

Coordination and the fight against tax havens*

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Abstract

The success or failure of the fight against tax havens is the outcome of a many player coordination game between a tax haven and its potential investors. Key determinants are the costly international pressure and the size of the haven country's revenue pool. The latter is determined endogenously by the decisions of many individual investors. Our analysis suggests a non-standard market model that explains why haven countries would ever comply with international standards of transparency despite the large empirically observable returns in the tax haven business. It also alludes to why service fees in tax havens can be positive despite a competitive financial market with multiple tax havens. Furthermore, we identify a trade-off between the fight against tax havens and high tax rates. Finally, low fines for disclosed offshore tax evasion, e.g. in special programs for tax evaders who voluntarily report their offshore wealth, strengthen haven countries against international pressure.

Keywords: tax havens, offshore tax evasion, international standards of transparency

JEL codes: G20, H26, H87

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1 Introduction

Offshore tax evasion poses a serious challenge to countries all over the world. Zucman (2013) estimates that households hold financial assets worth US\$5.9 trillion through tax havens, or equivalently 8% of their global net financial wealth, most of which is believed to go unrecorded.¹ Various countries and supranational organizations, such as the OECD, have launched several initiatives against tax havens, effectively making it more costly for a country or jurisdiction to offer tax sheltering opportunities. This process, sometimes referred to as the *fight against tax havens*, has partially succeeded. Some countries chose to become compliant and have abandoned their tax sheltering practices, while others have resisted and remain active as tax havens. For observers it is difficult to understand why and when haven countries change their attitudes.

With regard to tax evasion by private investors, the term tax haven is primarily used for countries with no or only nominal taxation and strict secrecy rules that enable foreign investors to conceal capital and capital income from the tax authorities in their respective home countries.² As one of the most prominent players, the OECD strives for an international exchange of tax information and exerts political pressure on all non-cooperative jurisdictions. The pressure has included blacklisting and the threat of economic sanctions, and peaked at the G20 summit in April 2009.³ In response, many haven countries agreed to an exchange of tax information on request. Other haven countries, however, either refused to enter such treaties, or signed them but did not implement them effectively.⁴ A thorough understanding of why and when a haven country adapts to the international standard of transparency, and when it does not, is important for taking the next steps to an effective automatic exchange of tax information.

This paper develops an equilibrium framework for the decision of a haven country as to whether to operate as a tax haven or to adopt a transparency regime. In our formal

¹The total wealth hidden in tax havens is likely to be even higher because Zucman's (2013) estimate does not include non-financial wealth, such as art or real estate, and accounts for the year 2008 when global stock markets were low. A detailed industry report estimates the private offshore wealth for the same year at US\$6.7 trillion (BCG 2009, p.30). The corresponding estimate for 2015 is US\$9.8 trillion (BCG 2016, p.11).

²The OECD report on harmful tax competition (OECD 1998, pp.21–25) presents a number of factors to identify tax havens. One of these are no or only nominal taxes combined with laws or administrative practices that prevent an effective exchange of information for tax purposes.

³Cf. G20 (2009, p.4): “In particular we agree [...] to take action against non-cooperative jurisdictions, including tax havens. We stand ready to deploy sanctions to protect our public finances and financial systems. The era of banking secrecy is over. We note that the OECD has today published a list of countries assessed by the Global Forum against the international standard for exchange of tax information.”

⁴The Global Forum on Transparency and Exchange of Information for Tax Purposes (OECD 2016, pp.24, 28) evaluates jurisdictions with respect to their effective implementation of the information exchange on request. As of July 2016, it has rated 22 jurisdictions as *compliant*, 60 jurisdictions as *largely compliant* and 12 jurisdictions as *partially compliant*. Eight jurisdictions revealed shortcomings in their legal and regulatory frameworks and were blocked from moving to the final phase of revision in order to be rated.

framework, a single haven country may operate a secrecy regime in which investors can hide otherwise taxable capital from their respective residence countries. The investors decide individually whether to use the concealment opportunity or to face full taxation in their residence country. A capital-concealing investor must pay a fee for the wealth management in the tax haven, and the haven country benefits from this economic activity, e.g. by taxing the financial sector. Even though the fee and the government revenue are related more indirectly (see Schön 2005) we treat them as equal in size. For each investor, the fee may be a small percentage of the funds sheltered but, given the large sums of capital that can be concealed by a haven country, even very small fees can add up to large earnings and can make the tax haven business very attractive. However, the provision of a secrecy regime creates not only benefits but also some political cost. It originates from international pressure that involves economic sanctions, forgone beneficial treaties or the potential loss in business reputation for being blacklisted as a tax haven. While most of our analysis focuses on a single haven country, we also discuss competition between haven countries and the robustness of our results to the presence of multiple tax havens.

We focus on the role of coordination among individual investors, and the role of coordination between a haven country and the set of its potential investors. We note that beliefs are of key importance in this process, and these beliefs are themselves endogenous. Our analysis provides insights into what factors drive the beliefs, the flow of financial capital and ultimately countries' decisions as to whether they will sustain a tax haven business. Specifically, we consider the role of the residence countries' level of taxation, penalties for disclosed offshore tax evasion, service fees in tax havens, and different types of international pressure. The framework also sheds light on the question of why countries would ever choose to comply with international standards of transparency despite the substantial returns in the tax haven business.

Switzerland, for instance, used to be highly successful in attracting a major share of the private financial wealth held offshore from all possible origins and was renowned for its strict bank secrecy laws.⁵ However, Switzerland has also been a prime target in the fight against tax havens and, seemingly, has given in to the international pressure in recent years. It joined the EU Savings Directive, entered information exchange treaties with several EU countries, and enabled its banks to disclose client information to the US tax authorities after the banks were indicted in the US for assisting American citizens with tax evasion.⁶ Also, investors from Europe and North America relocated their funds away from Switzerland, often just before the initiatives came into effect or were ultimately decided.⁷ Our analysis suggests that Switzerland's compliance choice and such investment

⁵Zucman (2013) and BCG (2009, 2016) estimate Switzerland to be the world market leader for offshore private wealth management, accounting for a market share of more than one quarter.

⁶For an account of the change in Switzerland's attitude toward its strict bank secrecy, see, for example, "Swiss banking secrecy: Don't ask, won't tell," *The Economist*, February 11, 2012.

⁷For anecdotal evidence of such capital relocations during the negotiations between Switzerland and Germany for a new tax treaty, see "Ermittlungen: Steuerfahnder verfolgen Spur nach Asien," *Financial Times Deutschland*, August 10, 2012, and more generally, see "Switzerland and its rivals: Rise of the midshores," *The Economist*, February 16, 2013, and regular remarks in the annual global wealth reports

decisions are complementary and mutually reinforcing.

For tax-evading investors, it is important whether a tax haven abandons its secrecy regime after they have located their assets there. A haven country that decides to adopt a transparency regime causes risks for those investors who have concealed capital therein. They may be worse off than they would have been had they simply paid the taxes in their residence countries. One of the risks is that lifting the secrecy regime may unmask the investors' identities and reveal information about previously accrued capital income to the tax offices of the investors' home countries, which may trigger severe penalties. If the regime change toward transparency comes with an information exchange about previously accrued income, tax-evading investors cannot avoid such penalties. In particular, a relocation of their funds to another tax haven would come too late, as it would not clean their records. The traces from tax evasion in previous years are not erased. A prominent example of a change in the concealment policy that also affected past transactions are the negotiations between the US and Swiss banks, which eventually revealed tax evasions by individual US taxpayers who were then prosecuted.⁸

Not all regime changes necessarily lead to an indictment for past tax evasions.⁹ However, the type of agreement to be struck depends on unforeseeable contingencies of international politics and political majorities.¹⁰ The precise nature of a possible regime transition is difficult to predict. Hence, what matters is the expected cost that comes with a regime change. If the prosecution and imprisonment of tax evaders is sufficiently likely, its threat is sufficient to make honest tax payment more attractive than concealing capital in a haven country that is likely to convert to a compliance regime within a foreseeable time frame.¹¹

by Boston Consulting Group, e.g., BCG (2009, 2016).

