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Is Transfer Pricing Harmonization the Panacea? Reporting Transparency, Standards Consistency, and Tax Avoidance*

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ABSTRACT

This study investigates the impact of the harmonization of tax transfer pricing across jurisdictions on multinational companies' reporting and tax authorities' auditing strategies. Applying a game-theoretical approach, we assess how consistent standards and enhanced reporting transparency influence firms' tax avoidance and profits and countries' tax revenue. Our analysis reveals that, while harmonization is generally perceived as discouraging tax avoidance, the effects depend on firms' and countries' profiles. We show that multinationals' equilibrium profit can increase or decrease with enhanced reporting transparency, depending on whether standards are consistent. We find that low-tax countries benefit in tax revenues from greater transparency, while high-tax countries may prefer less. Interestingly, high-tax countries may even benefit from inconsistency in standards. These findings challenge the expected effects of harmonization and offer valuable insights for policymakers aiming to curb tax avoidance and mitigate the risk of double taxation.

Keywords: transfer pricing; transfer pricing inconsistency; tax avoidance; tax harmonization; real effects

JEL classification: H20, H26, C72, K34, F53

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I. INTRODUCTION

We investigate the impact of harmonizing tax transfer pricing across jurisdictions on a multinational company's (MNC's) tax reporting and tax authorities' auditing strategies and the resulting effects on the firm's production and profit, countries' tax revenues, and global welfare. Harmonizing tax transfer pricing is considered a means of mitigating tax avoidance and the risks of double taxation, and it operates along two key dimensions: the standardization of rules for tax transfer pricing across countries and the enhancement of reporting transparency for tax authorities.

Standards consistency can be ensured by implementing general valuation principles, such as the arm's-length principle, and uniformly applying and interpreting these rules across countries. *Reporting transparency* can be achieved through improved information provision, notably through the exchange of information, as underscored by the OECD's BEPS Action 13 "Transfer Pricing Documentation and Country-by-Country Reporting" (OECD, 2015).

Despite the purported benefits, the practical ramifications of tax transfer pricing harmonization for MNCs and countries remain unclear, due to the interdependent nature of the audit strategies of tax authorities and firms' responses. Greater standards consistency alters MNCs' and countries' payoffs by changing arm's-length (AL) price standards and thus tax bases in the countries. Reporting transparency indirectly affects their payoffs by facilitating tax audits. To investigate the interplay of these forces, we employ a game-theoretical approach and examine how varying degrees of standards consistency and reporting transparency influence an MNC's propensity to report different transfer prices across countries *(reporting inconsistency)*.

As transfer pricing is one of the most important instruments of multinational tax avoidance (Heckemeyer and Overesch, 2017), lately intergovernmental forums, like the OECD/G20 Inclusive Framework on BEPS, have focused on ways to ensure consistent standards and transparent reporting. As a step toward this goal, the OECD addressed these issues in BEPS Action 13. The OECD expects that enhanced documentation and the exchange of information will require "taxpayers to articulate consistent transfer pricing positions" (OECD, 2015, p. 9). In the light of these ongoing reforms, it

is especially important to understand the implications of consistent transfer pricing standards and reporting transparency.

Our analysis also helps advance understanding of why international tax reforms often result in compromises, which means the ideals of complete standards consistency and reporting transparency may not be fully realized. It is crucial to understand the extent to which deviations from these ideals can exacerbate reporting inconsistencies and fuel tax avoidance. Analyzing the consequences for MNCs' production decisions and profits and the auditing strategies and tax revenues of the involved countries is likewise crucial in evaluating reforms.

Our anecdotal evidence from six semi-structured interviews and an online survey with global heads of taxes of major German MNCs, tax transfer pricing experts (Big Four), and the German Federal Tax Office (BZSt) emphasize the relevance of both inconsistent standards and inconsistent reporting.[1] For example, a transfer pricing expert explains:

> *So that also has nothing to do with what is an OECD country or not. This [transfer pricing standards inconsistency] is an issue for all tax authorities.*
> *—Transfer pricing partner, Big Four tax advisory firm.*

Inconsistent tax transfer pricing regulations are also observed empirically among OECD and non-OECD countries (Rathke, Rezende, and Watrin, 2020). As a consequence, MNCs do occasionally report inconsistently about their transfer prices to the involved countries for different reasons.[2]

> *[A] number of taxpayers differentiate and set a different transfer price in anticipation of a discussion during the tax audit.*
> *—Transfer pricing partner, Big Four tax advisory firm.*

> *You also have to see that of course the audit documents are sometimes different in the different countries.*
> *—Transfer pricing expert, German Federal Central Tax Office.*

Supported by these anecdotes, we assume that MNCs might file different and thus inconsistent tax transfer prices in two countries. Theoretical studies assume that MNCs report a single transfer price to both tax authorities and that consistent (Horst, 1971; Kant, 1988; Haufler and Schjelderup, 2000; Choe and Hyde, 2007; Blouin, Robinson, and Seidman, 2018; Davies, Martin, Parenti, and

[1] See Appendix A for details.

