + 2\Delta)}{4\Delta(\delta_1 - \delta_2)(2\Delta^2 + 2\Delta(\delta_1 + \delta_2) + \delta_1\delta_2)} > 0 \tag{25}$$

The partial derivative of λ^* relative to activity shifting cost Δ is

$$\frac{\partial \lambda^*}{\partial \Delta} = -\delta_1 \delta_2^2 \left(\frac{8\Delta^3 + (22\delta_1 + 4\delta_2)\Delta^2 + 12\delta_1(\delta_1 + \delta_2)\Delta + 3\delta_1^2\delta_2}{4(\delta_1 - \delta_2)\Delta^2(2\Delta^2 + 2\Delta(\Delta_1 + \delta_2) + \delta_1\delta_2)^2} \right) < 0 \tag{26}$$

Therefore the Pareto optimal minimum tax is strictly decreasing in the activity shifting cost. And by continuity, there exists $\Delta_m > 0$ such that $\lambda^*(\Delta_m) = 1$ and $\lambda^*(\Delta_m) \leq 1 \quad \forall \Delta \geq \Delta_m$. The threshold Δ_m varies with δ_1, δ_2.

What is the tax capacity effect on the Pareto optimal minimum tax? The partial derivative of λ^* relative to activity shifting cost δ_2 is

$$\frac{\partial \lambda^*}{\partial \delta_2} = \delta_1 \delta_2 (2\Delta + 3\delta_1) \left(\frac{2\Delta^2(2\delta_1 - \delta_2) + \delta_1^2(4\Delta + \delta_2)}{4\Delta(\delta_1 - \delta_2)^2 K^2} \right) > 0 \tag{27}$$

where $K = 2\Delta^2 + 2\Delta(\delta_1 + \delta_2)\delta_1\delta_2$. Interestingly, raising the tax capacity in the low-tax country increases the Pareto-optimal minimum tax. In other words, the low-tax country becomes more supportive of the minimum tax as its tax capacity grows and the tax gap narrows.

We provide illustrations of the revenue gain in the low-tax country $R_2^M - R_2^N$ as a function of the minimum tax λ for variable tax capacity, and activity shifting cost.

Figure 2 represents the revenue gain of the low tax country as a function of the minimum tax parameter λ. We consider $\delta_1 = 1 > \delta_2 = 0.75$. We compare the revenue gain from minimum tax $R_2^M - R_2^N$ for different costs of activity shifting $\Delta = 0.5$ and $\Delta = 1$. For lower cost of activity shifting $\Delta = 0.5$ (more intense FDI competition), $R_2^M - R_2^N$ is increasing over the interval (slightly upward slope). The developing country always benefit from the minimum tax. However, for the higher cost of activity shifting $\Delta = 1$ (less intense FDI competition), the curve bends down with a clear maximum near $\lambda^* = 0.45$. The minimum tax will harm developing country when pushed beyond that critical level. This Pareto optimal minimum tax depends on δ_2. For instance, as suggested in Figure 3, keeping $\Delta = \delta_1 = 1$ as before and lowering δ_2 to 0.5 (compared to 0.75 in Figure 2) shifts further the optimal minimum tax to very small values ($\lambda^* = 0.15$ for $\Delta = 1$ and $\lambda^* = 0.05$ for $\Delta = 2$). Thus, while a sufficiently small minimum tax always benefits the low-tax country, when its tax capacity is low and the FDI competition is less intense, the minimum tax cannot be