⁸In the first deal of its kind, Switzerland empowered UBS to turn over information on 4,450 clients to the US tax authorities. The accounts in question cover the years 2001 through 2008, that is, before the investigations against UBS became publicly known in 2008. (See "Swiss approve deal for UBS to reveal U.S. clients suspected of tax evasion," *The New York Times*, June 18, 2010.) By now, almost every Swiss bank has entered a similar information exchange based either on individual settlements or on the Swiss Bank Program by the US Department of Justice. (See "U.S. settles last Swiss bank case in \$1.3 billion program," *Reuters*, January 27, 2016.)

⁹Some initiatives have provided opportunities to channel funds from one haven country that is about to become compliant to another tax haven. Johannesen (2014) estimates that the EU Savings Directive reduced EU-owned bank deposits in Switzerland by 30-40%, and that the drop was driven by a relocation of funds or formal ownership to other offshore centers. Similarly, Johannesen and Zucman (2014) find that the bilateral information exchange treaties following the G20 summit in 2009 caused a relocation of assets to non-compliant tax havens rather than their repatriation.

¹⁰The German-Swiss Tax Treaty (*Abkommen zwischen der Schweizerischen Eidgenossenschaft und der Bundesrepublik Deutschland über Zusammenarbeit in den Bereichen Steuern und Finanzmarkt*), for instance, failed to pass the parliamentary hurdles in the second chamber in Germany 2012, which eventually led to a more far-reaching transparency regime. Many tax evaders who relied on this agreement were caught and prosecuted around that time due to data leaks and tax authorities purchasing these data. This also alludes to the risks involved with an imminent regime change.

¹¹This is not to claim that the relocation of funds to non-compliant tax havens is not important. However, for many tax evaders it is not the preferred option. Between 2009 and June 2014, the US received more than 45,000 voluntary disclosures of offshore accounts which created US\$6.5 billion in

Turn now to the decision problem of a haven country. It is willing to offer a secrecy regime only if that attracts a sufficiently large revenue pool. Without a sufficient number of investors, a haven country bears the cost that results from international pressure, but enjoys little benefits from the tax haven business. On the other hand, a tax haven can only attract business if the investors can rationally expect the country to provide concealment opportunities in the future. This creates an important feedback loop in the choices of the haven country and the secrecy-seeking investors.

Moreover, this complementarity raises deeper issues than some coordination problem between two players, because the investors themselves do not constitute a single player. They are many, independent decision-makers. Every single investor assesses whether it is likely that the country will act as a tax haven in the future, and this likelihood depends, among other things, on the number of other investors moving their funds to this country. This generates a second complementarity that exists among investors.

These two complementarities are at the core of our analysis. We show that they generate a multiplicity of equilibria and create strategic uncertainty in a context that is otherwise a complete information framework. Yet, in a more realistic setup, investors face a non-negligible degree of uncertainty as regards the choice of the haven country. The decision on the concealment policy is made by political actors who may differ in their personal convictions about secrecy laws or the international pressure associated with it. These psychic costs and benefits enter into the cost of operating a tax haven and are not observable for the investors. We demonstrate that a slight amount of incomplete information can overcome the problem of strategic uncertainty and result in a unique equilibrium.

This equilibrium contains a limit regarding the political cost of running a tax haven. For political costs below the limit, a haven country attracts large capital inflows from tax-evading investors and maintains a secrecy regime. For costs above it, investors do not locate their funds in the haven country, which in turn operates a transparency regime. This critical cost limit is a function of the exogenous parameters of the model and has implications for the design of optimal policies. We find a trade-off between a successful fight against tax havens and high tax rates, for example, in the course of an international tax harmonization. High tax rates make it attractive for investors to evade taxes and render haven countries robust toward political pressure. A similar effect exists for low penalties for disclosed offshore tax evasion, for instance, in the context of special programs with reduced fines for tax evaders who voluntarily report their undeclared offshore wealth. Many countries apply such programs to reduce administrative costs, encourage the repatriation of offshore funds or to enlarge the group of tax evaders that can be targeted with a single

taxes, interest and penalties. (See <https://www.irs.gov/uac/newsroom/irs-offshore-voluntary-disclosure-efforts-produce-6-5-billion-45-000-taxpayers-participate>.) In the fiscal year 2014-2015 alone, Canada received 19,134 voluntary disclosures on Can\$1.3 billion of unreported income, of which Can\$780 million originated offshore. (See the Annual Report to Parliament 2014-2015 by the Canada Revenue Agency.) Finally, between 2010 and 2015, Germany received 123,278 voluntary disclosures. (See “Die späte Reue der Steueründer. Der Fall Hoeneß wirkt nach: Die Zahl der Selbstanzeigen bleibt auch 2015 hoch,” *Handelsblatt*, January 20, 2016.)

initiative.¹² However, our results suggest that they also strengthen the resistance of tax havens against costly pressure. Moreover, we can explain why service fees in tax havens need not be competed down to zero despite a highly competitive, international financial market with multiple active tax havens. Intuitively, high revenues make haven countries robust toward international pressure and hence trustworthy for secrecy-seeking investors.

2 Literature and empirical review

Our analysis is related to a growing literature on tax havens surveyed in Dharmapala (2008) and Keen and Konrad (2013). Dharmapala and Hines (2009) and Slemrod (2008) provide empirical support for the widespread view that tax havens tend to be small, affluent island countries that have American or British colonial or territorial roots, and score particularly well on indices measuring aspects of governance quality, such as the protection of property rights.¹³ As tax havens typically attract large amounts of investments relative to the size of their own economy and population, earnings from or taxes on the haven industry account for a major share of their public revenues.¹⁴ The importance of the investor protection is studied by Bucovetsky (2014) who focuses on the possibility that foreign investors might be expropriated by the haven country. Slemrod and Wilson (2009) argue that small countries have a comparative advantage in becoming tax havens. These analyses identify natural candidate countries, some of which act or have acted as tax havens in the past and may continue this business in the future. A related, empirical question asks which active tax havens are likely to terminate their provision of tax sheltering opportunities if offering them also generates a political cost.¹⁵

Another domain in the literature evaluates particular initiatives in the fight against tax havens. Hemmelgarn and Nicodème (2009), Johannesen (2014), and Klautke and Weichenrieder (2010) study the EU Savings Directive. For an assessment of the G20 Tax Haven Crackdown, see Johannesen and Zucman (2014). Although most studies address the effectiveness of the current initiatives, little has been done to understand the incentives for a haven country when exposed to international pressure. As an exception, Elsayyad and Konrad (2012) consider the interaction between several tax havens and the consequences of a sequential exit for those haven countries that remain active. They show that the increase in market shares and market power which these remaining tax havens enjoy makes them increasingly resistant toward international pressure. Pieretti et al. (2016) contribute to the analysis of the dynamics in the compliance decisions of multiple

¹²For an overview of voluntary disclosure programs in different countries and an analysis of the effect of such programs on compliance rates and public revenues, see Langenmayr (2015).

¹³The colonial or territorial roots influence, among other things, a country's legal and political system, its official language, and its degree of sovereignty/dependency.

¹⁴A comparison of the size of tax havens and the amount of international investment that they attract can be found in Hines (2010, pp.105–111).

¹⁵Bilicka and Fuest (2014) and Elsayyad (2012) study the role of haven country characteristics and bilateral country pair attributes for the likelihood of international agreements being signed in the aftermath of the G20 Tax Haven Crackdown in 2009.

tax havens, by allowing them to compete for international flows of offshore capital and also for real economic activity. We consider a single haven country in most parts of our analysis and discuss generalizations in Section 6. Another exception is Pieretti and Pulina (2015) who study the optimal response by haven countries if the stigmatization of tax havens makes it more costly for multinational firms to not only shift their profits to these countries but to also set up real economic activities there. We look at tax evasion by private investors and the legal risk that they face when concealing capital in a tax haven.