[2] Different reports might not only result from tax avoidance but from MNCs' anticipation of inconsistent standards. To be compliant in both countries, MNCs would need to file different reports to the two tax authorities. Technically, this can be achieved by carrying out primary and secondary adjustments, e.g., by constructive dividends, constructive equity contributions, or constructive loans (c. f. OECD, 2017, Glossary).

Toubal, 2018; Koethenbuerger, Mardan, and Stimmelmayr, 2019) or inconsistent (De Waegenaere, Sansing, and Wielhouwer, 2006; De Waegenaere, Sansing, and Wielhouwer, 2007; De Waegenaere and Sansing, 2010) adaptations to the reported prices emerge only later during tax negotiations and audits. We add to the literature by allowing for *reporting* inconsistencies. We model this reporting behavior for different levels of reporting transparency and standards inconsistency.

We set up a game between an MNC and two countries, referred to henceforth as "domestic" and "foreign." We assume the domestic country is a high-tax country, while the foreign one is low-tax. The MNC produces in its foreign subsidiary and sells its product to its domestic subsidiary. The arm's-length prices (AL prices) associated with this transaction can differ in both countries. These AL prices depend on the allocation of the MNC's functions, assets, and risks. In our model, we assume that AL prices are exogenously given.[3] In the first stage, the MNC decides which quantity to produce. In the second stage, it chooses the tax transfer prices to be reported. Each tax authority then chooses its audit strategy, conditional on the reported prices. We assume that a specific transparency regime is in place, for example, given by a tax information exchange agreement or country-by-country reporting. This regime provides incremental information about the extent of reporting inconsistency to the tax authorities. This information facilitates the tax authorities' ability to challenge the MNC's position and enforce AL prices, which we model as a reduction in audit cost.

We obtain four main findings. First, our analysis shows that a rise in the foreign AL price without a corresponding change in the domestic AL price—which implies higher standards inconsistency—leads to the MNC reporting a higher transfer price in both countries. Intuitively, the changed foreign report alters the information environment for *both* tax authorities, triggering the increase of the domestic report. Consequently, our model demonstrates that a change in the AL price in one country

[3]The tax authorities must conduct a costly in-depth audit of the functions, assets, and risk (FAR) profile to deduce the AL price of a given product. The exact same product can be assigned different AL prices, depending on how much risk is involved in producing or selling it. Low AL prices emerge and are appropriate if the foreign division has a routine function; they typically result from cost-based pricing rules. By contrast, high AL prices typically emerge from a resale price minus method and are applied if the foreign division has an entrepreneurial function, leaving the domestic division with a routine function (e. g., distribution unit). Consequently, intermediate AL prices generally point to a hybrid functional profile of both divisions.

not only affects tax avoidance in that country but also fosters tax avoidance in the other. Intriguingly, we observe that this rise of tax avoidance is more pronounced when reporting transparency is high.

Second, in equilibrium, MNCs with AL prices at the lower and upper bounds of the possible AL prices in total are audited less frequently than those with AL prices at intermediate levels. The MNC anticipates the marginal (penalty) costs from this audit game in its production decision. As a result, enhanced reporting transparency, which alters these costs, increases or damps production quantity and in turn firm profits. The direction of the response in production and profits depends on the level of standards inconsistency. Extending the literature (e.g. Haufler and Schjelderup, 2000; Juranek, Schindler, and Schjelderup, 2018) by considering audit costs, we identify novel effects, especially for the MNC's response in production quantity to different levels of reporting transparency and standards inconsistency in the presence of tax revenue-maximizing[4] tax authorities.

