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Abstract

Tax avoidance opportunities lower tax revenues in non-haven countries but can intensify market competition because of the entry of multinational enterprises (MNEs), which makes the welfare effects of a tax haven unclear. We construct an oligopoly model under free entry to show that the emergence of tax havens can improve welfare in a non-haven country. Our model shows that an opportunity for tax avoidance allows more MNEs to enter the market because it lowers their tax burden when the tax gap between the non-haven and tax haven countries is wide. In addition, our welfare analysis reveals that the existence of a tax haven can improve total welfare because more MNEs enter the market. Furthermore, recent international tax designs intended to tackle MNEs' tax avoidance, such as tighter enforcement of transfer pricing regulations and the introduction of global minimum taxation, can negatively affect welfare. Hence, our findings provide new insights into the welfare effects of tax avoidance.

Keywords: Free entry; Tax haven; Profit shifting

JEL classification: F15; F13; H23; L13; L23

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1 Introduction

Cross-border tax avoidance by multinational enterprises (MNEs) through tax havens results in tax revenue losses and is widely regarded as detrimental to non-haven economies. Tax avoidance is mainly conducted by manipulating intra-firm transaction prices, known as transfer pricing.[1] According to OECD estimates, base erosion and profit shifting causes annual revenue losses for countries equivalent to 4% to 10% of global corporate income taxes.[2] Tørsløv et al. (2023) find that profit shifting accounts for approximately 20% of corporate profit loss in non-haven EU countries, while Zucman (2014) estimates that the share of U.S. multinational profits shifted offshore steadily increased from 2% to 18% between the 1980s and 2013 despite little real economic activities overseas, eroding nearly one-fifth of U.S. tax revenue. A loss in tax revenue shrinks public good provisions and can harm non-haven countries (Slemrod and Wilson, 2009), and is thus widely believed to be essential in designing policies to prevent MNEs from engaging in tax avoidance.

Despite this widespread harmful view of tax havens, tax avoidance opportunities can influence MNEs' strategies more than profit shifting, and some beneficial aspects of tax havens may have been overlooked.[3] Among several potential benefits, this study focuses on its impact on firms' entry decisions because tax havens can allow MNEs to lower their tax burden and might induce the entry of more firms. Da Rin et al. (2011) provides empirical evidence suggesting a negative relationship between corporate taxation and firm entry across 17 European countries, implying that a higher statutory tax rate discourages firms from entering a market and implicitly acts as a tax-induced entry barrier.[4] Furthermore, De Mooij and Liu (2020) show that introducing transfer pricing regulation reduces 11% of MNEs' investments, on average. As MNEs lower their effective tax rates through tax-avoidance behaviors,[5] it seems realistic that tax havens induce the tax-motivated entry of MNEs and benefit consumers through fierce market competition.

Notably, some studies indicate that MNEs' tax avoidance behavior is often concentrated in

[1] MNEs engage in profit shifting in several ways. See Beer et al. (2020) for a comprehensive survey. They describe how the strategic location of intellectual property rights as a main channel because the lack of comparable transactions with unrelated parties makes it difficult to determine the arm's length price for a company's intangible transactions.

[2] See `https://www.oecd.org/en/topics/base-erosion-and-profit-shifting-beps.html`.

[3] In addition to the effects of tax avoidance on tax revenue, those on MNEs' real economic activities, such as investment decisions, have attracted growing attention. See Alstadsæter et al. (2024) for information on the real effects of tax havens.

[4] Early empirical research provides the positive effect of MNEs' tax avoidance on domestic investments. Desai et al. (2006) provide evidence based on U.S. multinationals' foreign investment between 1982 and 1999, establishing a positive relationship between investment activities outside tax havens and demand for tax haven operations. Desai et al. (2009) incorporate affiliate-level data of U.S. manufacturing firms from 1982 to 2004 and find that an additional unit of foreign capital investment generates an incremental 0.26 unit of domestic capital investment. Collectively, these findings imply that tax havens may facilitate domestic and foreign investments, thereby directly or indirectly stimulating economic activity in non-haven countries.

[5] For example, see Figure 6 of Hugger et al. (2023) for the differences between the effective tax rates of MNEs and statutory tax rates in several jurisdictions, which shows that the effective tax rates are, on average, 6.9% lower than the statutory tax rate.

research and development (R&D) intensive industries with large entry barriers of production. Belz et al. (2017) provides a comprehensive survey showing that R&D intensity is closely associated with transfer mispricing and negatively linked with effective tax rates. R&D intensive industries require high fixed costs of laboratory or production facilities, and, thus, tax-avoidance-motivated entry might result in important welfare gains. Therefore, understanding the wider effects of tax havens is indispensable for proper policy design.

Although it appears realistic that tax avoidance opportunities affect firms' organizational choices and entry decisions, the current discussion focuses mainly on the effects of policy design on tax revenues. Recently, non-haven countries have cooperatively introduced new international tax rules to restrict MNEs' tax avoidance via country-by-country reports or global minimum taxation (GMT).[6] These new policies are expected to increase tax revenue; however, their effects on consumers are often ignored. Accordingly, we address the following two questions: Is the emergence of a tax haven always harmful to non-haven countries? Do policies to prevent MNEs from engaging in tax avoidance improve welfare in non-haven countries?

To focus on the welfare gain from firm entry, we construct an oligopoly model with a tax haven country under free entry, in which firms' strategic interactions are well captured. Firms are symmetric and compete in a product market in a non-haven country. Firms have two choices when entering a market. First, by incurring a fixed entry cost of production, firms decide whether to enter the market (i.e., entry or not). Second, by incurring the additional fixed costs of having a shell company in a tax haven, they determine whether to become an MNE and engage in tax avoidance (i.e., domestic firm or MNE). Therefore, the emergence of a tax haven lowers corporate tax payments and can encourage the entry of more firms as MNEs if the tax avoidance gains dominate the fixed cost of tax avoidance.

Our model shows that firms prefer to become MNEs when the tax rate in a non-haven country is sufficiently high. This is because domestic firms must make large tax payments; therefore, the gains from tax avoidance are large. Moreover, our welfare analysis reveals that, compared to a case without a tax haven, a tax avoidance opportunity can be beneficial for a non-haven country when its tax rate is sufficiently high. If a tax haven does not appear and tax avoidance is impossible, firms face a heavy tax burden and no active firms remain, especially under a high tax rate. However, if firms have the opportunity for tax avoidance, some MNEs will still enter the market. The appearance of MNEs generates a consumer surplus and even tax revenue; thus, allowing MNEs to use a tax haven

[6]The GMT requires MNEs to pay corporate taxes until the effective corporate tax rate reaches 15%. For example, see Janeba and Schjelderup (2023) for recent theoretical research.

is beneficial for a non-haven country under a high corporate tax rate.

These results indicate that policies regulating MNEs' tax avoidance do not necessarily benefit non-haven countries. Hence, we explore the welfare effects of (i) the marginally tighter enforcement of transfer pricing regulations and (ii) the introduction of the GMT (i.e., an exogenous rise in the tax rate in a tax haven). Tighter enforcement of transfer pricing regulations makes it difficult or costly to justify international profit shifting, whereas introducing the GMT narrows the tax gap between non-haven and haven countries. Therefore, both policies decrease MNEs' gains from tax avoidance and thus tend to result in an equilibrium without any firms/MNEs. Our analysis shows that anti-tax avoidance policies reduce the likelihood of such beneficial tax havens.

Although such a beneficial tax haven might appear to be an extreme case, these results jeopardize the emergence of a new high-tech industry. In reality, a new market arises once an innovative firm succeeds in developing a new product, such as the iPhone in 2007. As firms must pay high fixed costs to develop a new product, large tax payments discourage them from conducting innovative activities, even though such a large market allows firms to make money. As our theoretical results concern the reduced emergence of new markets, providing firms with opportunities for tax savings, such as patent boxes, might be beneficial.[7]

1.1 Literature review

Our study primarily contributes to the literature on MNEs' tax avoidance. Although the traditional focus has been on tax revenue effects, recent research has explored MNEs' tax avoidance behavior in the context of welfare under an imperfectly competitive setting. Okoshi (2021) showed that MNEs increase their R&D investments in product differentiation due to tax avoidance opportunities to make their products less comparable to others' and make it difficult to be audited. Therefore, tax avoidance opportunities can be beneficial owing to more innovation. Choi et al. (2024) examined the effects of transfer pricing regulations on an MNEs' licensing decisions and showed that restricting profit shifting activity of an MNE can hurt a non-haven country because an MNE strategically stops granting its new technology to a rival firm to reduce the risks of being audited by a tax authority. Although these studies noted some beneficial aspects of tax avoidance, they fixed the number of firms; thus, how tax avoidance opportunities influence firms' entry decisions remains unclear.[8]

Some notable studies have examined tax avoidance combined with firms' entry decisions.[9]

[7] See Haufler and Schindler (2023) for a theoretical analysis of the patent box in the profit shifting context.

[8] Hong and Smart (2010) theoretically revealed that, once the tax rate is endogenously determined, allowing tax avoidance can mitigate tax competition because it prevents foreign capital from out-flowing.

[9] Our study also contributes to the literature on free entry. For example, Wang (2016) investigated the optimal per-unit

Goerke and Runkel (2006) showed that, in an oligopoly setting under free entry, opportunities for tax avoidance encourage more firms to enter the product market because they expect lower corporate tax payments and entering the market is profitable. In addition, Bauer and Langenmayr (2013) used a monopolistic competition model to investigate heterogeneous firms' choices to either outsource input production or be MNEs and manufacture internally. They found that more firms become MNEs if they can manipulate transfer pricing. This implies that the effective tax of MNEs is lower than that of domestic firms and that MNEs set lower prices for their goods. More closely related to our study, Lüttmann (2024) incorporated MNEs' R&D decisions and revealed beneficial tax havens through technological improvements. By considering two non-haven countries, he noted that the cross-border spillover of R&D leads to an insufficient level of national policy and that R&D-spurring tax avoidance can be beneficial. Although these studies found that MNEs' chances of tax avoidance influence firms' organizational and entry decisions, they did not clarify whether and when regulating tax avoidance could harm welfare.