Furthermore, the current initiatives against tax havens have triggered a controversial discussion about the effects of tax havens on global welfare, surveyed by Hines (2010). Most of this literature considers corporate tax avoidance rather than private tax evasion. On the upside, tax havens allow high-tax countries to levy a de facto differentiated tax rate on mobile capital (Hong and Smart 2010), effectively limiting the consequences of a harmful tax competition to a subset of the tax base (Keen 2001), economic activities in haven and nearby non-haven countries are found to be complements rather than substitutes (Desai et al. 2006a, 2006b), total tax revenues may increase as non-haven countries face weaker incentives to enter an aggressive tax competition (Johannesen 2010), and investors may benefit from fiercer institutional competition (Pieretti et al. 2013). On the downside, tax havens may also contribute to excessive tax competition by lowering equilibrium tax rates, cause wasteful resource expenditures for purely tax arbitrage activities and the attempt to limit those activities, and increase the shadow price for public revenues in high-tax countries (Slemrod and Wilson 2009). These are important questions, but they are only tangential to our analysis. We focus on tax havens that offer tax sheltering opportunities to private capital investors and an important strategic complementarity that emerges in this context.¹⁶

Several authors describe tax havens as juridical entrepreneurs who sell protection from foreign taxation whenever they find it profitable to do so.¹⁷ These analyses typically treat the demand for tax sheltering services as a quantity that smoothly reacts to parameter changes. For the phenomenon we study, the decisions of individual investors, the strategic complementarity among them, and the self-fulfilling effect of investors' beliefs on a haven country's actual behavior are crucial and create discontinuous jumps in the tax haven's revenue pool. We deal with the beliefs as to the stability of a country's potential tax haven endogenously, and we identify the key drivers for a country's decision of whether to provide a secrecy or a transparency regime.

¹⁶Strategic complementarities are known to generate multiple equilibria in many contexts. Prominent examples are bank runs (Diamond and Dybvig 1983), currency crises (Obstfeld 1996 and Morris and Shin 1998), sovereign public debt sustainability (Cole and Kehoe 2000), political accountability and the role of elections as a coordination mechanism (Fearon 2011), capital formation with a time-consistent taxation of capital (Persson and Tabellini 1990), and network effects (Katz and Shapiro 1994).

¹⁷Palan (2002) refers to this process as the *commercialization of state sovereignty*.

3 The role of beliefs

For a start we consider the most simple environment with one haven country H and a continuum of homogeneous investors $i \in I$. The mass of I is normalized to 1. Investors reside somewhere outside H , and we call this place country R . One can think of R as a representative high-tax country.

Each individual investor i holds one unit of capital and chooses between two actions $a_i \in \{0, 1\}$. An investor can locate the capital in R , denoted by $a_i = 0$, or can locate it in H , denoted by $a_i = 1$. The individual choices then add up to a total share of capital located in H

$$a = \int_{i \in I} a_i di. \quad (1)$$

The amount $a \in [0, 1]$ is observed by the haven country H . This completes stage 1. In stage 2, country H has the capabilities to operate as a tax haven and chooses $h \in \{0, 1\}$. The choice $h = 0$ refers to a behavior in compliance with international standards of transparency. The choice $h = 1$ refers to a secrecy regime with concealment opportunities.

The sequencing of choices naturally maps the situation in which investors make long-term decisions about whether or not to locate their capital in a haven country (stage 1), and in which the haven country makes a time-consistent decision that maximizes its genuine interests some, possibly considerable, time later (stage 2).¹⁸ Tax evaders are then, over time, increasingly vulnerable to the possibility that the haven country will not offer concealment opportunities but will participate in an exchange of tax information in the future (stage 2). Also note that we study a static setting in which the haven country decides on h only once, based on the amount of capital a attracted in stage 1.¹⁹ A more generous interpretation of our setup is that H is a country that qualifies as a potential tax haven, for instance, by having been a tax haven in the past. In this case the decision $h = 1$ can be interpreted as a continuation of the secrecy regime, and the decision $h = 0$ can be interpreted as a policy change, an *exit* from the tax haven business, and the adoption of a transparency regime. This possible exit decision may take place years later. The time structure of the game is summarized in Figure 1 and is common knowledge for all players.

If an investor locates the capital in R , the capital is taxed at rate $t \in (0, 1)$ and the

¹⁸Alternatively, the haven country may irreversibly commit to whether to offer concealment services or not prior to stage 1 and it sticks to this commitment even if no or very few investors show up compared to a high costly pressure. Tax evaders would not face any risk of being disclosed. This time structure would change our results. However, such a commitment assumption is difficult to justify as the haven countries are sovereign countries and a commitment is not time consistent. In fact, many haven countries recently changed their concealment policies when this seemed to be in their national interest, including Switzerland – the country whose bank secrecy was considered to be part of its national identity.

¹⁹The static analysis drops a number of relevant dynamic issues from the picture. Some of these have been dealt with in other analyses, such as the *last-haven-standing effect* in an exit game studied by Elsayyad and Konrad (2012). However, the complementarities of this framework remain an issue for analyses that adopt dynamic aspects, as we discuss in Section 6.

to evade taxes, such as diversification, strong institutions, financial expertise, insurance against leviathan governments. Some investors may also enjoy the combination of concealment opportunities and the quality of the property rights regime in the haven country. An important paper by Pieretti et al. (2014) focuses precisely on the conditions for which offshore financial centres operate as tax havens only, i.e. undercut tax rates, and the conditions for which they also operate as safe havens, i.e. provide a better institutional framework.²³ Within our more narrow framework, all investors are homogeneous and these additional motives are absent. As tax-compliant investors in the tax haven have to pay the service fee s and the tax t , they would not like to locate their capital in the haven country.

The haven country's payoff depends on the aggregate investment it can attract and on its own decision. If H operates a transparency regime, its payoff is normalized to zero. If H acts as a tax haven, it benefits to the extent of s from each investor whose capital is deposited therein.²⁴ This yields total revenues equal to sa . However, the haven country also bears an operating cost, which is higher if the amount of international pressure on tax havens is higher. We assume that it consists of a fixed cost θ , a unit cost $c \in [0, s)$, and sums up to

$$\theta + ca. \quad (3)$$

We allow $\theta \in [\underline{\theta}, \bar{\theta}]$, where $\underline{\theta} < 0 < s - c < \bar{\theta}$. One might expect that $\theta > 0$, but a country may also derive some intrinsic benefit from running a secrecy regime. For instance, its decision-makers may be proud to be helping honest business people from abroad avoid illegitimate expropriation claims, may feel that giving up its bank secrecy is a sacrifice of the national identity, or some such reason. The resulting profit for the haven country upon providing concealment opportunities is $(s - c)a - \theta$. Summarized, the payoff for the haven country is given by

$$\pi_H(a, h) = \begin{cases} 0 & \text{if } h = 0 \\ (s - c)a - \theta & \text{if } h = 1 \end{cases}. \quad (4)$$

We assume the service fee s , the tax rate t , and the detection cost τ to be finite and exogenous. In a more general setup, one could consider the residence country to determine t and τ , and the haven country to influence s . We discussed in the Introduction that s need not be a variable of direct choice, but we consider the impact of some of these parameters on the equilibrium outcome in more detail in Section 5. Furthermore, to make our analysis economically interesting and non-trivial, we restrict the allowed parameter

²³To account for fully tax-compliant investors who enjoy other qualities of offshore centers requires heterogeneity among investors and additional qualities of the haven country. Such a generalized framework need not affect the central results of our analysis, provided that there are no strategic links between the two types of asset management.

²⁴In the literature, tax havens are usually assumed to charge a flat service fee per account or per investor. However, an investor with offshore deposits worth several hundred million dollars can still be expected to pay more than a middle-class wage earner. In our model with homogeneous investors, both interpretations of a fixed or a proportional service fee are equivalent.

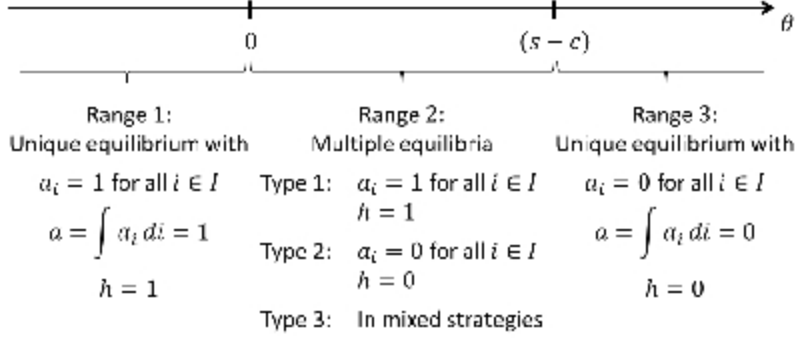


Figure 2: Equilibrium characterization with complete information.

ranges such that $s < t < \tau$. If the service fee in the tax haven exceeds the tax rate $s \geq t$, an investor would have nothing to gain from locating capital in H . Similarly, if $\tau \leq t$, an investor would have nothing to lose when trying to evade taxes. We also restrict the tax haven's variable cost c in comparison to the service fee such that $s - c > 0$, which refers to a situation in which a country that operates as a tax haven prefers to have a larger pool of investment.