Third, our numerical analysis reveals that, surprisingly, scenarios exist in which an intermediate or even low level of reporting transparency is optimal (in terms of expected tax revenues) for the domestic high-tax country but full transparency is preferred by the foreign low-tax country. In particular, this is the case if standards are inconsistent. Then the expected amount of tax avoidance is insensitive to reporting transparency, making the response in expected production quantity the predominant effect. Production quantity can decrease in response to lower reporting transparency, which benefits the domestic tax authority (but hurts the foreign one) as the reduction in tax-deductible expenses outpaces the decline in sales revenues.

Fourth, from a global welfare perspective, we find in equilibrium that more reporting transparency increases consumer and producer surplus for an array of parameter settings, but, surprisingly, we find that, under consistent standards, an intermediate level of reporting transparency can benefit producers. Overall our numerical results suggest that social welfare is rather insensitive to changes in reporting transparency while sensitive to standards inconsistency.

[4]This also contrasts findings of Haufler and Schjelderup (2000), who investigate optimal corporate taxation and, consequently, assume a benevolent government.

In the literature, it is well established that MNCs maximize their tax advantage by choosing either the highest or lowest possible price from a range of feasible tax transfer prices (e.g. Horst, 1971). Our research extends the literature in three ways.

First, while studies, such as those by Kant (1988), Choe and Hyde (2007), Baumann and Friehe (2013), Blouin et al. (2018), Davies et al. (2018), and Koethenbuerger et al. (2019), examine MNCs' selection of tax transfer prices beyond the feasible range, accounting for concealment costs or audit probability, they lack an analysis of tax authorities' strategic adjustments to these firm behaviors. We bridge this gap by applying the Reinganum and Wilde (1986a) model with a strategic tax authority and a taxpayer with private knowledge about the true income to an international transfer pricing context with *two* strategic tax authorities and an MNC with private knowledge about its AL prices.

Second, theoretical studies indicate that inconsistent transfer prices (Elitzur and Mintz, 1996; Mansori and Weichenrieder, 2001; Raimondos-Møller and Scharf, 2002; De Waegenaere and Sansing, 2010) and information exchange (Huizinga and Nielsen, 2003) emerge from strategic interaction between countries. In line with these studies, empirical studies clarify that inconsistent tax transfer pricing regulations (Rathke et al., 2020) and country-specific bilateral tax information exchange agreements (Bilicka and Fuest, 2014) can be observed. Even though these studies highlight the presence of such inconsistencies, they abstain from exploring strategic responses in tax authorities' audit strategies, an area our study delves into.

Third, De Waegenaere et al. (2006) and De Waegenaere et al. (2007) were the first researchers to combine both above-described extensions to the basic transfer pricing problem. They investigate a setting with an MNC and two strategic tax authorities under inconsistent tax transfer pricing standards. They model *standards* inconsistency but assume consistent *reports* by the taxpayers in both countries and thus a given global tax income that must be allocated between the countries. While De Waegenaere et al. (2007) assume that the tax authorities can observe the taxpayer's reported transfer prices only by auditing or entering an advance pricing agreement, we follow De Waegenaere et al. (2006) and assume that the tax authorities can always observe both reported transfer prices and condition their strategy accordingly. Yet a key assumption in these two studies

is that worldwide income is undisputed and common knowledge, which means that the MNC cannot report different (inconsistent) tax transfer prices to the two tax authorities. We relax this assumption and study various levels of reporting transparency (where high reporting transparency corresponds to the case of a commonly known worldwide income) and allow the MNC to account for double taxation or report less than worldwide income (i.e., different tax transfer prices). We thereby connect the De Waegenaere et al. (2006) setting to the literature on tax evasion (Reinganum and Wilde, 1986a). In De Waegenaere et al. (2006), the possibility to claim disputed income (with the result of double taxation) is an important audit incentive, and consequently the tax authorities audit more heavily if the likelihood of standards inconsistency (i.e., the chance to double tax) is high. By contrast, the main audit incentive in our model is to prevent MNCs from deviating from the AL price, and thus audit strategies depend on the reported tax transfer price. We further add to the findings of De Waegenaere et al. (2006) by demonstrating how strategic auditing and reporting translate into tax avoidance and real effects.