An exception is Goerke (2017), who investigated firms' behaviors, including tax evasion, under free entry in an oligopoly setting and demonstrated the conditions under which tax evasion increases or decreases welfare (see Proposition 4 of Goerke (2017)). However, their study considered tax evasion rather than tax avoidance via a tax haven; thus, how anti-tax-avoidance policies such as tighter enforcement of transfer pricing regulation or the GMT affect welfare remains unclear. Therefore, our study complements Goerke (2017) by deepening the understanding of the welfare effects of recent international tax policies from the perspective of the tax gap between non-haven and haven countries, the degree of transfer pricing regulation, and the size of entry costs.

The remainder of this paper is organized as follows. Section 2 presents our free-entry equilibrium model and derives the equilibrium. Section 3 examines the welfare effects of tax-induced entry into a non-haven. After showing the conditions for beneficial tax havens, we explore the welfare effects of (i) introducing the GMT and (ii) tightening tax avoidance regulations. Section 4 extends this analysis in two directions: conducting comparative statics under different entry barriers and incorporating differentiated products. In addition, we present an argument on the assumption of the types of tax havens with and without economic activities. Section 5 concludes the paper.

subsidy and tariff under free entry, whereas Gama and Samano (2021) considered the effects of network externalities.

2 Model

Consider a non-haven domestic country with a fixed corporate tax rate $T(>0)$. The representative individual in the country has the following utility function:

$$u = aX - \frac{bX^2}{2} + Y + G$$

where X and Y are the consumption of goods from imperfectly and perfectly competitive markets, respectively, and G is the government's provision of public goods. We regard the perfectly competitive industry as a numeraíre industry: its price is normalized to unity, and the marginal cost of the production of the good is also assumed to be unity. In addition, the public good provision is financed by corporate tax revenue, TR, from an imperfectly competitive industry, and $G = TR$ holds.[10] Our focus is on the imperfectly competitive industry, and we explain further setups below.

The imperfectly competitive industry has a potentially large pool of firms that supply homogeneous goods, and there are n active firms. To highlight the main mechanisms, we assume that firms are symmetric. Specifically, they have the same returns-to-scale technology and constant marginal cost, which is normalized to zero, $c_i = 0$. Additionally, each firm must incur a fixed setup cost F, which is not tax deductible. Given the utility function above, firms face the inverse demand function as $p = a - bX$ where $X = \sum_{i=1}^{n} x_i$ and firm i's operating profits are formulated as $\pi_i = (p - c_i)x_i$ where x_i is the firm i's supply.

The main purpose of our analysis is that firms may become MNEs if a tax haven emerges, and they find tax avoidance via a tax-haven country profitable. Following the literature on tax havens, we assume that the tax haven country, denoted by H, has no economic activity and only provides MNEs with tax avoidance opportunities.[11] Additionally, the tax haven is assumed to impose a negligible corporate tax which is normalized to zero.[12] MNEs can shift profits by establishing a shell company in H and using transfer pricing manipulation, typically involving intangible assets such as trademarks or patents. Let π_{si} be the amount of profit shifted by active MNE $i \in \{1, \ldots, n\}$ from the domestic country to the haven country. Then, MNE i reports $\pi_i - \pi_{si}$ and π_{si} in the domestic and tax haven countries, respectively.

[10] Note that firms in a perfectly competitive industry make zero profit; thus, no tax base remains.

[11] According to the Tax Justice Network, the top three countries with a low corporate tax index in 2024 are the British Virgin Islands, the Cayman Islands, and Bermuda, implying that the assumption of no economic activity is realistic. However, some countries with economic activity are also listed, such as the Netherlands and Ireland, which rank seventh and ninth, respectively. See `https://cthi.taxjustice.net/` for the top-twenty ranking. This is discussed in Section 4.

[12] In Section 3, we briefly argue the case with a positive tax rate for a haven. However, because our primary aim is to examine the welfare effects of tax avoidance on a non-haven country, our benchmark analysis simplifies the model as much as possible and assumes that the haven is a small jurisdiction with no substantial economic activity or effective consumer market, serving solely as a location for booking multinational profits.

Engaging in tax avoidance is costly, and firms must pay two additional costs. First, the administrative burden of building a shell company incurs an additional fixed cost f, which is not tax-deductible.[13] Second, because profit shifting is globally regulated (e.g., by the OECD's transfer pricing guidelines), MNEs must employ accountants, lawyers, and other experts to justify their transfer pricing decisions. In the literature, such costs are called "concealment costs" and are assumed to be non-tax deductible. Following Huizinga and Laeven (2008) and Gumpert et al. (2016), the concealment cost is specified as:[14]

$$C(\pi_i, \pi_{si}) = \frac{\phi \pi_{si}^2}{2\pi_i},$$

where ϕ captures the difficulty of profit shifting.

This specification has three notable features. First, the quadratic form of concealment costs over shifted profits captures that larger shifted profits make it harder for tax experts to justify the abusive use of transfer prices. Therefore, MNEs must pay them higher rewards. Second, the costs are smaller when MNEs' operating profits π_i become large because the marginal change in profits in a bank account is small, and auditing tax avoidance behavior becomes difficult when a bank account has a high balance. Third, in our analysis, a higher ϕ reflects stricter enforcement of the transfer pricing regulation. Therefore, we interpret an increase in ϕ as tightening transfer pricing regulations.

In the above setting, firms decide whether to enter the market, and we investigate how the opportunity for tax avoidance affects welfare in a non-haven country. Let ν be a state variable that takes unity if there is a tax haven and firms become MNEs, and zero otherwise. Then, each firm/MNE maximizes its post-tax profits,[15]

$$\Pi_i = (1-T)(\pi_i - \nu\pi_{si}) - F + \nu\pi_{si} - \nu\left(f + \frac{\phi\pi_{si}^2}{2\pi_i}\right) \tag{1}$$

where the third and last terms capture the reported profits in a tax haven and the tax avoidance cost, respectively.

To close the model, we assume that the representative consumer has an exogenously large income I which secures positive consumption of both goods X and Y.[16] By solving the utility

[13] Owing to a lack of substantial production activity, our numerical example illustrates cases where $f < F$ holds.

[14] Our setting only captures the tax avoidance distortion and the government's penalty scheme. Although there are alternative formulations of the cost or penalty scheme, they have no qualitative effect on the issue we examine.

[15] The separate accounting principle is in force; thus, profits booked in the haven are exempt from double taxation.

[16] The profits of each symmetric firm/MNE in the market will become zero in the free-entry equilibrium, and all corporate income tax revenues are used in public good provision. Thus, domestic consumers will have no disposable

maximization problem, the optimal consumption of Y is $\widehat{Y} = I - pX$ and we can derive the following welfare function

$$u = aX - \frac{bX^2}{2} + \widehat{Y} + G = \underbrace{\frac{b(X)^2}{2}}_{CS_X} + TR + I \tag{2}$$

where CS_X denotes the consumer surplus from the imperfectly competitive industry.

We will solve the following three-stage game. In the first stage, firms decide whether to enter the market and become MNEs. Second, firms/MNEs compete in quantities à la Cournot. Finally, if firms decide to become MNEs, they determine the amount of profit shifted to the tax haven. The game is solved using backward induction.

2.1 MNEs' optimal shifted profits

In the third stage, firms that become MNEs by having a shell company in a tax haven decide how much profit they shift to the haven. MNE i chooses shifted profit π_{si} to maximize Eq.(1) with $\nu = 1$. The first-order condition (FOC) with respect to π_{si} yields:

$$\widehat{\pi}_{si} = \frac{T}{\phi}\pi_i \tag{3}$$

where $0 < \frac{T}{\phi} < 1$ is assumed to secure positive reported profits in the non-haven country. Hence, MNEs shift $\frac{T}{\phi}$% of their operating profits to the tax haven and $\widehat{\pi}_{si}$ increases with T and decreases with ϕ. Intuitively, a higher tax rate in the non-haven county increases the gains from tax avoidance, and looser enforcement of transfer pricing regulation decreases the cost of profit shifting, both of which encourage MNEs to shift profits.

Substituting $\widehat{\pi}_{si}$ into Eq.(1) yields:

$$\Pi_i = \left(1 - T + \nu\frac{T^2}{2\phi}\right)\pi_i - F - \nu f \tag{4}$$

where the third term in brackets represents the net gain from profit shifting.

2.2 Firms' optimal output

In the second stage, firms/MNEs make supply decisions. Note that Π_i is proportional to π_i, their supply decision does not depend on any tax terms. By solving the FOC of Eq.(4) with respect to x_i,

income to consume private goods X and Y. Therefore, we assume an exogenous large amount of individual income I as budget for consumption.

we have,

$$\widehat{x}_i = \frac{a}{b(n+1)} \quad \text{and} \quad \widehat{\pi}_i = \frac{a^2}{b(n+1)^2} = b(\widehat{x}_i)^2$$

which are standard Cournot outcomes: More entrants make market competition fiercer, which results in smaller supplies and lower operating profits per firm.