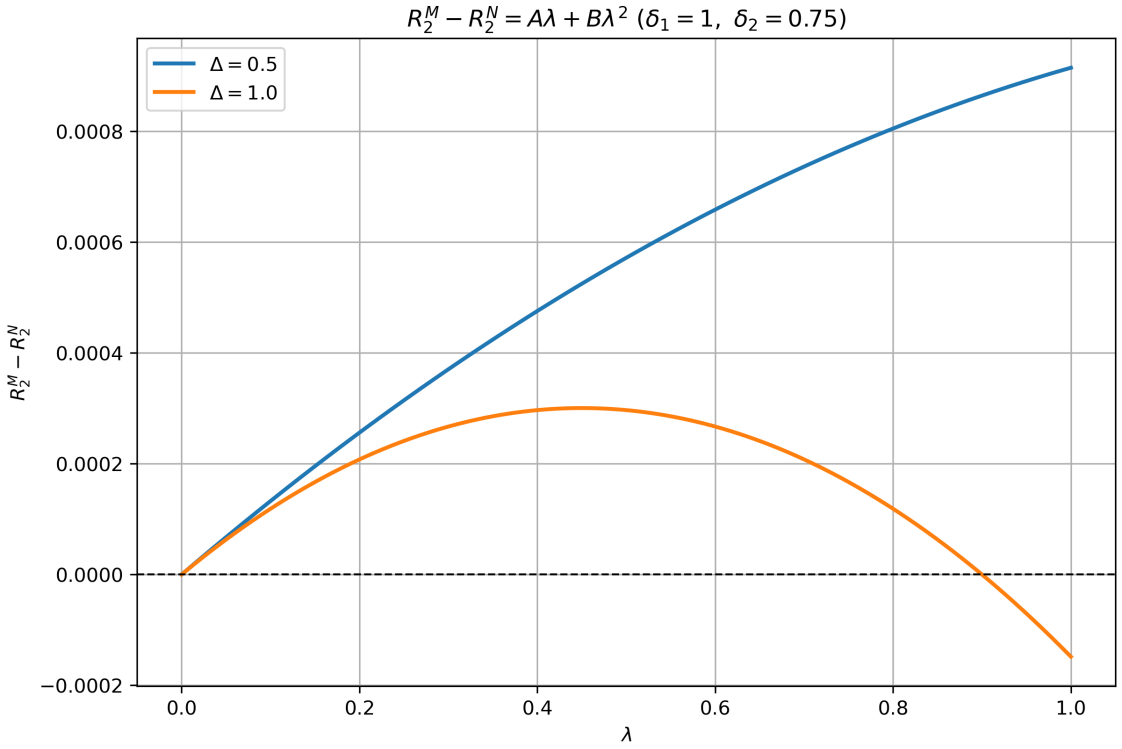

Figure 2: Low-tax country revenue gain $R_2^M - R_2^N$ as a function of λ for $\delta_1 = 1 > \delta_2 = 0.75$ with low $\Delta = 0.5$ and high cost of activity shifting $\Delta = 1$

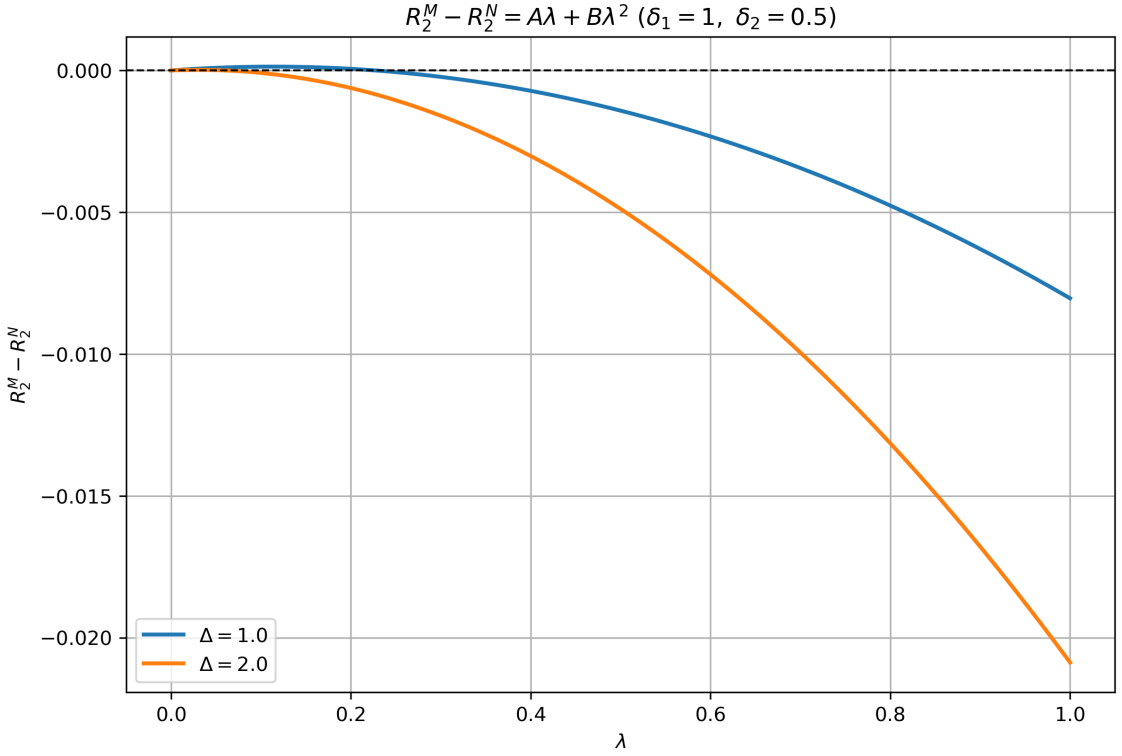

Figure 3: Low-tax country revenue gain $R_2^M - R_2^N$ as a function of λ for $\delta_1 = 1 > \delta_2 = 0.5$ with $\Delta = 1$ and $\Delta = 2$

raised too much without harming the low-tax country.