Our contribution is threefold. First, based on evidence on transfer pricing inconsistency collected in our interviews, we extend the literature on tax transfer pricing by studying a strategic situation in which an MNC can choose reports that not only deviate from AL prices but also can differ in different countries and show that, in equilibrium, inconsistent reports occur. We examine how, in different transfer pricing environments, reporting inconsistencies influence real decisions and tax revenue. Second, we contribute to the understanding of the impact of two key dimensions of transfer pricing harmonization. We show how modifying standards inconsistency and reporting transparency affects firms' tax avoidance, production quantities, and profits, countries' tax revenues, and global welfare. Third, we make a methodological contribution by showing how the game-theoretic framework on tax compliance with heterogeneous taxpayers introduced by Reinganum and Wilde (1986a) can be extended to settings with two tax authorities with information exchange.

Our findings are important for policymakers, who should be aware of the adverse incentives that countries may have during multilateral negotiations. Our predictions regarding the influence

of standards consistency and reporting transparency should be empirically tested to illuminate potentially heterogeneous responses in different firms and countries.

II. GAME THEORETIC FRAMEWORK: MNC PROFITS AND NET TAX REVENUES

We consider an MNC with divisions in two countries, referred to as "domestic" and "foreign." The foreign division produces an intermediate product of quantity q at constant marginal costs of production c, which is sold in the domestic country.[5] The domestic division earns sales revenue $R(q)$ with $R''(q) < 0$. We think of $R(q)$ as given by quantity times sales price.[6] The tax rate in the foreign country is given by τ_f, whereas the tax rate in the domestic country is denoted by τ_d, with $\tau_d > \tau_f$. We study a centralized setting; that is, the MNC's management is aware of $R(q)$ and can choose the optimal production quantity appropriately.[7] The production decision is referred to as *Stage 1*.

When making the production decision, the MNC anticipates the outcome of the sequential tax reporting and auditing game that takes place in *Stage 2*. In this game, it submits tax transfer price reports to both tax authorities, which then decide whether to audit. In particular, the MNC is privately informed about the product's AL prices $p_i, i \in \{d, f\}$. p_d is correct from the viewpoint of the domestic (d) and p_f from the foreign (f) jurisdiction. AL prices are distributed on the interval $[\underline{p_i}, \overline{p_i}]$,[8] according to the probability density functions $f_i(p_i)$.[9] A vector of AL prices (p_d, p_f)

[5] This basic setup is similar to the one studied by Baldenius, Melumad, and Reichelstein (2004) and Choe and Hyde (2007).

[6] $R(q)$ can also be understood as gross sales revenue less the domestic division's marginal production costs other than for the intermediate product (Baldenius et al., 2004). Without loss of generality, we set such costs to zero and obtain a sales price of $R(q)/q$. $R'' < 0$ allows for demand that is linearly or convex decreasing in quantity.

[7] This can also be interpreted as a decentralized setting where the domestic division is incentivized appropriately using an internal transfer price (e. g., Baldenius et al., 2004; Choe and Hyde, 2007). Our model could easily be extended with respect to appropriate incentives. In particular, it would be necessary to make the domestic division bear a share of potential penalties. However, we refrain from explicitly modelling this for ease of exposition.

[8] In accordance with common transfer price regulations, we assume that $\underline{p_i} \geq c$. Usually, the resale price serves as an upper bound for transfer prices; however, we do not need to make this a formal assumption. Depending on the sales market features, there are cases in which products are sold by the domestic division at a (tax) loss. However, in our numerical examples (Section V), we choose parameters such that the endogenously determined resale price lies above the upper boundary of the transfer price $\overline{p}$.

[9] Without loss of generality, we abstract from the fact that in reality there may be an interval of accepted tax transfer prices rather than a single arm's-length price. If there were a range of feasible arm's-length prices, the multinational would always report at the upper or lower boundary (Baldenius et al., 2004; Choe and Hyde, 2007).

characterizes an MNC's type. While we assume that both countries generally adhere to the AL principle, transfer pricing standards may still be inconsistent, meaning that $p_d \neq p_f$. Here we impose the (deterministic) relationship $p_f = p_d + \delta$, where $\delta \geq 0$ captures the amount of double taxation implied by the standards inconsistency.[10]

These inconsistencies can result, for example, from different applications of the AL principle (De Waegenaere et al., 2006; De Waegenaere et al., 2007; Rathke et al., 2020). Assume an example where the profit from a transaction is derived from both tangible and intangible assets. While the allocation of the transfer price for tangible assets is straightforward, the intangible portion requires more attention. Assume that the domestic country chooses to apply the comparable profit method, with the foreign toll manufacturer as the tested party. This approach allocates the entire profit attributed to the intangible asset to the entrepreneur in the domestic country, resulting in a transfer price of, say, $p_d = 2$. Conversely, the foreign country might recognize a greater degree of entrepreneurship in its local entity, opting for the profit split method. This method proposes a division of the intangible asset's profit, suggesting a transfer price of, say, $p_f = 3$. In this example, the difference (δ) between the two transfer prices is 1.