The above outcome rewrites the post-tax profits of firms/MNEs as follows:

$$\Pi_i = \left(1 - T + \nu\frac{T^2}{2\phi}\right)\left(\frac{a^2}{b(n+1)^2}\right) - F - \nu f \tag{5}$$

2.3 Entry decision

In the first stage, firms make decisions regarding entry and organizational form. Owing to the assumption of symmetric firms, if one firm decides to enter the market, all firms choose the same organizational form: either a domestic firm or an MNE. Therefore, given the state variable of firms ν, firms enter (exit) the market if their post-tax profits are positive (negative). Thus, in the equilibrium, the post-tax profits of all firms are zero, and we can derive the equilibrium number of firms/MNEs:

$$\widehat{\Pi}_i = 0 \iff \widehat{n} = \frac{a}{\sqrt{b(F+\nu f)}}\sqrt{1 - T + \nu\frac{T^2}{2\phi}} - 1.$$

To clarify the effect of the corporate tax rate in a non-haven country, we derive the sign of the first derivative of the equilibrium number of active firms with respect to the tax rate as

$$\frac{\partial \widehat{n}}{\partial T} \propto -1 + \nu\frac{T}{\phi} < 0.$$

Hence, a higher tax rate in a non-haven country decreases the number of active firms, which is consistent with Da Rin et al. (2011). Intuitively, a higher tax rate reduces post-tax profits and discourages firms/MNEs from entering the market.[17] Note that if firms become MNEs and engage in tax avoidance, they save on some tax payments, and this negative effect is mitigated, which is captured by the second term. This indicates that tax avoidance opportunities may induce new firm entry, which we examine next.

[17]We also can intuitively confirm that the number of active firms declines with fixed production costs and tax avoidance.

2.3.1 Organizational choice

As the final examination of the derivation of the equilibrium, we analyze the organizational form of firms. As all firms are symmetric, we drop the index for firms but we use superscript "D" and "H" denoting the equilibrium regime that firms choose to be a domestic firm and an MNE using the tax haven for tax avoidance, respectively, which corresponds with $\nu = 0$ and $\nu = 1$, hereafter.

To determine the effect of a tax avoidance opportunity on organizational form, we consider the short-term impact of a tax haven on incumbent firms' post-tax profits without further entries/exits. Thus, we observe what happens in the case without a tax haven if a tax haven suddenly arises and profit shifting is possible. If there are no tax havens, profit shifting is impossible and the equilibrium regime is D. In this case, the emergence of a tax haven allows incumbent firms to become MNEs and engage in tax avoidance if they find it profitable. If post-tax profits become positive, new firms can enter the market by becoming MNEs. Therefore, the equilibrium changes from regime D to H when the market outcome with $n = \widehat{n}^D$ yields positive post-tax profits and the following equation is positive,

$$\Pi^H\Big|_{n=\widehat{n}^D} = \underbrace{(1-T)\left(\frac{a^2}{b(\widehat{n}^D+1)^2}\right) - F}_{=0 \quad (\because \ \Pi^D=0)} + \frac{T^2}{2\phi}\left(\frac{a^2}{b(\widehat{n}^D+1)^2}\right) - f = \frac{FT^2}{2\phi(1-T)} - f. \tag{6}$$

The sign is ambiguous for the following reasons. The first two terms are the post-tax profits under regime D; thus, they go to zero. The remaining terms show the gains and costs of using tax avoidance, given the initial state with $\widehat{n}^D$ incumbent firms. On the positive side, captured by the third term, a portion of MNEs' profits are no longer taxed. On the negative side, as reflected in the fourth term, they must incur a fixed cost for profit shifting. Therefore, if the gain exceeds the cost, the incumbent firm makes positive post-tax profits, and new firms enter the market by becoming MNEs.

Eq.(6) is reformulated as follows.

$$\begin{aligned}
\Pi^H\Big|_{n=\widehat{n}^D} = \frac{FT^2}{2\phi(1-T)} - f \geq 0 \iff T &\geq \frac{f}{F}\left(\sqrt{\phi\left(\phi + \frac{2F}{f}\right)} - \phi\right) \equiv \underline{T}^H \\
\iff \phi &< \frac{FT^2}{2f(1-T)} \equiv \overline{\phi}^H \\
\iff F &> \frac{2\phi f(1-T)}{T^2} \equiv \underline{F}^H
\end{aligned}$$

Therefore, the tax avoidance opportunity is profitable for firms and induces the new entry of firms

as MNEs, and $\widehat{n}^D < \widehat{n}^H$ holds when (i) the corporate tax in a non-haven country is high, (ii) transfer pricing regulation is loose, and (iii) fixed production cost is large. The first two results reflect a large gain from tax avoidance because of a wide tax gap and lax transfer-pricing regulation. In addition, the third result indicates that high production costs lead to a few active firms in regime D and larger operating profits. Thus, tax avoidance gains are also large under large F. These results are summarized as the next proposition.

Proposition 1. An emergence of a tax haven makes incumbent firms become MNEs and, hence, induces more entrants ($\widehat{n}^D < \widehat{n}^H$) when (i) the tax gap is sufficiently wide, $T > \underline{T}^H$, (ii) transfer pricing regulation is sufficiently lax, $\phi < \overline{\phi}^H$, and (iii) market competition is relatively weak due to large fixed production cost, $F > \underline{F}^H$.

This proposition is in line with Goerke (2017), who investigated the effects of tax evasion on firms' entry decisions. Unlike Goerke (2017), we focus on tax avoidance via a tax haven and assume that tax avoidance is costly. Hence, our model does not always show an increase in entrants because of the emergence of a tax haven. Thus, we show clear tax-haven-associated conditions for more entrants.

In the next section, as a tax gap is easily observable and usually a main interest, our analysis focuses on how tax differences influence welfare effects. However, we also briefly note the roles of (i) tighter transfer pricing regulations and (ii) fixed production costs as possible measures of industries afterward.

3 Welfare effects of tax-induced entry

Proposition 1 shows that tax avoidance opportunities can induce new entrants and benefit consumers; therefore, the welfare effect of a tax haven is not obvious. To observe the overall welfare effect, we substitute the optimal supplies of firms/MNEs into the utility function of Eq.(2), which provides the following reformulation of welfare,

$$u = \frac{a^2}{b}\left(\frac{\widehat{n}}{\widehat{n}+1}\right)^2 + T\widehat{n}\left(1-\nu\frac{T}{\phi}\right)\left(\frac{a^2}{b}\right)\left(\frac{1}{\widehat{n}+1}\right)^2 + I,$$

where the first and second terms represent the consumer surplus from industry X and tax revenues, respectively.[18] The ambiguity of welfare gains from a tax haven is formulated as

$$\Delta u \equiv u^H - u^D = \left(CS_X^H - CS_X^D\right) + \left(TR^H - TR^D\right)$$

where the first bracket is consumer gain and the second bracket shows tax revenue losses. Therefore, we examine whether and under which conditions a non-haven country may benefit from MNEs' tax avoidance.

Note that because firms keep their organizational form unchanged from domestic firms under $0 < T < \underline{T}^H$, tax havens do not have welfare effects on the non-haven country. Thus, the lower threshold for tax havens' welfare effects is $T = \underline{T}^H$. Additionally, we can pin down the upper bounds of the corporate tax rate in a domestic country from $\widehat{n}^D = 1$ and $\widehat{n}^H = 1$, which are $\overline{T}^D \equiv 1 - \frac{4bF}{a^2}$ and $\overline{T}^H \equiv \phi\left[1 - \sqrt{1 - \frac{2}{\phi}\left\{1 - \frac{2}{a}^2 b(F+f)\right\}}\right]$, respectively. As Proposition 1 shows, $\widehat{n}^D < \widehat{n}^H$ under $\underline{T}^H < T$, it secures $\overline{T}^D < \overline{T}^H$. Thus, we have $1 < \widehat{n}^D < \widehat{n}^H$ under $\underline{T}^H < T < \overline{T}^D$ and $\widehat{n}^D = 0 < 1 < \widehat{n}^H$ under $\overline{T}^D < T < \overline{T}^H$. Thus, the remaining analysis focuses on the case under $\underline{T}^H < T < \overline{T}^H$ where $0 \leq \widehat{n}^D < \widehat{n}^H$ holds.

We can analytically obtain clear signs of Δu at both extremes. At the lower bound of the corporate tax rate, $T = \underline{T}^H$, the sign is negative. By definition, the number of active firms is the same at the lower bound ($\widehat{n} \equiv \widehat{n}^D = \widehat{n}^H$ at $T = \underline{T}^H$). Thus, consumer surplus remains unchanged in both regimes. However, all firms become MNEs and avoid tax payments without any changes in their operating profits, which implies tax revenue losses. Formally, we can compute

$$\Delta u|_{T=\underline{T}^H} = \underbrace{\left(CS_X^H - CS_X^D\right)}_{=0} + \left(TR^H - TR^D\right) = \underline{T}^H \underbrace{\left(\frac{\widehat{n}a^2}{b(\widehat{n}+1)^2}\right)}_{=\widehat{n}\times\pi_i}\left(1 - \tfrac{\underline{T}^H}{\phi} - 1\right) = -\frac{\widehat{n}}{b\phi}\left(\frac{a\underline{T}^H}{\widehat{n}+1}\right)^2 < 0.$$

This indicates that a low corporate tax T around $\underline{T}^H$ makes it more difficult to collect tax revenue from firms; however, consumers gain little because of a few new entrants. This negative welfare effect is in line with traditional discussions on the effects of tax havens.

However, in the opposite extreme case with a high tax rate $T \in (\overline{T}^D, \overline{T}^H)$, we find the opposite results. Note that by definition, no active firms exist under a sufficiently high tax rate. Additionally, Proposition 1 indicates that tax avoidance opportunities induce new entrants in the form of MNEs. Therefore, under $T \in (\overline{T}^D, \overline{T}^H)$, $\widehat{n}^D = 0 < 1 < \widehat{n}^H$ holds, which clearly indicates that the consumer

[18] Although the short-term effect of a tax haven increases incumbent firms' post-tax profits, it induces further entries, lowers their post-tax profits, and converges to zero in the new equilibrium.

gains. Tax revenues also increase. This is because although some tax bases of MNEs are shifted to a tax haven, their remaining tax base remains in the non-haven country, whereas no tax bases arise in the absence of a tax haven due to a lack of active firms.[19] Hence, we obtain

$$\Delta u|_{T\in(\overline{T}^D,\overline{T}^H)} = \underbrace{\frac{(a\widehat{n}^H)^2}{2b(\widehat{n}^H+1)^2}}_{=CS_X^H>0} + \underbrace{T\widehat{n}^H\left(1-\frac{T}{\phi}\right)\frac{a^2}{b(\widehat{n}^H+1)^2}}_{=TR^H>0} > 0.$$

Analogous to the case of the lower bound, this implies that the welfare gain is positive when the domestic tax rate is sufficiently high $T \in (\overline{T}^D, \overline{T}^H)$.