In the following we solve for the equilibrium of the game for every possible combination of θ , c , and s satisfying the previously discussed parameter conditions. We impose the standard requirement of subgame perfection and obtain the equilibrium characterization as stated in Proposition 1 and graphically summarized in Figure 2.

Proposition 1 (i) For $\theta < 0$, the unique subgame perfect equilibrium is characterized by $a_i = 1$ for all $i \in I$ and $h = 1$. All investors evade taxes and the haven country operates a secrecy regime.

(ii) For $\theta > s - c$, the unique subgame perfect equilibrium is characterized by $a_i = 0$ for all $i \in I$ and $h = 0$. All investors meet their tax liabilities and the haven country operates a transparency regime.

(iii) For $0 \leq \theta \leq s - c$, both $(a_i = 0$ for all $i \in I$ and $h = 0)$ and $(a_i = 1$ for all $i \in I$ and $h = 1)$ are subgame perfect equilibria. Furthermore, there exist equilibria in mixed strategies.

Proof. Consider (i): If $\theta < 0$, then $(s - c)a - \theta > 0$ for all possible $a \in [0, 1]$. This makes $h = 1$ a dominant choice for the haven country, independent of the investors' behavior. Anticipating that the haven country will offer concealment opportunities, the investors' unique optimal choice in stage 1 is $a_i = 1$.

Consider (ii): If $\theta > s - c$, then $(s - c)a - \theta < 0$ for all possible $a \in [0, 1]$. This makes $h = 0$ a dominant choice for the haven country, independent of the investors' behavior. Anticipating that the haven country will not offer concealment opportunities, the investors' unique optimal choice in stage 1 is $a_i = 0$.

Consider (iii), when $0 \leq \theta \leq s - c$. In stage 2, the haven country knows the amount of attracted capital a . So H 's optimal choice is $h = 1$ if $a > \theta / (s - c)$, and $h = 0$ if $a <$

$\theta/(s-c)$. For $a = \theta/(s-c)$, H is just indifferent and any pure action or randomization thereof is an optimal choice. In stage 1, the investors decide where to locate their capital depending on what they expect of h in stage 2, which, given the optimal reply by the haven country, depends on the aggregate outcome of the other investors' actions $a = \int a_j dj$. Note that an individual investor i 's choice a_i does not significantly affect the aggregate outcome a , as there is a continuum of investors. If all investors believe that $a \geq \theta/(s-c)$, leading to $h = 1$, then their optimal choices are $a_i = 1$ for all $i \in I$. These actions result in $a = 1$ and $h = 1$, confirming the investors' beliefs. This establishes that $(a_i = 1$ for all $i \in I$ and $h = 1$) is a subgame perfect equilibrium. If all investors believe that $a \leq \theta/(s-c)$, leading to $h = 0$, then their optimal choices are $a_i = 0$ for all $i \in I$. These actions result in $a = 0$ and $h = 0$, confirming the investors' beliefs. This establishes that $(a_i = 0$ for all $i \in I$ and $h = 0$) is a subgame perfect equilibrium.

We now turn to the case $a = \theta/(s-c)$. If this equality holds, the haven country is just indifferent and any pure action $h \in \{0, 1\}$ or randomization thereof is optimal. This allows for the further equilibria in mixed strategies for the range $\theta \in [0, s-c]$. Let $\Pr(h = 1 | a = \theta/(s-c))$ denote the probability that H will choose $h = 1$ when being indifferent. For $0 < \theta < s-c$, $a = \theta/(s-c)$ implies that only a fraction of investors will locate their capital in H . For that to be optimal, the investors must be indifferent between $a_i = 0$ and $a_i = 1$. This indifference holds if $\Pr(h = 1 | a = \theta/(s-c)) = p$, where p is the solution to the investors' indifference condition

$$p(1-s) + (1-p)(1-\tau) = (1-t). \quad (5)$$

There are many combinations of investors' choices that result in an aggregate investment of $a = \theta/(s-c)$ in H .²⁵ Any of these, together with $\Pr(h = 1 | a = \theta/(s-c)) = p$ constitutes a subgame perfect equilibrium in mixed strategies.

Finally, consider the borders of the interval $[0, s-c]$. For $\theta = s-c$, the choice $h = 1$ is inside the set of optimal choices if all investors, except for a set of measure zero, choose $a_i = 1$. This is optimal for them if H randomizes with some probability $\Pr(h = 1 | a = \theta/(s-c)) \in [p, 1]$. Similarly, for $\theta = 0$, optimality of $h = 0$ requires that all investors, except for a set of measure zero, choose $a_i = 0$. This is optimal for them if H randomizes with some probability $\Pr(h = 1 | a = \theta/(s-c)) \in [0, p]$. ■

For the range $\theta \in [0, s-c]$, Proposition 1 identifies the decisive role of the investors' beliefs for the actual equilibrium outcome. If investors believe that the haven country will comply with international standards of transparency, they will prefer to stay away from H . In response, the haven country will choose to avoid international pressure and operate a transparency regime. If instead investors believe that the haven country will provide effective protection against inquiries from the domestic tax authorities, they prefer to evade taxes and locate their capital in H . This makes the concealment business profitable

²⁵For instance, there is one equilibrium that has all investors playing the same mixed strategy in which each investor chooses $a_i = 1$ with probability $\theta/(s-c)$. Other equilibria contain all investors playing pure strategies that differ across investors. Again, other equilibria have some investors playing pure strategies and other investors playing mixed strategies.

and the haven country will then choose to provide concealment opportunities. We find that the haven country's decision to operate a secrecy regime and the investors' decisions to locate their capital in the tax haven are strategic complements. As the investors move first, their beliefs about the haven country's choice establish an investment behavior that makes the country act in line with their beliefs. Therefore, several sets of mutually consistent investors' beliefs exist, and these beliefs then determine whether the haven country will operate a secrecy or a transparency regime.

Moreover, these self-enforcing beliefs create a strategic complementarity among the group of individual investors. When deciding where to locate the capital, each investor individually assesses the likelihood of a maintained secrecy regime. As we show above, this probability depends among other things on the amount of capital deposited in the tax haven, and hence, on the actions of the other investors. If an individual investor expects a large share of the other investors to locate their capital in H , the individual investor can be confident of the haven country offering concealment opportunities and will consider it profitable to locate the capital in the haven country, too. Inversely, if an individual investor believes that no or only few other investors will locate their capital in H , the haven country is likely to divulge tax information to the residence country and the individual investor is better off not trying to hide capital in H . So there is a coordination problem among many individual investors in which the outcome and whether the haven country will operate as a tax haven or not is determined by the investors' beliefs, the beliefs as to the other investors' beliefs, and even higher-order beliefs.

Intuitively, we expect that these beliefs are driven by the fundamentals of a haven country, such as institutional aspects, a country's track record of its secrecy regime, and norms and values that are anchored in the society of the haven country.²⁶ However, except for extreme values with $\theta < 0$ or $\theta > s - c$, Proposition 1 comes with little predictive power. An optimistic interpretation suggests that even a small amount of pressure, in terms of a small but positive θ , may be enough to destroy the tax haven business model. But in fact we cannot even conclude that increased international pressure will make it more likely that a haven country will comply with international transparency standards.