The MNC chooses *reported* transfer prices p_i^r that may deviate from AL prices p_i and can be inconsistent ($p_d^r \neq p_f^r$). In our example above ($p_d = 2, p_f = 3$), reports $p_d^r = p_f^r = 2$ would be *consistent* (although not complying with the foreign AL price), while reports $(p_d^r = 2, p_f^r = 3)$ would be *inconsistent* (although complying with both standards). The MNC submits tax transfer pricing documentation that supports the chosen prices and informs tax authority *i* about the (reported) tax transfer price p_i^r and quantity q.[11] Additionally, the tax authorities might have access to information

[10] De Waegenaere et al. (2006) and De Waegenaere et al. (2007) study a setting where such inconsistencies appear stochastically. In contrast, we choose the deterministic relationship $p_f = p_d + \delta$ to focus on the influence of reporting transparency on the MNC's reporting decision (see below). This functional relation is motivated by the fact that the foreign country's tax base increases in p_f, whereas the domestic country's tax base decreases in p_d. Hence the foreign exporting (domestic, importing) country generally has an incentive to create tax transfer price regulations that lead to higher (lower) arm's-length prices (e. g., Mansori and Weichenrieder, 2001; De Waegenaere et al., 2007). Still, while both countries generally adhere to the AL principle, higher arm's-length prices in the domestic country coincide with higher arm's-length prices in the foreign country $\left(\frac{dp_f}{dp_d} > 0\right)$.

[11] Action 13 of OECD's BEPS action plan develops a three-tiered standardized approach to transfer pricing documentation. Tier two *"requires that detailed transactional transfer pricing documentation be provided in a "local file" specific to each country, identifying material related-party transactions, the amounts involved in those trans-*

on the transfer price reported in the other country via mandated or voluntary supplementary tax disclosure (e.g., country-by-country reporting or sustainability reports) or tax information exchange. These (bilateral) transparency devices provide incremental information that a tax authority can use to reveal inconsistency in reported transfer prices. However, depending on the transparency device, this information may not be perfect. For example, country-by-country reporting only provides tax information at the country level and not at transaction level. We use the term "reporting transparency" to describe the transparency generated by these bilateral transparency devices. We assume that information on inconsistent transfer price reports will facilitate the tax authorities' challenge of the MNC's position and enforce the AL price, reducing audit costs for the tax authorities. For example, a tax authority may consider the existence of two different prices as an indicator for potential noncompliance, which is also reflected in our interviews:[12]

> *[W]e have a growing exchange of information. ... So, such inconsistencies can sometimes also be perceived negatively and then lead to further seizures by the tax authorities in other countries.*
> *—Transfer pricing partner, Big Four tax advisory firm.*

In our model, we posit that the tax authorities' audit costs are scaled by a reporting transparency function, denoted as $\psi(p_d^r - p_f^r) > 0$, which is a function of the difference between the reported transfer prices. This function is normalized such that $\psi(0) = 1$, with its derivative being negative ($\psi' \leq 0$). Audit costs diminish as the level of reporting inconsistency increases because a larger difference between the reported transfer prices simplifies the task for tax authorities to challenge these prices. Negative reporting inconsistencies $p_d^r - p_f^r < 0$ reflect double taxation, leading to $\psi(\cdot) > 1$. Hence we also capture scenarios that make it costlier for the tax authorities to enforce transfer prices that even increase double taxation. Finally, the slope of $\psi(\cdot)$ reflects the incremental informational value of the transparency mechanism. $\psi' \to 0$ indicates a scant level of reporting transparency.

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actions, and the company's analysis of the transfer pricing determinations they have made with regard to those transactions" (OECD, 2015, p. 9). Still, if the transfer pricing requirements of a country do not comply with these OECD-requirements, tax authorities can infer the quantity, e.g., from sales revenues (obtained from VAT returns, financial statements, or customs declarations, etc.) in combination with the publicly observable sales price.

[12] Relatedly, the existence of two different prices is also considered as triggering tax authority scrutiny in Reineke, Weiskirchner-Merten, and Wielenberg (2022), Martini (2015), and Smith (2002), who study one versus two sets of books for transfer pricing purposes.