These results can be summarized as the following proposition:

Proposition 2. The emergence of a tax haven that allows firms to become MNEs and engage in tax avoidance is harmful for a non-haven country when corporate tax in the non-haven country is low $T = \underline{T}^H$. However, this is beneficial when the corporate tax is sufficiently high under $T \in (\overline{T}^D, \overline{T}^H)$.

To explicitly illustrate beneficial tax avoidance in a non-haven high-tax country, as highlighted in Proposition 2, we conduct a numerical exercise with fixed levels of transfer pricing regulation ($\phi = 2.5$) and market competition ($F = 4$). The corporate tax rate in a non-haven country satisfies $\underline{T}^H < T < \overline{T}$ to secure a positive number of entrants and a regime change from D to H due to the emergence of a tax haven. Therefore, our numerical analysis focuses on $T \in (\underline{T}^H = \frac{3\left(\sqrt{1339.583}-2.5\right)}{800} \approx 0.042, \overline{T}^H = 2.5 - \sqrt{4.4512} \approx 0.39)$, which is depicted by Fig.1.[20]

The figure depicts the welfare levels under different corporate tax rates. The solid curves represent welfare levels in the equilibrium: the blue curve shows welfare in the regime D under $T < \underline{T}^H$ whereas the red less steep curve shows that in the regime H under $\underline{T}^H < T$. The dashed blue curves represent the welfare level before the tax haven emerges. Therefore, the gaps between the dashed blue and solid red curves indicate welfare changes. As the figure shows, at a moderate level of $T \in [\underline{T}^H, \overline{T}^D]$, the solid curve is below the dashed one, meaning that the emergence of the tax haven is harmful. This is because tax revenue losses dominate consumer gains from more MNEs. However, under a sufficiently high tax rate $T \in (\overline{T}^D, \overline{T}^H)$, no active firms exist in regime D, but some MNEs remain in regime H ($\widehat{n}^D = 0 < 1 < \widehat{n}^H$), which clearly improves consumer surplus

[19] Notably, a non-haven country even receives tax revenue gains from a tax haven when corporate taxes are sufficiently high. This is contrary to the common sense notion that a tax haven reduces tax revenue in a non-haven country because MNEs substantially shift profits into the haven. However, our model provides novel insight that the traditional view holds only when a firm's entry decisions remain unchanged. A high corporate tax reduces the number of active firms without tax avoidance opportunities; therefore, allowing MNEs' tax avoidance activities can benefit a non-haven country even from the viewpoint of tax revenue.

[20] We use the following parameter values for all figures 1 to 5: $a = 5, b = 1, f = 0.0015, I = 1$.

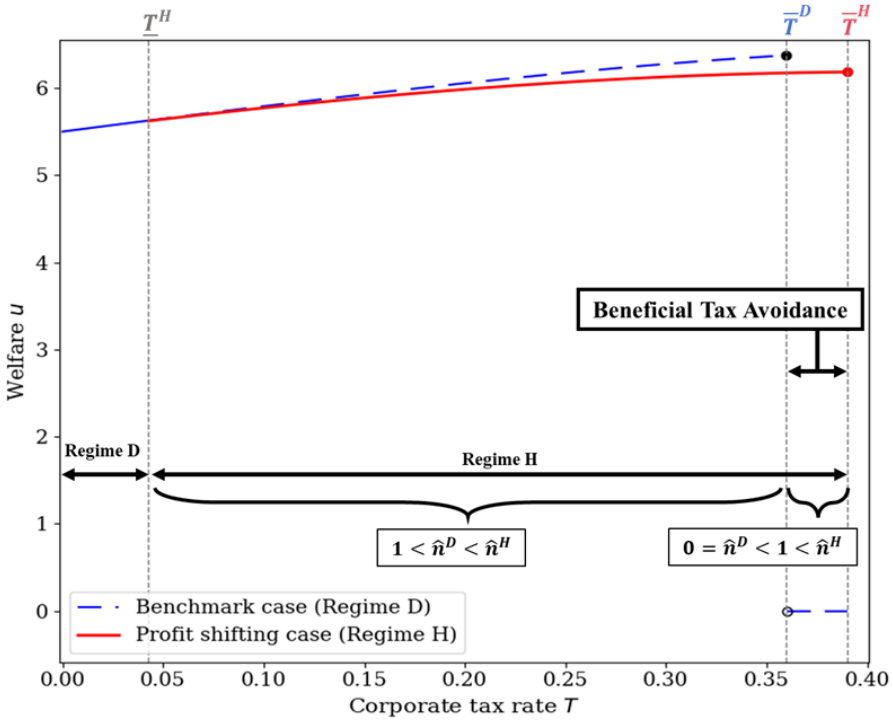

Figure 1: Welfare in a non-haven and beneficial tax havens at high tax rates

and tax revenues. Therefore, as shown in Proposition 2, a non-haven country with high corporate taxes benefits from tax havens because they induce firm entry and benefit consumers.

3.1 Policies to prevent profit shifting

The above analysis shows that allowing MNEs to engage in tax avoidance can be beneficial for a non-haven country. Thus, it is unclear whether designing policies to fight MNEs' profit shifts would be beneficial. In the remainder of this section, we briefly examine the effects of (i) tightening transfer-pricing regulations and (ii) the GMT.

3.1.1 Transfer pricing regulation

As non-haven countries have tightened transfer pricing regulations globally, the welfare effects of such stricter regulations must be examined. To deepen the understanding of the welfare gains of tax avoidance under the free-entry equilibrium, we extend our analysis by examining how tighter enforcement of transfer pricing regulations in a non-haven high-tax country affects the welfare gains from MNEs' tax avoidance via tax havens.

By differentiating the welfare in regime H with respect to ϕ, we obtain the following welfare

channels for stricter transfer pricing enforcement, $\frac{\partial u^H}{\partial \phi} = \frac{a^2}{b(\widehat{n}^H+1)^2} v^H$ where

$$\begin{aligned}
\frac{\partial u^H}{\partial \phi} \propto v^H &\equiv \underbrace{\frac{T^2 \widehat{n}^H}{\phi^2} + T\left(1-\frac{T}{\phi}\right)\left(\frac{\partial \widehat{n}^H}{\partial \phi}\right) - T\left(1-\frac{T}{\phi}\right)\left(\frac{2\widehat{n}^H}{\widehat{n}^H+1}\right)\left(\frac{\partial \widehat{n}^H}{\partial \phi}\right)}_{\text{Tax-revenue effects}} + \underbrace{\left(\frac{\widehat{n}^H}{\widehat{n}^H+1}\right)\left(\frac{\partial \widehat{n}^H}{\partial \phi}\right)}_{\text{Consumer surplus effect}}, \\
&= \frac{T^2 \widehat{n}^H}{\phi^2} - T\left(1-\frac{T}{\phi}\right)\underbrace{\left(\frac{\widehat{n}^H-1}{\widehat{n}^H+1}\right)}_{+}\underbrace{\left(\frac{\partial \widehat{n}^H}{\partial \phi}\right)}_{-} + \left(\frac{\widehat{n}^H}{\widehat{n}^H+1}\right)\underbrace{\left(\frac{\partial \widehat{n}^H}{\partial \phi}\right)}_{-}, \\
&= \frac{T^2 \widehat{n}^H}{\phi^2} + \left(\frac{1}{\widehat{n}^H+1}\right)\left\{\widehat{n}^H\left(1-T+\frac{T^2}{\phi}\right) + T\left(1-\frac{T}{\phi}\right)\right\}\underbrace{\left(\frac{\partial \widehat{n}^H}{\partial \phi}\right)}_{-}.
\end{aligned}$$

Note that the above results hold only when tightening transfer pricing regulations does not affect firms' organizational form. We next consider a change in regimes due to stricter transfer pricing regulations.

The first term is the direct effect of tighter regulations and is positive because of tax revenue gains. The remaining terms are indirect effects via a reduction in active MNEs owing to fewer gains from tax avoidance. The second and third terms reflect tax revenue channels. The second term reflects a negative effect on tax revenue because stricter regulations prevent MNEs from entering the market. However, less fierce competition owing to fewer MNEs entering the market increases the operating profits of active MNEs, as reflected by the third term. Despite the two opposing indirect effects, the latter positive effect dominates the former negative one; thus, the indirect effect has a positive indirect effect in total, as shown by the second term in the second line. Finally, the fourth term captures the negative effect of the consumer surplus due to fewer MNEs. In summary, as shown in the last line, we can see a positive direct tax revenue effect and negative indirect effects. Although the total effect is ambiguous, the direct channel is expected to be the main effect, and we can anticipate a positive effect of tightening transfer pricing regulations.