By contrast, using a different framework, Haufler et al. (2025) show that GMT would hurt developing countries when competition for investment is "more" intense. In fact, Figure 3 clearly suggests that, for any given minimum tax λ, more intense FDI competition (lower Δ) limits the revenue loss from the minimum tax in the low-tax country. Consequently, an effective way to increase revenue in developing country is to encourage FDI competition up to a certain point (given by Δ^* in proposition 7). We summarize our findings on the minimum tax in the next proposition.

Proposition 8. Under $\epsilon = 0$, activity shifting cost $\Delta > 0$ and profit shifting cost $\delta_1 > \delta_2$, the minimum tax $t_2^M = t_2^N + \lambda(t_1^N - t_2^N)$ has the following properties

(i) R_1^M is increasing for all $\lambda \in [0, 1]$

(ii)R_2^M is increasing for all $\lambda \leq \lambda^*$ and decreasing otherwise

(iii) the Pareto optimal minimum tax λ^* is strictly positive, decreasing with Δ (activity shifting cost), and increasing with δ_2 (tax capacity in developing country)

It is easy to agree that, between revenue-maximizing governments, a low-tax country may benefit from a minimum tax that obliges it to raise its own rate by a small amount, as a result of the positive return from the induced increase in rates set by high tax countries (see Proposition 8 (iii)). Less straightforward is the level of the minimum rate, a low-tax country most prefer. This is the issue addressed in Hebous and Keen (2023) in a tax competition framework focusing on profit shifting rather than real investment (but with governments with different concerns on revenue maximization). They compute the Pareto efficient minimum rate as the level that is most preferred by the low-tax country (the equivalent of λ^* in our model but with $\Delta \to \infty$). Proposition 8 (iii) suggests that extending the analysis to real investment competition, together with profit shifting has profound implication on the minimum tax that the low tax country most prefer. In fact this minimum tax is increasing with the intensity of the competition for real investment (lower Δ). Another issue that is addressed in Hebous and Keen (2023) is the the highest level of the minimum tax which, while not its most preferred, is for the low tax country preferable to the no-minimum tax (the maximal Pareto dominant rate). In our model it is straightforward to calculate how high can the minimum be set while still leaving that

low tax country better off than in no minimum tax equilibrium. From (19) it requires that $\lambda = -\frac{A}{B}$ so that $R_2^M - R_2^N = (A + B\lambda)\lambda = 0$. Let λ^{**} be the maximal Pareto dominant rate. It follows that $\lambda^{**} = 2\lambda^*$. Thus, from proposition 8 , the maximal Pareto dominant rate is increasing with the intensity of the competition for real investment (lower Δ), and increasing in the tax capacity of the low tax country (higher δ_2).

The bottom line of our analysis is that low-tax countries tend to support raising the minimum tax when competition for real investment is intense or when their tax capacity is sufficiently high.

6 Conclusion

We have developed a transparent framework to explain tax asymmetries between countries simultaneously competing with each other for real investment and with tax haven for profit shifting. A key feature of our analysis is that competition for investment can help low-tax country to compensate for unequal tax base or unequal tax capacity by taxing less to attract investment. Our objective was to show how this twofold competition shapes the effectiveness of tax policy, including minimum tax rules. We have denoted developing country as one with a narrower tax base or lower tax-raising capacity. Such a country is more susceptible to profit shifting and therefore sets a lower tax rate, attracting more FDI.

Our analysis reveals that policies designed to enhance FDI competition—such as lowering transaction costs, reducing country risk, or easing market-entry barriers—do not necessarily benefit the developing country. There exists a critical degree of real-investment competition beyond which further intensification becomes harmful for the developing country (and for the developed country as well).

We further identify a "tax capacity externality": an increase in tax capacity in the developed (high-tax) country always boosts revenue in the developing country. Finally, we derive the minimum tax rate preferred by the developing country and show that this preferred level rises with both the intensity of FDI competition and the country's tax capacity. The implication is that developing countries would support raising the minimum tax if competition for real investment is sufficiently intense or if their tax capacity is

sufficiently high.

Our findings are specific to some key modeling assumptions. First the cost of profit shifting depends on the total amount shifted, so that profit is actually only shifted to the tax haven. In Hindriks and Nishimura (2025b) we relax this assumption so that profit is also shifted between non-haven countries. We provide a full analysis of the impact of the minimum tax either under unequal tax base or unequal tax capacity. Another key assumption is the use of profit tax. For developing country, the profit tax is not easily implemented and turnover tax may be preferable. In Chen and Hindriks (2023) we provide conditions under which turnover tax is preferable to profit tax under symmetry. It would be interesting extending that analysis to accommodate various country asymmetries.

References

Agrawal, D., Wildasin, D., 2020. Technology and tax systems. Journal of Public Economics 185, 104082.