After the reports are submitted, both tax authorities decide separately on whether to audit, conditional on the reported transfer prices p_d^r, p_f^r. The audit strategy of tax authority i is denoted by the scalar α_i. In general, α_i can be zero (no audit), one (audit), or between zero and one (audit with a particular probability). The separating equilibrium developed below involves mixed strategies of the tax authorities, that is, $\alpha_i \in [0,1]$, and equilibrium audit probabilities $a_i(p_d^r, p_f^r)$ are functions of the reports; in equilibrium, $\alpha_i = a_i(p_d^r, p_f^r)$. If a tax authority audits, deviations from the AL price bring a penalty (e. g., Choe and Hyde, 2007; Blouin et al., 2018; Davies et al., 2018; Koethenbuerger et al., 2019). We assume a linear penalty; that is, $\theta_i \geq 1$ times the underpaid tax (Yitzhaki, 1974).[13]

Figure 1 depicts the timing of events, and Figure 2 the MNC's and tax authorities' strategies.

[Insert Figure 1 and Figure 2 about here]

After observing the MNC's reported transfer prices, the tax authorities' choose audit probabilities α_i to maximize net tax revenues T_i as given by

$$T_d(p_d^r, p_f^r, \alpha_d, \mu_d) = \tau_d(R(q) - p_d^r q) + \alpha_d \tau_d \theta_d (p_d^r - \mu_d(p_d^r, p_f^r))q - k_d(\alpha_d \psi(p_d^r - p_f^r)) \quad (1)$$

$$T_f(p_d^r, p_f^r, \alpha_f, \mu_f) = \tau_f q(p_f^r - c) + \alpha_f \tau_f \theta_f q(\mu_f(p_d^r, p_f^r) - p_f^r) - k_f(\alpha_f \psi(p_d^r - p_f^r)), \quad (2)$$

where $k_i(\cdot)$ with $k_i' > 0, k_i'' \geq 0$ denotes the audit costs. As motivated above, audit costs are monotone decreasing with an increasing level of reporting inconsistency. Finally, $\mu_i(p_d^r, p_f^r)$ is tax authority i's point belief[14] about the AL price p_i upon observing reports p_d^r, p_f^r.[15]

[13] We introduce a penalty for the sake of generality; in many countries, reported transfer prices that differ from the respective AL prices are simply corrected by the tax authorities without incurring a penalty. This can be captured by setting θ_d and / or θ_f equal to 1 (see also footnote 15); our results do not change qualitatively in these cases.

[14] To keep the notation simple, we use $\mu_i(p_d^r, p_f^r)$ to describe the tax authority i's expected value of the AL price p_i, given reports p_d^r, p_f^r and its beliefs, instead of the corresponding distribution function. Since in a separating equilibrium the distribution function is a point measure, there is a one-to-one correspondence between the expected value and the distribution function. Defining point beliefs implies that we are searching for a separating equilibrium.

[15] The assumption of the governments maximizing net tax revenues is standard in the literature on tax transfer pricing (Graetz, Reinganum, and Wilde, 1986; Reinganum and Wilde, 1986a; Beck and Jung, 1989; Mills and Sansing, 2000; Sansing, 1993; Elitzur and Mintz, 1996; Mansori and Weichenrieder, 2001; De Waegenaere et al., 2006; De Waegenaere et al., 2007). Also, it is common to assume that the penalty is part of the tax authorities' revenues (e. g., Graetz et al., 1986; Beck and Jung, 1989). However, the results of our model would not change qualitatively, when

The MNC's problem is to maximize its payoff Π, anticipating the equilibrium audit strategies of the tax authorities $\alpha_d = a_d(\cdot,\cdot), \alpha_f = a_f(\cdot,\cdot)$:

$$\begin{aligned}\Pi(p_d^r, p_f^r, a_d, a_f) = R(q) - cq - \tau_d\left(R(q) - qp_d^r\right) - \tau_f\left(p_f^r - c\right)q \\ - a_d(p_d^r, p_f^r)\theta_d\tau_d q\left(p_d^r - p_d\right) - a_f(p_d^r, p_f^r)\theta_f\tau_f q\left(p_f - p_f^r\right). \qquad (3)\end{aligned}$$