The indeterminacy is caused by the particularly simple information structure considered so far. Common knowledge of the cost parameters θ and c allows the players' equilibrium beliefs and actions to be perfectly aligned contingent on the combination of θ and c that is known to prevail. While this approach underlines the importance of investors' first and higher-order beliefs for the haven country's concealment policy, the set of beliefs that prevails is in the end determined exogenously, pointing to factors outside the model. In a more realistic setup, investors face incomplete information on the true cost of operating a tax haven. Including some small amounts of incomplete information in our framework is not just some tool to introduce another grain of reality to our model, it will also allow us to deal with the investors' beliefs endogenously and yield a unique

²⁶For empirical analyses on the characteristics that make countries likely to operate as tax havens, see Dharmapala and Hines (2009) and Slemrod (2008). Some of the driving factors are also mentioned in Section 2.

equilibrium prediction that depends on the parameters of the model. Such a setup is commonly referred to as a *global game*, which was initiated by Carlsson and van Damme (1993) and Morris and Shin (1998), and is reviewed, for example, in Morris and Shin (2003).²⁷

4 Small amounts of incomplete information

The cost of operating *as* a secrecy regime is given by (3) and was common knowledge in Section 3. For reasons explained above and in the Introduction, we now assume that the fixed cost parameter θ is incompletely observed by the investors.²⁸ More specifically, we assume that nature determines the true values of θ and c . The value of c remains common knowledge, but the value of θ is known only to the haven country. Each investor receives an individual and private signal $x_i = \theta + \sigma\varepsilon_i$, where $\sigma \in (0, 1]$ is a scaling parameter and ε_i is the realization of a random variable $\tilde{\varepsilon}_i$ with a continuous cumulative distribution function $F(\cdot)$, which has support on the interval $[-\frac{1}{2}, \frac{1}{2}]$.²⁹ We require $\tilde{\varepsilon}_i$ to be identically and independently distributed across investors and to be independent of the true operating cost θ . Similarly, x_i is the realization of a random variable $\tilde{x}_i = \theta + \sigma\tilde{\varepsilon}_i$. Investors have no prior information on the true cost and learn about θ only through their private signals. So we assume that θ is the realization of a random variable $\tilde{\theta}$ that is uniformly distributed over $[\underline{\theta}, \bar{\theta}]$, where $\underline{\theta} < -\sigma$ and $\bar{\theta} > s - c + \sigma$.³⁰ We discuss the importance and validity of the assumption on the allowed parameter range below. Then, except for signals close to the boundaries $\underline{\theta}$ and $\bar{\theta}$, an investor with signal x_i forms the belief that $\tilde{\theta}$ is distributed as $x_i - \sigma\tilde{\varepsilon}_i$, and for a given θ an investor's signal \tilde{x}_i is distributed according to $F(\frac{x_i - \theta}{\sigma})$. Everything apart from the true underlying θ and the actual values of the other investors' signals remains common knowledge.

²⁷The global game approach has already been applied to many different environments with a coordination problem and can be considered a standard tool in the coordination literature. Applications include studies on currency crises, debt pricing, bank runs, political revolutions, and the adoption of new network technologies. See, e.g., Morris and Shin (2003, pp.71–77) for a review of the most common applications. The approach has been broadened in many directions, for example, to allow for heterogeneous agents, such as including single investors with a non-negligible influence on the aggregate outcome (Corsetti et al. 2004), or allowing for different wealth levels and/or payoff variables (Sakovics and Steiner 2012).

²⁸Recall from the Introduction that the decision on the concealment policy is made by political actors such as country leaders. Emotionally, they may cope differently with international pressure or may differ in their personal convictions. We assume that their psychic costs and benefits enter into the fixed cost component θ and are not publicly observable. A similar reason for incomplete information in the context of international bargaining that draws on the mental constitution and the potential psychic elements of costs and benefits in the minds of political decision-makers is applied in Konrad and Thum (2014).

²⁹Note that we will solve for the equilibrium of the game for any level of $\sigma \in (0, 1]$ including very small but positive values of σ .

³⁰A uniform prior probability distribution can be seen as a limiting case when the individual signals become very precise compared to any prior information of θ . For a discussion on how this assumption can be significantly weakened, see Morris and Shin (2003, pp.77–86). They show that any well-behaved prior distribution becomes approximately uniform as $\sigma \rightarrow 0$. Hence, for a small σ , our setting approximates one with a non-uniform prior.

For reasons of clarity and brevity, we restrict our attention to symmetric equilibria in which all investors follow the same cut-off strategy. A cut-off strategy for an investor i is described by a cut-off value x of the investor's signal x_i such that i chooses $a_i = 1$ if $x_i \leq x$, and $a_i = 0$ otherwise. The assumption can be weakened and the uniqueness result can be generalized using standard reasoning.³¹ Moreover, to avoid technical complications that arise if a player's optimal choice is on the boundary of an open set, we impose tie-breaking rules as follows. If indifferent, the haven country operates a secrecy regime, and an investor who is indifferent locates the capital in H .³²

Proposition 2 *The game with incomplete information has a unique symmetric perfect Bayesian Nash equilibrium in cut-off strategies. In this equilibrium, the haven country operates a secrecy regime ($h = 1$) if and only if*

$$\theta \leq \theta^E(s, c, t, \tau) = (s - c) \frac{t - s}{\tau - s}, \quad (6)$$

and each investor locates the capital in the haven country ($a_i = 1$) if and only if

$$x_i \leq x^E(s, c, t, \tau, \sigma) = (s - c) \frac{t - s}{\tau - s} + \sigma F^{-1} \left(\frac{t - s}{\tau - s} \right). \quad (7)$$

Proof. Consider stage 2. The haven country observes a , knows θ , and requires an investment pool of $\theta/(s - c)$ to break even. So H chooses $h = 1$ if $a \geq \theta/(s - c)$, and $h = 0$ if $a < \theta/(s - c)$.

Consider now stage 1. We show that there is a unique cut-off value $x = x^E$ such that, if a mass of investors of size 1 follows the cut-off strategy characterized by x^E , it is optimal for every individual investor to also follow this strategy. The amount a in the haven country is not significantly affected by the choice of an individual investor, but is fully determined by the decisions of all other investors. It is therefore a function of the investors' common cut-off value x and the set of realized signals to the investors $j \in I \setminus \{i\}$. As the error terms $\tilde{\varepsilon}_j$ are identically and independently distributed, and because there is a continuum of investors, the share of investors who locate their capital in H is equal to the probability of any single investor j observing a signal $\tilde{x}_j \leq x$. Given θ , this probability is $\Pr(\tilde{x}_j \leq x \mid \theta) = F\left(\frac{x - \theta}{\sigma}\right)$. So we can write

$$a(x, \theta) = F\left(\frac{x - \theta}{\sigma}\right), \quad (8)$$

which is continuous in both arguments and non-increasing in θ .

Figure 3 illustrates the aggregate investment a flowing to the haven country as a function of θ for three different levels of x . The figure also depicts the required investment

³¹There is a standard proof in the literature showing that the derived equilibrium is the only one in the entire strategy space to survive the iterated elimination of strictly dominated strategies. For example, see Morris and Shin (2003, pp.64–67).

³²In the literature on global games, the equilibrium is sometimes described as being essentially unique because the players are indifferent at their cut-off values, where any action can be rationalized. Note, however, that this situation occurs with a zero probability mass.

for the tax haven to break even, $\theta/(s-c)$. We see that (8) and H 's break even condition have a single crossing point $\theta^*(x)$, defined by

$$\theta^*(x) = (s-c)F\left(\frac{x-\theta^*(x)}{\sigma}\right). \quad (9)$$

For a given cut-off strategy with x being chosen by a mass of investors of size 1, H operates a secrecy regime for all $\theta \leq \theta^*(x)$, and operates a transparency regime for $\theta > \theta^*(x)$. Note that θ^* as in (9) is continuous in x , equal to 0 for $x \leq -\frac{1}{2}\sigma$, equal to $s-c$ for $x \geq s-c + \frac{1}{2}\sigma$, and strictly increasing in x with a slope of

$$\frac{d\theta^*(x)}{dx} = \frac{(s-c)F'\left(\frac{x-\theta^*(x)}{\sigma}\right)}{\sigma + (s-c)F'\left(\frac{x-\theta^*(x)}{\sigma}\right)} < 1 \quad (10)$$

for $x \in \left(-\frac{1}{2}\sigma, s-c + \frac{1}{2}\sigma\right)$.