Next, we consider cases in which tightening transfer-pricing regulations discourages MNEs from avoiding tax payments and changing regime H into regime D. To demonstrate this, we investigate the effects of an increase in ϕ on $\underline{T}^H$ and $\overline{T}^H$. The thresholds are defined as $\Pi^H\big|_{n=\widehat{n}^D} = 0$ and $\widehat{n}^H = 1$, respectively. Thus, by using the implicit function theorem, we have

$$\begin{aligned}
\frac{d\underline{T}^H}{d\phi} &= -\frac{\partial \Pi^H_{n=\widehat{n}^D}/\partial \phi}{\partial \Pi^H_{n=\widehat{n}^D}/\partial T} = \frac{T(1-T)}{\phi(2-T)} > 0 \\
\frac{d\overline{T}^H}{d\phi} &= -\frac{\partial \widehat{n}^H/\partial \phi}{\partial \widehat{n}^H/\partial T} = -\frac{T^2}{2\phi^2\left(1-\frac{T}{\phi}\right)} < 0
\end{aligned}$$

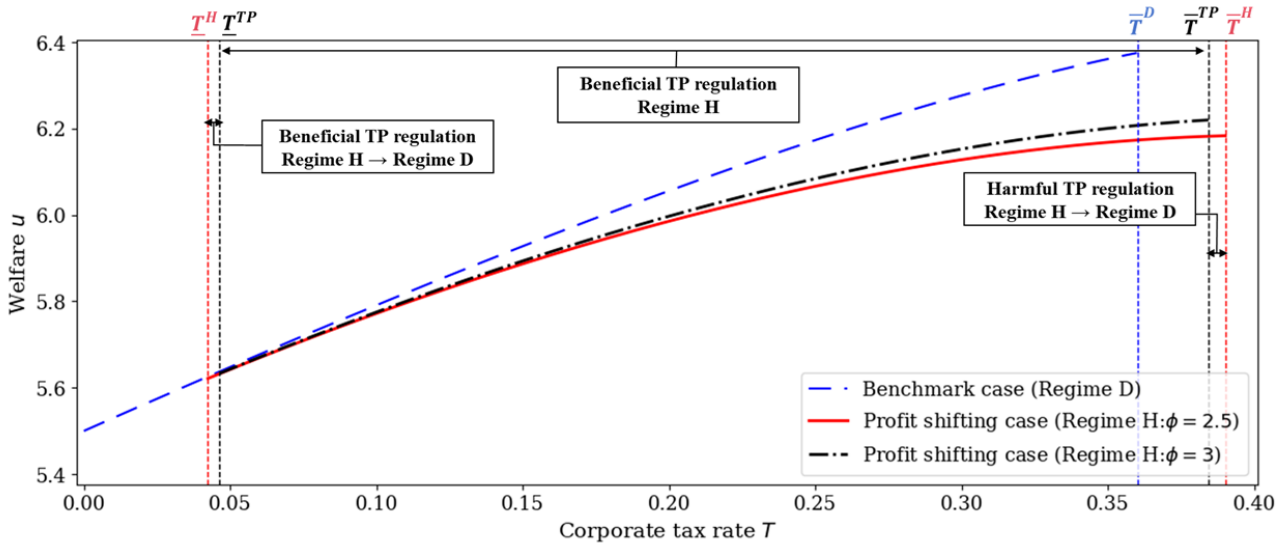

Figure 2: Welfare over different enforcement levels of transfer pricing regulation

The above equations show that firms are less likely to become MNEs because tax avoidance benefits them less owing to stricter transfer pricing regulations.

The above discussion is illustrated in Fig.2, which shows the welfare effects of tightening transfer pricing regulation by adding another welfare curve in regime H with a higher $\phi = 3$ to Fig.1. To focus on our discussion, the figure narrows the vertical axis between 5.4 and 6.4. The lowest solid red curve represents the lax regulation case with $\phi = 2.5$, the middle single-dot blue curve represents the strict case with $\phi = 3$, and the upper dashed blue curve represents the case in regime D. With different levels of regulation, the lower and upper bounds of the corporate tax in regime H differ. As the above equations show, the lower (upper) bound moves to the right (left), $\underline{T}^H < \underline{T}^{TP}$ and $\overline{T}^{TP} < \overline{T}^H$ hold, and regime H is less likely to occur. Thus, we can observe three cases of tightening transfer pricing regulations.

Under a small corporate tax rate $\underline{T}^H < T < \underline{T}^{TP}$, stricter transfer pricing regulation enforcement changes the equilibrium from regime H to regime D because MNEs' tax avoidance costs increase and dominate their gains. Fig.2 shows that, although it reduces the number of product suppliers, tax revenue gains are dominant and, thus, welfare increases. Similarly, under a moderate tax rate $\underline{T}^{TP} < T < \overline{T}^{TP}$, stricter transfer pricing does not affect the equilibrium regime but reduces the number of entrants. As the black single-dot curve is above the red solid curve, welfare gains arise from tightening transfer pricing regulations.

However, under a high tax rate in a non-haven country $\overline{T}^{TP} < T < \overline{T}^H$, tightening regulations is harmful for the country. Under $\overline{T}^{TP} < T < \overline{T}^H$, stricter transfer pricing regulation enforcement influences the equilibrium regime from regime H to regime D because tax avoidance is difficult.

In the new equilibrium regime D, tax payments are relatively high compared to fixed production costs. Thus, no active firms exist, and welfare drops dramatically.

As tightening transfer pricing regulations is widely expected to benefit non-haven countries, our analysis provides new insights. An increase in tax revenue is beneficial for a non-haven country when the corporate tax rate is not at such a high level. However, transfer pricing regulations can negatively affect welfare in a non-haven country when the corporate tax rate is high, and $T \in (\overline{T}^{TP}, \overline{T}^{H})$ holds. Hence, strengthening transfer pricing regulations requires careful discussion, particularly in non-haven countries with high corporate taxes.

3.1.2 Global minimum taxation (GMT)

Another discussion on the anti-tax-avoidance policy is the introduction of the GMT. The GMT requires MNEs to pay corporate taxes until MNEs' effective tax rate becomes at least 15%. Although it is expected to lower MNEs' gains from tax avoidance by narrowing down a tax gap, our main finding so far is that a wide tax gap leads to beneficial tax avoidance. Therefore, similar to tighter transfer pricing regulations, whether introducing the GMT is beneficial is again unclear, as we show below.

Suppose that, if countries agree to introduce the GMT, the tax haven sets the GMT tax rate, denoted as t.[21] Clearly, our benchmark analysis remains unchanged when $t = 0$ holds.

With this modification, the post-tax profits of MNEs can be rewritten as

$$\Pi_i^{GMT} = (1-T)(\pi_i - \pi_{si}) + (1-t)\pi_{si} - F - \left(f + \frac{\phi \pi_{si}^2}{2\pi_i}\right)$$

which yields MNEs' optimal profit shifting strategy as

$$\frac{\partial \Pi_i^{GMT}}{\partial \pi_{si}} = -(1-T) + (1-t) - \left(\frac{\phi \widehat{\pi}_{si}}{\pi_i}\right) = 0 \Rightarrow \widehat{\pi}_{si} = \frac{(T-t)\pi_i}{\phi}.$$

Note that the output decision of firms/MNEs is independent from the tax component, and we can reuse the supply decision in the benchmark model. Therefore, we can derive the following set of

[21] Following the GMT literature, we consider this exogenous increase in t as introducing the GMT. This assumption is justified by the incentives for tax havens to collect tax base inflows and tax revenues because the GMT allows some countries to receive MNEs' tax payments, despite tax havens maintaining tax rates below 15%. Therefore, setting a higher tax rate than in the case without the GMT is beneficial for tax havens.

key endogenous variables

$$\widehat{\Pi}_i^{GMT} = \left(1 - T + \frac{(T-t)^2}{2\phi}\right)\left(\frac{a^2}{b(\widehat{n}^{GMT}+1)^2}\right) - (F+f)$$
$$\widehat{n}^{GMT} = \frac{a}{\sqrt{b(F+f)}}\sqrt{1 - T + \frac{(T-t)^2}{2\phi}} - 1$$
$$CS_X^{GMT} = \frac{a^2}{2b}\left(\frac{\widehat{n}^{GMT}}{\widehat{n}^{GMT}+1}\right)^2$$
$$TR^{GMT} = T\widehat{n}^{GMT}\left(1 - \frac{T-t}{\phi}\right)\frac{a^2}{b(\widehat{n}^{GMT}+1)^2}$$

As the above expressions imply, MNEs' post-tax profits decline because of lower tax avoidance gains, which are captured by the third term in the first parentheses. This leads to an equilibrium in which there are fewer active MNEs than in the case without the GMT. To confirm this, we have,

$$\begin{aligned}\frac{\partial \widehat{n}^{GMT}}{\partial t} &= \frac{a}{\sqrt{b(F+f)}}\frac{\frac{2(T-t)}{2\phi}(-1)}{2\sqrt{1 - T + \frac{(T-t)^2}{2\phi}}} \\ &= -\left(\frac{T-t}{2\phi}\right)\left(\frac{1}{1 - T + \frac{(T-t)^2}{2\phi}}\right)\left(\frac{a}{\sqrt{b(F+f)}}\sqrt{1 - T + \frac{(T-t)^2}{2\phi}}\right) \\ &= -\left(\frac{T-t}{2\phi}\right)\left(\frac{\widehat{n}^{GMT}+1}{1 - T + \frac{(T-t)^2}{2\phi}}\right) < 0.\end{aligned}$$

Subsequently, consumer surplus decreases but tax revenues increase because of MNEs' less active tax avoidance.