Altshuler, R., Grubert, H., 2016. The three parties in the race to the bottom: Host governments, home governments, and multinational companies. Technical Report. CES working paper series no 1613.

Chen, X., Hindriks, J., 2023. Multinational taxation under pressure: the role of tax deductibility. Lidam Discussion Paper 2023/13 UCLouvain.

Chen, X., Sun, R., 2025. The Global Minimum Tax, investment incentives and asymmetric tax competition. Lidam Discussion paper 2025/19 UCLouvain.

Crivelli, de Mooij, Keen, 2016. Base erosion, profit shifting and developing countries. FinanzArchiv .

Delis, F., Delis, M., Laeven, L., Ongena, S., 2025. Global evidence on profit shifting within firms and across time. European Central Bank WP , 3071.

Devereux, M., Lockwood, B., Redoano, M., 2008. Do countries compete over corporate tax rates? Journal of Public Economics 92, 1210–1235.

Dharmapala, D., 2020. Do multinationals firms use tax havens to the detriment of other countries. Technical Report. University of Chicago Coase-Sandor Institute Research paper.

Fuest, C., Hebous, S., Riedel, N., 2011. International debt shifting and multinational firms in developing countries. Economics Letters , 113, 135–138.

Garcia-Bernardos, J., Jansky, P., 2022. Profit shifting of multinationals corporations worldwide. World Development 177, 106527.

Haufler, A., Mardan, M., 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.

Haufler, A., Okoshi, H., Schindler, D., 2025. Will the Global Minimum Tax hurt developing countries? presented at Public Economics Workshop, University of Tokyo.

Hebous, S., Hillier, C., Mengistu, A., 2024. Deciphering the globe in a low-tax jurisdiction. In: Research Handbook on the Economics of Tax Havens, edited by A. Lejour and D. Schindler, , Chapter 20. Cheltenham: Edward Elgar Publishing.

Hebous, S., Keen, M., 2023. Pareto-improving minimum corporate taxation. Journal of Public Economics 225.

Hindriks, J., Nishimura, Y., 2017. Equilibrium leadership in tax competition models with capital ownership: A rejoinder. International Tax and Public Finance , 338–349.

Hindriks, J., Nishimura, Y., 2021. Taxing multinationals: The scope for enforcement cooperation. Journal of Public Economic Theory 23, 487–509.

Hindriks, J., Nishimura, Y., 2025a. The enforcement dilemma of the global minimum tax. International Tax and Public Finance published online, DOI 10.1007/s10797–025–09905–9.

Hindriks, J., Nishimura, Y., 2025b. Minimum tax, tax haven and foreign direct investment. LIDAM discussion paper CORE 2025/23.

Hohmann, A., Riedel, N., Zinke, I., 2024. Tax havens: A developing country perspective. In: Research Handbook on the Economics of Tax Havens, edited by A. Lejour and D. Schindler , Chapter 8. Cheltenham: Edward Elgar Publishing.

Huizinga, H., Laeven, L., 2008. International profit shifting within multinationals: A multi-country perspective. Journal of Public Economics 92, 1164–1182.

Jansky, P., Palansky, M., 2019. Estimating the scale of profit shifting and tax revenue losses related to foreign direct investment. International Tax and Public Finance 26, 1048–1103.

Johannesen, N., Tørsløv, T., Wier, L., 2020. Are less developed countries more exposed to multinational tax avoidance? method and evidence from micro-data. The World Bank Economic Review 34, 790–809.

Keen, M., Konrad, K., 2013. The theory of international tax competition and coordination, in: Auerbach, A., Chetty, R., Feldstein, M., Saez, E. (Eds.), Handbook of Public Economics. North Holland, Amsterdam. volume 5, pp. 257–328.

Mardan, M., Stimmelmayr, M., 2020. Tax competition between developed, emerging, and developing countries – same same but different? Journal of Development Economics 146, 102491.

Mongrain, S., Oh, D., van Ypersel, T., 2023. Tax competition in the presence of profit shifting. Journal of Public Economics 224, 104940.

Nielsen, S.B., 2001. A simple model of commodity taxation and crossborder shopping. Scandinavian Journal of Economics 103 , 599–623.

Peralta, S., Wauthy, X., van Ypersele, T., 2006. Should countries control international profit shifting? Journal of International Economics 68, 24–37.

Suarez Serrato, C., 2019. Unintended Consequences of Eliminating Tax Havens. Technical Report. unpublished.

UNCTAD, 2015. An FDI-driven approach to measuring the scale and economic impact of BEPS. Technical background paper accompanying the World Investment Report 2015,

Chapter V "International Tax and Investment Policy Coherence", https://unctad.org/system/files/official-document/wir2015ch5_Annex_II_en.pdf.