Let us now turn to the decision of an individual investor i . Given the observed signal x_i , the cut-off value x characterizing the strategy of all other investors, and anticipating that H provides concealment opportunities if and only if $\tilde{\theta} \leq \theta^*(x)$, i assesses the likelihood of an active tax haven to be

$$p(x_i, x) = \Pr\left(\tilde{\theta} \leq \theta^*(x) \mid x_i\right) = 1 - F\left(\frac{x_i - \theta^*(x)}{\sigma}\right). \quad (11)$$

The investor i chooses $a_i = 1$ if $p(x_i, x) \geq p$, and $a_i = 0$ if $p(x_i, x) < p$, where p is the solution to the investors' indifference condition

$$p = \frac{\tau - t}{\tau - s}, \quad (12)$$

also given in (5). The subjective probability $p(x_i, x)$ that i assigns to the outcome with a sustained tax haven business is equal to 1 for $x_i \leq \theta^*(x) - \frac{1}{2}\sigma$, equal to 0 for $x_i \geq \theta^*(x) + \frac{1}{2}\sigma$, and is strictly decreasing in x_i for $x_i \in \left(\theta^*(x) - \frac{1}{2}\sigma, \theta^*(x) + \frac{1}{2}\sigma\right)$. So for a given cut-off strategy played by all other investors, i 's best response is to also follow a cut-off strategy around some x^* , defined by

$$p(x^*, x) = p. \quad (13)$$

Inserting the expressions from (11) and (12) into (13) and subsequently solving the equation for x^* yields

$$x^*(x) = \theta^*(x) + \sigma F^{-1}\left(\frac{t-s}{\tau-s}\right). \quad (14)$$

Any equilibrium requires $x^* = x$. For all common cut-off values $x \leq -\frac{1}{2}\sigma$, $x^*(x) = \sigma F^{-1}\left(\frac{t-s}{\tau-s}\right) > -\frac{1}{2}\sigma$. Similarly, for all $x \geq s-c + \frac{1}{2}\sigma$, $x^*(x) = s-c + \sigma F^{-1}\left(\frac{t-s}{\tau-s}\right) < s-c + \frac{1}{2}\sigma$. In the intermediary range $x \in \left(-\frac{1}{2}\sigma, s-c + \frac{1}{2}\sigma\right)$, $x^*(x)$ is strictly increasing with a slope of $\frac{dx^*}{dx} = \frac{d\theta^*(x)}{dx} < 1$. Therefore, there is one and only one intersection of $x^*(x)$ with the locus $x^* = x$, which defines $x = x^*(x) \equiv x^E$, the unique symmetric equilibrium in cut-off strategies.

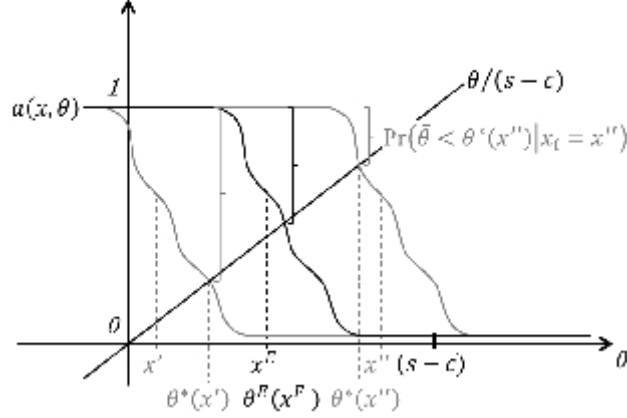


Figure 3: Amount of capital in the haven country for different values of x plotted against the required investment for the tax haven to break even.

Finally, it remains to derive x^E and θ^E as stated in Proposition 2. We define θ^E by $\theta^E \equiv \theta^*(x^E)$. Evaluating (14) at x^E gives $x^E = \theta^E + \sigma F^{-1}\left(\frac{t-s}{\tau-s}\right)$. Substituting it into (9), also evaluated at x^E , yields

$$\theta^E = (s-c) F\left(\frac{\theta^E + \sigma F^{-1}\left(\frac{t-s}{\tau-s}\right) - \theta^E}{\sigma}\right) = (s-c) \frac{t-s}{\tau-s}. \quad (15)$$

■

For an intuition for the unique equilibrium cut-off strategy, assume all investors coordinate to switch around some common cut-off value x . Figure 3 depicts three potential candidates: x' , x^E , and x'' . An investor i who then receives the critical signal $x_i = x$ believes that all investors with a smaller signal $x_j \leq x$ will locate their capital in H and investors with a larger signal $x_j > x$ will locate their capital in R . Also, except for small boundary regions close to $\underline{\theta}$ and $\bar{\theta}$, the investor has no information other than the individually observed signal. So regardless of whether the investors coordinate on a high or low cut-off value, an investor who then observes this critical signal always expects the same amount of investments in H , $E[a(x, \theta) | x_i = x] \stackrel{iid}{=} \Pr(\tilde{x}_j \leq x | x_i = x) = \Pr(\tilde{\varepsilon}_j - \tilde{\varepsilon}_i \leq 0)$, which is independent of x . On the other hand, the required revenue pool for a tax haven to break even is strictly increasing. Hence, there is a unique x for which an investor, upon observing the critical signal $x_i = x$, is indifferent, and for which it is indeed optimal to follow a cut-off strategy around this value. Figure 3 also illustrates the subjective probability that such an investor will assign to the outcome with a secrecy regime, $p(x_i = x, x) \stackrel{(11),(8)}{=} 1 - a(x, \theta(x))$. The probability is monotonically decreasing in x and satisfies the investors' indifference condition only if $x = x^E$.

Proposition 2 does not make an equilibrium selection argument based on axiomatic considerations. Instead, the equilibrium is derived from plausible assumptions on the information available to investors. To arrive at this equilibrium, we require very few additional assumptions. One of them is that the support of the prior probability distribution of θ covers a sufficiently wide range. In particular, investors must have a dominant

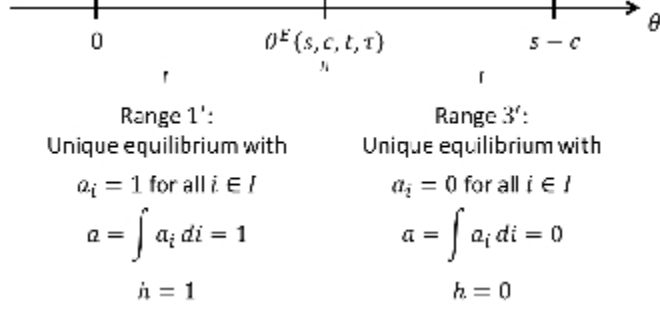


Figure 4: Equilibrium characterization with incomplete information.

action to locate their capital in H for very low levels of θ , and to locate their capital in R for very large levels of θ . Still, it seems plausible that investors perceive tax evasion as being risky, and think that such cost levels are possible.

The proposition provides a clear-cut equilibrium prediction for the outcome of the fight against tax havens. It identifies a hyperplane

$$\theta^E(c) = s \frac{t-s}{\tau-s} - c \frac{t-s}{\tau-s} \quad (16)$$

and characterizes the equilibrium depending on the haven country's operating cost parameters (θ, c) . For combinations of (θ, c) below the hyperplane the equilibrium predicts an effective secrecy regime, and above it the equilibrium predicts that the haven country will comply with the standards of transparency. Notably, there are combinations of (θ, c) for which the equilibrium predicts a compliant behavior ($h = 0$) although an active tax haven business with all investors locating their funds therein would yield higher payoffs for both the haven country and the investors.

In the equilibrium, a single investor's decision to locate capital in H need not be perfectly aligned with the haven country's decision to operate as a tax haven for two reasons, both depend on the degree of uncertainty σ and the shape of the noise distribution F . First, an investor can observe a signal that is too far away from the true θ . Second, the equilibrium cut-off value x^E may differ slightly from the haven country's equilibrium cost threshold $\theta^E(\cdot)$. As the amount of uncertainty becomes very small, i.e. $\sigma \rightarrow 0$, both sources of coordination failure disappear and $x^E(\cdot) \rightarrow \theta^E(\cdot)$.³³ To simplify interpretations and enhance the tractability of the subsequent calculations, we assume this limiting case from here on for the remainder of the paper. We will point out when the assumption becomes important and discuss how the results would change for a larger σ . The equilibrium for this limiting case is illustrated in Figure 4.

With the clear-cut equilibrium prediction at hand, we are able to derive implications for the design of optimal policies in the fight against tax havens.