Similar to the effects of tightening transfer pricing regulations, we must consider two cases to understand the welfare effects of the GMT. First, introducing the GMT discourages MNEs from engaging in tax avoidance owing to a smaller tax gap and, thus, lower tax avoidance gains, which might change the equilibrium regime from H to D. Note that such a regime change results in no active firms in the new equilibrium, which is the same as shown in Fig.2, and introducing the GMT is clearly harmful. This is confirmed by examining the sign of $\frac{d\overline{F}^H}{dt}$ where $\overline{F}^H$ is the upper bound of F defined by $\widehat{n}^{GMT} = 1$. Formally, by using the implicit function theorem, we can derive the following equation,

$$\frac{d\overline{F}^H}{dt} = -\frac{\partial \widehat{n}^{GMT}/\partial t}{\partial \widehat{n}^{GMT}/\partial F} = -\left(\frac{T-t}{\phi}\right)\left(\frac{F+f}{1 - T + \frac{(T-t)^2}{2\phi}}\right) < 0.$$

Hence, introducing the GMT reduces the threshold of the equilibrium range for regime H and

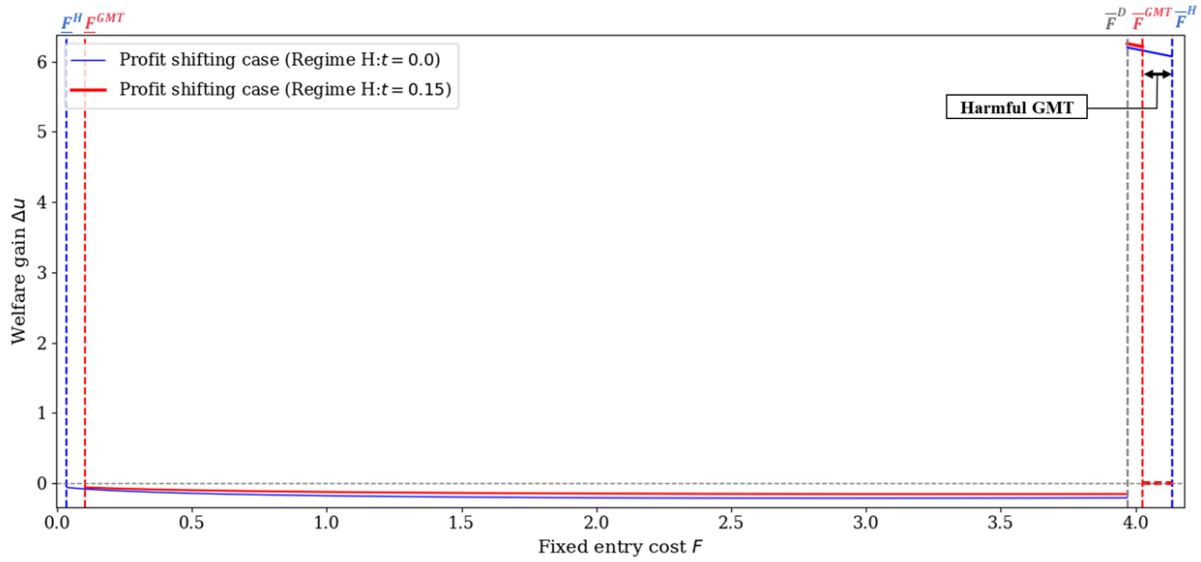

Figure 3: Implication of GMT on welfare gains from a tax haven: Increase in t

results in a harmful GMT when $\overline{F}^{GMT} < F < \overline{F}^{H}$ where $\overline{F}^{GMT}$ is the threshold $\overline{F}^{H}$ with $t > 0$.

The next case arises when introducing the GMT does not affect equilibrium regime H. In Appendix A.1, we show the following equation,

$$\frac{\partial u^{GMT}}{\partial t} > 0 \iff F < \frac{a^2[1-T+\frac{(T-t)^2}{2\phi}]}{b\left[\frac{\frac{T-t}{2}[T(1-\frac{T-t}{\phi})]}{T[1-T+\frac{(T-t)^2}{2\phi}]-\left(\frac{T-t}{2}\right)\left\{1-T\left(1-\frac{T-t}{\phi}\right)\right\}}+1\right]^2} - f.$$

Thus, as expected, introducing the GMT improves welfare in a non-haven country if fixed entry costs are low. These results can be intuitively understood as follows. The GMT increases tax revenue by discouraging MNEs from engaging in tax avoidance, thereby realizing tax revenue gains. By contrast, the GMT reduces the number of MNEs; however, this reduction is very limited under a small fixed entry cost. Thus, the dominant effect is the positive tax revenue effect.

The above discussion is summarized as the following proposition.

Proposition 3. When the fixed cost F is low, an increase in the tax haven rate t improves welfare in the non-haven country. However, under $\overline{F}^{GMT} < F < \overline{F}^{H}$, the GMT changes the equilibrium regime from regime H to regime D and negatively affects welfare.

To clarify the welfare implications of the GMT in a non-haven high-tax country under different entry barriers, we conduct a numerical analysis focusing on $F \in \left(F^H = \frac{2\phi f(1-T)}{(T-t)^2}, \overline{F}^H \equiv \frac{a^2}{4b}\left(1-T+\frac{(T-t)^2}{2\phi}\right)-f\right)$ under which firms choose to become MNEs if the GMT is not introduced. Fig.3 depicts the welfare gain from tax avoidance $\Delta u = u^H - u^D$ under

$T = 0.365$ and two different levels of tax rates in the tax haven, $t = 0$ and $t = 0.15$. The blue curves represent the case without the GMT ($t = 0$), whereas the red curves illustrate the case with it ($t = 0.15$).

Under $\underline{F}^H < F < \overline{F}^D$, the equilibrium is regime H and the emergence of a tax haven is harmful because $\Delta u < 0$ holds. Once the GMT is introduced, the lower threshold of F for regime H increases $\underline{F}^H < \underline{F}^{GMT}$, indicating that firms are less likely to become MNEs again because of fewer gains from tax avoidance. In this case, formally under $\underline{F}^H < F < \underline{F}^{GMT}$, regime D occurs and the GMT is clearly beneficial. Even under $\underline{F}^{GMT} < F < \overline{F}^D$ where the equilibrium regime remains in regime H, the numerical analysis shows a mitigated welfare loss in line with Proposition 3.

If the fixed cost F is sufficiently high, no active firms exist without a tax haven; thus, the emergence of a tax haven is beneficial $\Delta u > 0$. As Proposition 3 shows, this welfare gain is strengthened when $\overline{F}^D < F < \overline{F}^{GMT}$ holds. However, the GMT discourages MNEs from engaging in tax avoidance; thus, the upper bound decreases. Hence, under $\overline{F}^{GMT} < F < \overline{F}^H$, the new equilibrium with the GMT leads to equilibrium regime D and no welfare gains arise from the emergence of a tax haven. Thus, a harmful GMT is observed when the fixed entry cost is sufficiently high. Therefore, similar to the effects of transfer pricing regulations, introducing the GMT does not necessarily benefit non-haven countries when fixed production costs are high and the entry of firms/MNEs is highly limited.

4 Extensions

Our benchmark analysis shows a new and important trade-off between tax avoidance and the notable welfare effects of anti-tax-avoidance policies, such as the tighter enforcement of transfer pricing regulations and the GMT. In this section, we focus on industry-related features, such as the size of entry barriers and differentiated products, to obtain policy implications.

4.1 Different barriers to entry

Empirical evidence suggests that the magnitude of entry barriers varies considerably across industries.[22] This subsection clarifies how the degree of barriers to entry for firms/MNEs in a non-haven country influences the welfare effects of MNEs' tax avoidance under free entry.

As shown in Proposition 2, tax avoidance is harmful for a non-haven country when the tax gap is

[22]Gupta (1968), drawing on cross-sectional data from 29 Indian industries in the 1950s, finds that absolute capital requirements for establishing a minimum optimum plant constitute effective entry barriers in 13 industries, revealing substantial industry heterogeneity.

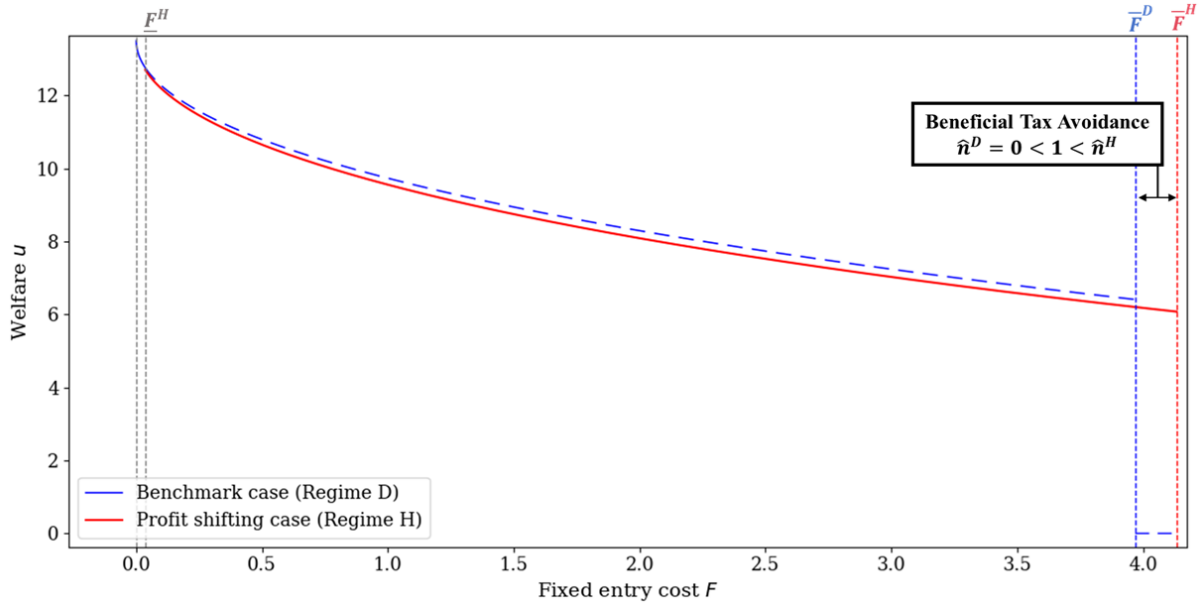

Figure 4: Welfare effects of tax avoidance across entry costs

narrow but beneficial when it is wide. These different outcomes are based on how much consumers gain from tax-avoidance-motivated entry. Therefore, it is intuitive that such a beneficial (harmful) tax haven tends to arise when the entry barrier F is large (small) because a large F makes it difficult for firms to enter the market, and tax avoidance opportunities lower fixed entry costs. Analytically, we derive $\underline{T}^H$ and $\underline{F}^H$ when summarizing Proposition 1, such that a harmful tax haven clearly occurs at $F = \underline{F}^H$. Additionally, we can compute the upper bounds of $F = \overline{F}^D$ from $\hat{n}^D = 1$ and $F = \overline{F}^H$ from $\hat{n}^H = 1$, which is equivalent to the case of $T = \overline{T}^D$ and $T = \overline{T}^H$ at which a beneficial tax haven occurs under $T \in (\overline{T}^D, \overline{T}^H)$. Thus, the following corollary is obtained.