³³Remember that we solved for the equilibrium of the game for any level of $\sigma \in (0, 1]$ including very small but positive values of σ . For a discussion on the difference between common knowledge and very small amounts of incomplete information, see, e.g., Carlsson and van Damme (1993, pp.1,008–1,010).

5 Policy implications

The cost limit identified by Proposition 2 is a function of the parameters s , c , t , and τ , where $\tau(t, z)$ is a function of the tax rate t and the fine z . It thereby carries further implications about how changes in these parameters affect the equilibrium interaction between the haven country and its potential investors. One may argue that all variables such as s , c , t , z , and θ along with a and h are endogenous choice variables. However, decisions on s , t , and z are predominantly influenced by many factors, including a country's attitude toward redistribution, its needs or opportunities for publicly provided goods, its ability to generate tax revenue, and its exposure to international tax competition. Also, general attitudes and value judgements may play a role. Similarly, the size of c and θ may be strongly influenced by institutional and technological factors. In this line of reasoning, we apply comparative static analyses in which the variables are predetermined and fixed at the stage when the haven country and the investors interact. This approach is different from considering an extended game in which a high-tax country or a group thereof are players in a game theoretic sense or in which the service fee in the tax haven becomes part of the strategy choices.

First, our model relates the residence country's level of taxation and the penalties for disclosed offshore tax evasion to the amount of international pressure that a haven country can resist and still operate a secrecy regime. So we can study the implications of the tax rate t and the fine z on the prospects of the fight against tax havens. Corollary 1 describes this relationship in more detail.³⁴

Corollary 1 *The required amount of international pressure to make the haven country comply with international transparency standards is higher for a higher t , and lower for a higher z .*

Proof. For a given a , the cost of operating a secrecy regime as in (3) is higher if the level of international pressure is higher. Hence, everything else being constant, a higher equilibrium cost threshold $\theta^E(\cdot)$ requires a larger amount of international pressure to make the haven country compliant. Now, note that the function $\theta^E(s, c, t, \tau)$ is increasing in t

$$\frac{d\theta^E(\cdot)}{dt} = \frac{s-c}{(\tau-s)^2} \left[\tau - t + (t-s) \left(1 - \frac{d\tau}{dt} \right) \right] > 0 \quad (17)$$

as $\frac{d\tau}{dt} < \frac{\tau-s}{t-s}$, and decreasing in z

$$\frac{d\theta^E(\cdot)}{dz} = (-1) \frac{s-c}{(\tau-s)^2} (t-s) \frac{d\tau}{dz} < 0. \quad (18)$$

■

³⁴Strictly speaking, a high-tax country cares about the amount of evaded tax revenue, which is determined by the cut-off value x^E characterizing the investors' strategy rather than the haven country's cost threshold θ^E . However, the effects of the tax rate and the fine on x^E are qualitatively the same and even slightly stronger than the effects on θ^E , with the exact magnitude depending on σ and the shape of F .

Intuitively, a high tax rate or a low fine creates a high relative payoff for tax evaders. So for the investors to be indifferent to the location decision, the probability of an active tax haven must only be moderate. This translates into a wide range of signals for which the investors locate their capital in H . In turn, the haven country attracts a large revenue pool for a large space of cost parameter combinations. As the decisions of the investors and of the haven country are strategic complements, they mutually reinforce each other and the haven country will run a secrecy regime even for large amounts of international pressure.

For this result, we require that $\frac{d\tau}{dt} < \frac{\tau-s}{t-s}$. Note that a change in t has two direct effects on θ^E : a positive effect via the tax liability that an investor can possibly evade and a negative effect via the cost that a disclosed tax evader has to face. Our assumption ensures that the variable t denotes primarily a tax rate rather than a penalty for disclosed tax evasion. All additional compliance/detection costs for identified tax evaders are included in z .

Our results suggest that the chances of a transparency regime and no offshore tax evasion are better if high-tax countries impose low tax rates and severe penalties for disclosed tax evasion. This reveals an inherent trade-off between the fight against tax havens and high tax rates, for instance, in the course of an international tax harmonization. If tax competition is overly excessive and considered harmful, it is a popular countermeasure to harmonize tax rates in order to maintain or possibly increase the level of taxation. However, Corollary 1 shows that a high level of taxation renders haven countries robust against costly pressure and thereby deteriorates the prospect of a successful initiative against them. Similarly, in order to increase public revenues, many countries offer special programs with reduced fines for tax evaders who voluntarily report their undeclared offshore wealth. We find that such arrangements not only encourage tax evasion on the personal level but also strengthen the resistance of haven countries against international pressure.

Second, we can consider the impact of the service fee s on the haven country's equilibrium concealment policy, which is characterized in Corollary 2.

Corollary 2 *The maximum $\theta^E(c)$ for which the haven country operates a secrecy regime in equilibrium is obtained for an interior service fee of*

$$s^* = \tau - \sqrt{(\tau - c)(\tau - t)}. \quad (19)$$

Proof. The service fee s^* which maximizes $\theta^E(c)$ must be positive. If, on the contrary, the service fee is weakly negative $s \leq 0$, an active tax haven yields non-positive unit profits of $s - c$.³⁵ Inserting non-positive unit profits into the haven country's break even condition implies that H will not operate a secrecy regime for positive levels of θ , which contradicts a maximum of $\theta^E(c)$. Similarly, the service fee s^* must be smaller than the

³⁵Note that for negative levels of the service fee $s < 0$ the allowed parameter range for the unit cost of operating a secrecy regime $c \in [0, s)$ is an empty set. The statement above holds true for any weakly positive unit cost $c \geq 0$.

tax rate t . If the service fee equals the tax rate $s = t$, the same logic as in the proof of Proposition 2 yields $\theta^E(c) = 0$, which is clearly not a maximum of $\theta^E(c)$. If the service fee exceeds the tax rate $s > t$, no investor will locate capital in H , i.e. $a = 0$, and H will again not operate a secrecy regime for positive levels of θ .

In the interior range $s \in (0, t)$, the function $\theta^E(s, c, t, \tau)$ has a maximum at (19) because its second derivative $\frac{d^2\theta^E(\cdot)}{ds^2} = -2\frac{\tau-t}{(\tau-s)^2} - 2(s-c)\frac{\tau-t}{(\tau-s)^3} < 0$ is negative for all $s \in (0, t)$ and its first derivative $\left.\frac{d\theta^E(\cdot)}{ds}\right|_{s=s^*} = \frac{t-s^*}{\tau-s^*} - (s^*-c)\frac{\tau-t}{(\tau-s^*)^2} = 0$ equals zero for $s = s^*$. ■

Neither a very high nor a very low service fee are best for the haven country. Rather, interpreting θ as being positively related with the international pressure, Corollary 2 suggests that the haven country can withstand larger amounts of international pressure if the service fee is at an interior level. For a very small service fee, the haven country will operate a transparency regime even for small amounts of international pressure because, even if all investors locate their capital in H , the return on supplying concealment opportunities is simply very low. For a very large service fee close to the residence country's tax rate and for low values of θ , the haven country will also operate a transparency regime as it can barely attract a revenue pool. Even if it provided concealment opportunities, investors would benefit only very little from them and would therefore be reluctant to locate their funds in H . Taking both effects together, the haven country is more likely to operate as a tax haven if the service fee is at an interior level.

Corollary 2 provides insights into the pricing of services in tax havens. It contributes to the explanation of why tax haven businesses typically yield large profits despite being active in a competitive, global financial market. It is those profits that render haven countries robust against international initiatives and make them trustworthy for tax-evading investors. Competition between multiple tax havens may of course exert downward pressure on the service fees in tax havens, but it is unlikely to drive equilibrium prices down to zero. Investors would not trust a tax haven with concealment opportunities and a service fee close to zero, because international initiatives that push the fixed cost θ of operating a secrecy regime above zero will automatically drive such a tax haven out of the market.

Third, our analysis contains two parameters that determine the haven country's cost of operating a secrecy regime as given in (3), a fixed component θ and a proportional component c . Both parameters may be influenced by international pressure. Corollary 3 exploits the incentives for a residence country or a group thereof, such as the OECD, to influence one or the other component, or both.

Corollary 3 *The two types of cost θ and c are substitutes, with $\frac{d\theta^E}{dc} = -\frac{t-s}{\tau-s}$.*

The result follows directly from (16) and is intuitive. It is, however, less obvious, given the non-monotonic relationship between θ^E and s in Corollary 2 and the similarity between an increase in s and a decrease in c in the model framework. Note that a change in s has two direct effects: one for the objective function of the haven country and one

for the objective function of the investors. In contrast, a change in c affects only the objective function of the haven country and, much like a higher θ , a higher c makes it less profitable to operate a secrecy regime.

6 Accounting for multiple tax havens

For the remainder, we discuss a setting with multiple haven countries. This will lead further to several issues. We show how the results from the static, complete information game with one haven country can be generalized to include multiple haven countries. For that, some changes in the notation are needed. We denote the set of haven countries as $\mathcal{H} = \{H_1, H_2, \dots, H_n\}$. The set I is the set of investors, which has the measure $m > 0$. The investor i 's pure strategy is denoted as a choice $a_i \in \{0, 1, 2, \dots, n\}$, such that $a_i = 0$ if i invests in R , and $a_i = k$ if i invests in H_k . Investors could also randomize, but for the remainder we will focus on pure strategies only. Each haven country H_k 's pure strategy is a choice $h_k \in \{0, 1\}$, i.e. whether to comply with transparency standards ($h_k = 0$) or to operate as a tax haven ($h_k = 1$). We define

$$(a_R, a_{H_1}, a_{H_2}, \dots, a_{H_n}) \equiv \left(\int_{a_i=0} 1 di, \int_{a_i=1} 1 di, \dots, \int_{a_i=n} 1 di \right), \quad (20)$$

where $\int_{a_i=k} 1 di$ denotes the mass of investors who locate their capital in H_k . Suppose further that the parameters s , t , z , and τ are defined as in the previous sections, but allow for the haven country's specific cost parameters (θ_k, c_k) .

Proposition 3 *Investors' location choices a_i leading to $(a_R, a_{H_1}, a_{H_2}, \dots, a_{H_n})$ and a vector (h_1, h_2, \dots, h_n) constitute a subgame perfect equilibrium, if*

$$h_k = \begin{cases} 0 & \text{if } a_{H_k} < \theta_k / (s - c_k) \\ 1 & \text{if } a_{H_k} \geq \theta_k / (s - c_k) \end{cases} \quad (21)$$

and each a_i fulfills the following conditions: $a_i = 0$ if $a_{H_k} < \theta_k / (s - c_k)$ for all $k = 1, \dots, n$; $a_i \neq 0$ and $a_i \neq j$ for all j with $a_{H_j} < \theta_j / (s - c_j)$ if $a_{H_k} \geq \theta_k / (s - c_k)$ holds for at least one haven country H_k .

A proof follows the same logic as in the first paragraphs of (iii) in the proof of Proposition 1. Equation (21) describes the time-consistent choice of haven countries. Given (21), the individual investors have an incentive to locate their capital in R if they anticipate that none of the haven countries attracts the critical amount of investment. If investors anticipate that one or several of the haven countries attract at least the critical quantity of investment, the investors have an incentive to locate their capital in one of the haven countries that is anticipated to attract sufficient funds. If several countries fulfill the condition $a_{H_k} \geq \theta_k / (s - c_k)$, the investors are indifferent between them and may make decisions such that the resulting capital allocation $(a_R, a_{H_1}, a_{H_2}, \dots, a_{H_n})$ confirms their expectations. However, the investors prefer each of these location choices to locating

the capital in R or in one of the haven countries that has too little funds and will choose to comply with the transparency standards.

As a result, none, one, or several haven countries may attract the critical amounts of investment that are needed to make the tax haven business sufficiently profitable. All other haven countries attract zero investment and do not offer concealment opportunities. The equilibrium with $a_i = 0$ for all $i \in I$ and $h_k = 0$ for all $k \in \{1, 2, \dots, n\}$ from Proposition 1 is in this set. Also, the equilibrium in which one haven country monopolizes the whole market and attracts all investment m is in this set, if $(s - c_k)m \geq \theta_k$ is fulfilled for at least one haven country $H_k \in \mathcal{H}$. The complementarities are still in place but the multiplicity of available haven countries allows for further equilibria and also creates additional coordination problems.

We may also consider and allow for a relocation of funds between haven countries. Consider a haven country H that operates in an extended framework in which there is a second haven country \hat{H} that investors may use to shift their funds to should the haven country under consideration choose to operate a transparency regime. Let us take this second investment opportunity as guaranteed and exogenous, basically assuming away the profitability considerations for \hat{H} that drive the logic of the time-consistent choices of sovereign countries in the main part of our paper. If the service fee in this second tax haven is a lower than the tax rate t in country R , the payoff outcome $1 - \tau$ is to be interpreted as the return on relocating the funds to \hat{H} . Apart from this, the logic of the equilibrium analysis remains unaffected. A relocation of the offshore wealth to \hat{H} typically does not solve an investor's problem when being identified as a tax evader, particularly if we adopt the more generous interpretation of the model alluded to in Section 3. In the more generous interpretation, the decision on h is the decision between a haven policy continuation or a policy change, which is made much later than the investment decisions and under the influence of international pressure. If funds were located in a tax haven that some years later decides to lift its secrecy regulations and agree to full transparency, a relocation of the funds to a different tax haven may come too late. The tax evasion on previously accrued capital income becomes visible and cannot be neutralized or concealed by shifting the capital to another haven. In the Introduction we referred to a recent empirical example, when the policy change in Switzerland revealed previous tax evasions by US citizens, who were then prosecuted by the US authorities.³⁶ Fines z apply and the tax rate t , which has been evaded, may influence the cost that accrues to a tax-evading investor if $h = 0$, even if the funds are not repatriated but are relocated elsewhere.

There are further dynamic issues which we bypass because they are orthogonal to the problem we study. A truly dynamic framework would endogenize many of the competition

³⁶Recall from the Introduction the example of the recent crackdown on Swiss banks by US courts, explained in detail in Footnote 8. There might be other empirical examples in which investors were able to keep their identities a secret by relocating their funds to a different tax haven early enough. But it is the mere possibility that a haven country can release information on past transactions and make a tax evading investor worse off than by simply paying the tax due in country R that drives the logic of our analysis.

parameters that are exogenous in our analysis. Elsayyad and Konrad (2012) address competition aspects in an exit game among several haven countries, but they removed the issue of strategic complementarity in the decisions of investors from the picture. They assume that investors make a uniform choice as a group, and act as a single player. They highlight that a *last-haven-standing effect* can make it attractive for a haven country to persist, because the fees that tax havens attract in the equilibrium are to some extent a function of the market concentration and the competitive pressure among havens. The results of this analysis ask for a coordinated fight against tax havens that increases the operating costs for all haven countries. Otherwise, with a sequential approach, haven countries may try to hold out in order to obtain higher earnings in a more concentrated market for concealment services.

7 Concluding remarks

Our model provides insights into why and when haven countries choose to operate a secrecy regime, and when they decide to comply with international standards of transparency. We identify a key factor driving their decisions: a many player coordination game between a haven country and its potential investors. Investors must anticipate corresponding reactions when making the decision as to whether or not to locate their assets in a haven country. Strategic complementarities between a haven country and investors as well as among investors play a crucial role and suggest a multiplicity of equilibrium outcomes.

Accounting for the incomplete information that investors typically face, we derive an endogenous cost limit of operating *as* a tax haven above which a haven country will comply with an exchange of tax information, and below which it will run a secrecy regime. Notably, this cost limit lies below the potential revenues for an active tax haven. So there are circumstances for which the equilibrium predicts a transparency regime although an active tax haven could yield positive profits. In these situations, a coordination failure precludes a secrecy regime and explains why a haven country might be compliant despite the positive returns on operating as a tax haven.

Furthermore, we derive policy implications. First, we find an inherent trade-off between the fight against tax havens and high tax rates, for example, in the course of an international tax harmonization. Second, low penalties for disclosed offshore tax evasion not only make it attractive for investors to evade taxes, but also render haven countries resistant against costly pressure. Third, we give insights into the pricing of services in tax havens and explain why positive service fees need not be competed away in a competitive, international financial market with multiple active tax havens. Large profits make haven countries robust toward international initiatives and therefore trustworthy for investors.

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