Corollary 1. In the range of $F \in [\underline{F}^H, \overline{F}^H]$ the emergence of a tax haven worsens welfare in a non-haven country at $F = \underline{F}^H$ but improves it at $\overline{F}^D < F < \overline{F}^H$.

Fig.4 illustrates welfare levels in a non-haven country with $T = 0.365$ and $\phi = 2.5$ over an entry barrier F. With the parameter values, the range of F within which firms become MNEs is $F \in (\underline{F}^H = \frac{381}{10658}, \overline{F}^H \approx 4.134)$. The blue dashed curves represent the benchmark without profit shifting, whereas the red solid curve represents the case in which firms become MNEs and shift their profits to a haven. Thus, in line with the corollary above, tax avoidance is beneficial when the entry barrier is sufficiently large and $F \in (\overline{F}^D, \overline{F}^H)$ holds.

This outcome implies that, as the main industries are different in non-haven countries, the effects of tax havens can be heterogeneous across non-haven countries based on the composition of the main industries. Some industries, such as high-tech industries and large automated plants, can be characterized as industries with high entry costs. For these countries, tax avoidance may play a

role in maintaining their domestic industry, and further discussion on tightening transfer pricing regulations is essential.

4.2 Product differentiation

As the degree of product differentiation can be considered another industry characteristic, we now consider the differentiated products of good X. Similar to the benchmark model, an industry consisting of N identical large pools of firms with zero constant marginal costs and n active firms enters the product market.

Let us reformulate the utility function as follows,

$$u = a\sum_{i=1}^{n} x_i - \frac{b}{2}\sum_{i=1}^{n} x_i^2 - d\sum_{i\neq j}^{n} x_i x_j + Y + G$$

where $d \in (0, b)$ is the degree of product differentiation; the closer d is to 0, the more differentiated firms' products are. As an extreme case, the analysis corresponds to the benchmark case when $d = b$ holds. We summarize the detailed computations in online appendix OA.1.

The key endogenous variable in our model is the number of active firms/MNEs, making it important to understand how the degree of product differentiation changes the active firms. Intuitively, product differentiation weakens market competition, and firms have greater market power, which makes firms' post-tax profits positive. Thus, free entry allows more entrants to the market, and such entry decisions by firms continue until the new post-tax profits converge to zero. Thus, greater differentiation captured by lower d results in more active firms, $\frac{\partial \widehat{n}}{\partial d} < 0$.

Notably, the threshold $\underline{T}^H$ of whether tax havens encourage firms to become MNEs is independent from d in the specification. Under the free entry equilibrium, operating profits without tax havens are always equal to the tax-adjusted fixed cost (i.e., $\widehat{\pi}^D = \frac{F}{1-T}$), irrespective of product differentiation. Therefore, as expressed in Eq.(6), the emergence of a tax haven generates additional tax avoidance gains and fixed costs for tax havens $\frac{T^2F}{2\phi(1-T)} - f$, and tax havens allow more entries when $T > \underline{T}^H$ holds. In addition, as the threshold that only one domestic firm/MNEs exists in regime D and H, respectively, is a monopoly and independent from product differentiation level d, we pin down $\overline{T}^D = 1 - \frac{4bF}{a^2}$ from $\widehat{n}^D = 1$ and $\overline{T}^H = \phi\left(1 - \sqrt{1 - \left(\frac{2}{\phi}\right)\left(1 - \frac{4b(F+f)}{a^2}\right)}\right)$ from $\widehat{n}^H = 1$.

Although the three thresholds, $(\underline{T}^H, \overline{T}^D, \overline{T}^H)$, are independent from the degree of product differentiation, the number of active firms/MNEs depends on d, and is thus crucial for welfare gains. Therefore, we conduct a numerical analysis focusing on the case under $T \in \left(\underline{T}^H, \overline{T}^H\right)$. Fig.5 depicts the welfare levels under two degrees of differentiation with $\phi = 2.5$ and $F = 4$. The

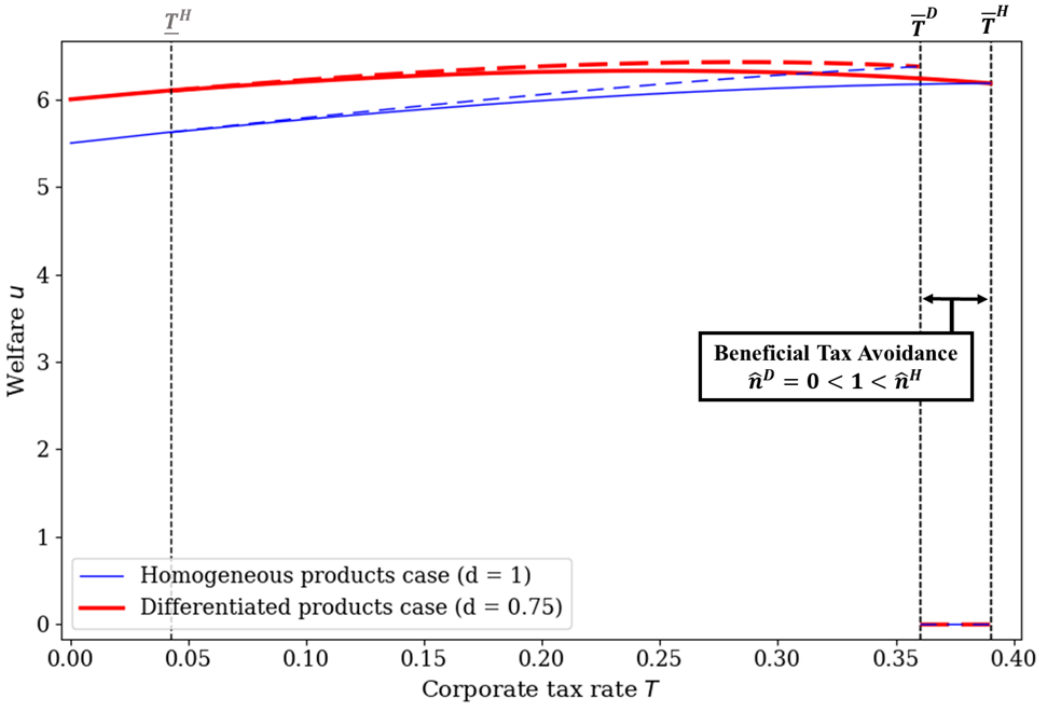

Figure 5: Beneficial tax havens under moderate tax rates due to product differentiation

lower blue curves are consistent with the homogeneous-product case ($d = b = 1$) of Fig.1, whereas the upper red curves represent the case with a differentiated product case ($d = 0.75$). Similar to the previous figures, the solid parts of the curves show the equilibrium regime, and the dashed part is a non-equilibrium counterfactual of regime D. As consumers benefit from a greater variety of products, welfare in the differentiated products case is higher than that in the homogeneous products case.[23] Therefore, our benchmark results hold, and welfare gains from tax avoidance are indeed larger in the case with differentiated products.

4.3 Tax havens with economic activities

In the benchmark analysis, we assume that the tax haven does not have any economic activity, which appears realistic when discussing countries such as the British Virgin Islands. However, if we consider the Netherlands or Ireland, this assumption is unrealistic. Thus, it is helpful to understand what happens once we consider the case with consumption and production in the tax-haven country. In this subsection, we briefly discuss this issue by considering two extreme cases. To simplify this argument, we assume that corporate tax rates are the only difference between tax haven and non-haven countries.

First, let us suppose that the tax haven and non-haven countries locate very close to each other

[23]This nature of consumer gains is also obtained in Collie (2016).

and that firms can supply goods in an integrated market without any trade costs. In this case, all firms clearly prefer to be located in a tax haven country to reduce their corporate taxes. As these firms have no incentive to have their subsidiary in a non-haven country, no MNEs arise in the equilibrium, and entry-spurring tax avoidance does not occur.

Second, let us consider the other extreme case, in which the trade costs between the two countries are prohibitively high and the markets are segregated. In such a case, we can derive the equilibrium number of active firms in both countries, as we did in the main analysis, and firms in the tax haven have no incentive to become MNEs for the same reason as in the first extreme case. However, firms in a non-haven country can receive gains from having a shell company in a tax haven and engaging in tax avoidance, as shown in the main analysis. Hence, the main mechanism holds for firms in non-haven countries. Once tax avoidance by having a shell company and shifting profits via intangible assets becomes possible, it can spur the entry of firms, and the other subsequent analysis holds.

Although the reality lies between the two extremes, the above discussion provides us with important insights. If we consider a non-haven European country, such as Germany and Portugal, the first extreme is likely to happen, and the tax avoidance opportunity is less likely to spur the entry of domestic firms. However, if we consider a non-haven country that has no tax havens with economic activities, such as Japan, the second extreme case tends to occur; thus, tax-avoidance-induced entry occurs. Therefore, when one discusses or conducts an empirical test on this issue, the distance between non-haven and haven countries is an important issue to consider.

5 Conclusion

The emergence of tax havens is widely believed to be harmful to non-haven countries because of tax revenue losses from MNEs, which increases the importance of international tax policies to prevent MNEs from avoiding taxes, such as introducing the GMT or tightening the enforcement of transfer pricing regulations. However, as Goerke (2017) noted, tax avoidance opportunities allow MNEs to lower their tax burden and increase post-tax profits; thus, they spur firms' entry into a product market, which results in consumer gains. Owing to the trade-offs between tax revenues and consumer gains, whether the recent development of international tax policies is truly beneficial in terms of welfare is unclear. Thus, we construct a symmetric oligopoly model under free entry with a tax haven to obtain conditions for "*beneficial tax haven*."

Our main findings are twofold. First, beneficial tax avoidance occurs when a large tax gap exists

between non-haven and haven countries. This is because a wide tax gap increases MNEs' gains from tax avoidance, thereby realizing more entry by MNEs. Second, and more importantly, the new international tax policies can be harmful to a non-haven country: (i) tightening transfer pricing regulations can deteriorate welfare in a non-haven country, and (ii) introducing the GMT reduces the likelihood of beneficial tax avoidance. These findings indicate that proper policy discussion needs to consider the effects of introducing such policies on firms' entry decisions.

Although our analysis provides new insights into the welfare effects of tax havens from the perspective of firms' entry decisions, there are some directions for future research. First, as the current model assumes symmetric firms to simplify the equilibrium analysis, incorporating firm heterogeneity allows us to understand possible different effects on firms. Furthermore, we ignore government decisions and assume exogenous tax rates. However, as countries may adjust their tax rates in response to firm entry/exit, endogenizing policy choices would provide deeper insights into the relationship between equilibrium tax strategies and welfare in the context of multinational tax avoidance. These issues should be addressed in future studies.

Appendix

A.1 Proof of Proposition 3

Utility level under regime D is not related to the tax rate in the tax haven and u^D is independent of t, which means $\frac{\partial \Delta u}{\partial t} = \frac{\partial u^{GMT}}{\partial t} = \frac{\partial (CS_X^{GMT} + TR^{GMT})}{\partial t}$. Then, the first derivative of the welfare gains with respect to t yields

$$
\begin{aligned}
\frac{\partial u^{GMT}}{\partial t} &= \frac{\partial CS_X^{GMT}}{\partial t} + \frac{\partial TR^{GMT}}{\partial t} \\
&= \frac{a^2}{b}\left(\frac{\widehat{n}^{GMT}}{\widehat{n}^{GMT}+1}\right)\left(\frac{1}{(\widehat{n}^{GMT}+1)^2}\right)\frac{\partial \widehat{n}^{GMT}}{\partial t} \\
&\quad + T\left\{\left(1-\frac{T-t}{\phi}\right)\frac{a^2}{b}\left(\frac{1-\widehat{n}^{GMT}}{(\widehat{n}^{GMT}+1)^3}\right)\frac{\partial \widehat{n}^{GMT}}{\partial t} + \frac{1}{\phi}\left(\frac{a^2\widehat{n}^{GMT}}{b(\widehat{n}^{GMT}+1)^2}\right)\right\} \\
&= \frac{a^2}{b}\left(\frac{\widehat{n}^{GMT}}{(\widehat{n}^{GMT}+1)^3}\right)\left(-\left(\frac{T-t}{2\phi}\right)\left(\frac{\widehat{n}^{GMT}+1}{1-T+\frac{(T-t)^2}{2\phi}}\right)\right) \\
&\quad + T\left\{\left(1-\frac{T-t}{\phi}\right)\frac{a^2}{b}\left(\frac{1-\widehat{n}^{GMT}}{(\widehat{n}^{GMT}+1)^3}\right)\left(-\left(\frac{T-t}{2\phi}\right)\left(\frac{\widehat{n}^{GMT}+1}{1-T+\frac{(T-t)^2}{2\phi}}\right)\right) + \frac{1}{\phi}\left(\frac{a^2\widehat{n}^{GMT}}{b(\widehat{n}^{GMT}+1)^2}\right)\right\} \\
&= \frac{a^2}{b(\widehat{n}^{GMT}+1)^2}\left[-\left(\frac{T-t}{2\phi}\right)\left(\frac{\widehat{n}^{GMT}}{1-T+\frac{(T-t)^2}{2\phi}}\right)\right. \\
&\qquad \left. -T\left(\frac{T-t}{2\phi}\right)\left(1-\frac{T-t}{\phi}\right)\left(\frac{\widehat{n}^{GMT}-1}{1-T+\frac{(T-t)^2}{2\phi}}\right) + \frac{T}{\phi}\widehat{n}^{GMT}\right] \\
&= \frac{a^2}{b(\widehat{n}^{GMT}+1)^2}\underbrace{\frac{F+f}{\phi\left(1-T+\frac{(T-t)^2}{2\phi}\right)^2}}_{>0}\times\Gamma_t
\end{aligned}
$$

$$
\text{where}\quad \Gamma_t \equiv \left\{\underbrace{\frac{T-t}{2}}_{>0}\left[\underbrace{-\widehat{n}^H\left\{1-T\left(1-\frac{T-t}{\phi}\right)\right\}}_{<0}\underbrace{-T\left(1-\frac{T-t}{\phi}\right)}_{<0}\right] + \underbrace{T\widehat{n}^H\left(1-T+\frac{(T-t)^2}{2\phi}\right)}_{>0}\right\} \gtreqless 0
$$

$$
\iff \widehat{n}^H\left[T\left(1-T+\frac{(T-t)^2}{2\phi}\right)-\left(\frac{T-t}{2}\right)\left\{1-T\left(1-\frac{T-t}{\phi}\right)\right\}\right]-\left(\frac{T-t}{2}\right)T\left(1-\frac{T-t}{\phi}\right)\gtreqless 0
$$

$$
\iff \widehat{n}^H = \frac{a}{\sqrt{b(F+f)}}\sqrt{1-T+\frac{T^2}{2\phi}}-1 \gtreqless \frac{\left(\frac{T-t}{2}\right)T\left(1-\frac{T-t}{\phi}\right)}{\left[T\left(1-T+\frac{(T-t)^2}{2\phi}\right)-\left(\frac{T-t}{2}\right)\left\{1-T\left(1-\frac{T-t}{\phi}\right)\right\}\right]}
$$

$$
\iff F \lesseqgtr \frac{a^2\left(1-T+\frac{(T-t)^2}{2\phi}\right)}{b\left[\frac{\left(\frac{T-t}{2}\right)T\left(1-\frac{T-t}{\phi}\right)}{\left[T\left(1-T+\frac{(T-t)^2}{2\phi}\right)-\left(\frac{T-t}{2}\right)\left\{1-T\left(1-\frac{T-t}{\phi}\right)\right\}\right]}+1\right]^2} - f \equiv F^{GMT}.
$$

Therefore, $\frac{\partial u^{GMT}}{\partial t} \propto \Gamma_t > 0$ holds if and only if $F < F^{GMT}$ holds.

References

Alstadsæter, A., Davies, R.B., Parenti, M., Toubal, F., 2024. The real effects of tax havens, in: Research Handbook on the Economics of Tax Havens. Edward Elgar Publishing, pp. 121–139.

Bauer, C.J., Langenmayr, D., 2013. Sorting into outsourcing: Are profits taxed at a gorilla's arm's length? Journal of International Economics 90, 326–336.

Beer, S., De Mooij, R., Liu, L., 2020. International corporate tax avoidance: A review of the channels, magnitudes, and blind spots. Journal of Economic Surveys 34, 660–688.

Belz, T., von Hagen, D., Steffens, C., 2017. R&D intensity and the effective tax rate: A meta-regression analysis. Journal of Economic Surveys 31, 988–1010.

Choi, J.P., Ishikawa, J., Okoshi, H., 2024. Tax havens and cross-border licensing with transfer pricing regulation. International Tax and Public Finance 31, 333–366.

Collie, D.R., 2016. Gains from variety? product differentiation and the possibility of losses from trade under cournot oligopoly with free entry. Economics Letters 146, 55–58.

Da Rin, M., Di Giacomo, M., Sembenelli, A., 2011. Entrepreneurship, firm entry, and the taxation of corporate income: Evidence from Europe. Journal of Public Economics 95, 1048–1066.

De Mooij, R., Liu, L., 2020. At a cost: The real effects of transfer pricing regulations. IMF Economic Review 68, 268–306.

Desai, M.A., Foley, C.F., Hines Jr, J.R., 2006. The demand for tax haven operations. Journal of Public economics 90, 513–531.

Desai, M.A., Foley, C.F., Hines Jr, J.R., 2009. Domestic effects of the foreign activities of US multinationals. American Economic Journal: Economic Policy 1, 181–203.

Gama, A., Samano, M., 2021. Free and second-best entry in oligopolies with network effects. Journal of Public Economic Theory 23, 746–759.

Goerke, L., 2017. Tax evasion in a cournot oligopoly with endogenous entry. International Tax and Public Finance 24, 754–779.

Goerke, L., Runkel, M., 2006. Profit tax evasion under oligopoly with endogenous market structure. National Tax Journal 59, 851–857.

Gumpert, A., Hines Jr, J.R., Schnitzer, M., 2016. Multinational firms and tax havens. Review of Economics and Statistics 98, 713–727.

Gupta, V.K., 1968. Cost functions, concentration, and barriers to entry in twenty-nine manufacturing industries of india. The Journal of Industrial Economics , 57–72.

Haufler, A., Schindler, D., 2023. Attracting profit shifting or fostering innovation? on patent boxes and r&d subsidies. European Economic Review 155, 104446.

Hong, Q., Smart, M., 2010. In praise of tax havens: International tax planning and foreign direct investment. European Economic Review 54, 82–95.

Hugger, F., Cabral, A.C.G., O'Reilly, P., 2023. Effective tax rates of MNEs: New evidence on global low-taxed profit. OECD Taxation Working Papers No.67 .

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

Janeba, E., Schjelderup, G., 2023. The global minimum tax raises more revenues than you think, or much less. Journal of International Economics 145, 103837.

Lüttmann, M., 2024. Taxation of mne profits in an r&d driven economy: Beneficial tax havens and minimum taxes. The World Economy 47, 4061–4087.

Okoshi, H., 2021. Innovation for tax avoidance: Product differentiation and the arm's length principle. RIETI Discussion Paper Series 21, 1–31.

Slemrod, J., Wilson, J.D., 2009. Tax competition with parasitic tax havens. Journal of Public Economics 93, 1261–1270.

Tørsløv, T., Wier, L., Zucman, G., 2023. The missing profits of nations. The Review of Economic Studies 90, 1499–1534.

Wang, L.F., 2016. Do industrial and trade policy lead to excess entry and social inefficiency? International Review of Economics & Finance 43, 354–362.

Zucman, G., 2014. Taxing across borders: Tracking personal wealth and corporate profits. Journal of Economic Perspectives 28, 121–148.