III. CHOICE OF REPORTED TAX TRANSFER PRICES AND AUDIT PROBABILITY (SECOND STAGE)

We determine the reaction functions and equilibrium outcome by backward induction. Both tax authorities strategically determine the audit probabilities α_i, given reported transfer prices p_d^r, p_f^r. Anticipating these audit probabilities, the MNC strategically determines tax transfer price reports. For this kind of game, there exists a separating equilibrium, which was first shown by Reinganum and Wilde (1986a; 1986b) and used to study tax evasion and avoidance by Reinganum and Wilde (1986a), Erard and Feinstein (1994), and Diller and Lorenz (2015).[16] We define a separating equilibrium as established by Reinganum and Wilde (1986a):

DEFINITION 1. *A separating equilibrium between the MNC and the domestic and foreign tax authorities consists of point beliefs $\mu_i(p_d^r, p_f^r)$, audit probabilities $a_i(p_d^r, p_f^r)$, and reports $p_i^{r*}(p_d, p_f)$[17] such that*

assuming that the tax authorities do not benefit from the penalty payment. In this case, θ_i would be set to 1 in the tax authorities' objective functions but remain in the MNC's objective function. Setting $\theta_i = 1$ implies that the tax authority still receives the underpaid amount after an audit but no penalty on top. Furthermore, we do *not* assume that an MNC *receives* penalties after paying *too much* taxes. On the equilibrium path, the MNC never overstates the tax base in either country. For simplicity, we therefore do not formally include a max operator.

[16] As noted in these analyses, pooling and partially pooling equilibria also emerge. While Erard and Feinstein (1994) show that (partially) pooling equilibria can be ruled out by introducing a portion of "honest" taxpayers who always report their true income, Reinganum and Wilde (1986b) show that (partially) pooling equilibria do not survive the universally divine equilibrium concept introduced by Banks and Sobel (1987). We have elaborated on possible (partially) pooling equilibria on the special case with constant reporting transparency ($\psi' = 0$, c.f. Appendix C) and shown that they can be ruled out by applying the universally divine equilibrium concept; because of space constraints we do not include the explanations in this paper; they are available from the authors upon request. Furthermore, pooling would require that MNCs also choose the optimal production level of the type they imitate, since production quantities are visible to the tax authorities. We therefore focus on the separating equilibrium.

[17] While p_i^r is a scalar and denotes what is provided to the tax authority i, the MNC's equilibrium reporting strategy, given AL price p_i, is denoted as $p_i^{r*}(p_d, p_f)$. Therefore, in equilibrium, $p_i^r = p_i^{r*}(p_d, p_f)$.

a) $a_i(p_d^r, p_f^r)$ *maximizes* $T_i(p_d^r, p_f^r, \alpha_i, \mu_i)$*, given the beliefs* $\mu_i(p_d^r, p_f^r), \forall i \in \{d, f\}$*;*

b) $p_d^{r*}(p_d, p_f)$ *and* $p_f^{r*}(p_d, p_f)$ *maximize* $\Pi(p_d^r, p_f^r, a_d, a_f)$*, given the audit probabilities* $a_i(p_d^r, p_f^r)$*;*

c) On the equilibrium path, the tax authorities' beliefs correspond to the multinational's equilibrium strategy: $\mu_i(p_d^{r*}, p_f^{r*}) = p_i, \forall i \in \{d, f\}$.

For clarity, we explicate audit costs as $k_i(\alpha_i\psi(\cdot)) = b_i\alpha_i\psi(\cdot)$: auditing costs a fixed amount b_i, which is reduced (or increased) by $\psi(\cdot)$. $\alpha_i b_i \psi$ is thus the expected audit cost.[18]

Tax Authorities' Decisions

After observing reported tax transfer prices, the tax authorities choose their audit probabilities so as to maximize net tax revenues. The first-order conditions yield

$$\frac{dT_d}{d\alpha_d} = \tau_d\theta_d q(p_d^r - \mu_d(p_d^r, p_f^r)) - b_d\psi(p_d^r - p_f^r) = 0, \tag{4}$$

$$\frac{dT_f}{d\alpha_f} = \tau_f\theta_f q(\mu_f(p_d^r, p_f^r) - p_f^r) - b_f\psi(p_d^r - p_f^r) = 0. \tag{5}$$

With fixed audit costs b_i, equations (4) and (5) are indifference conditions. In equilibrium, the expected additional taxes and penalties (first terms) need to equate the expected audit costs (second terms). Equations (4) and (5) serve two purposes. First, given that on the equilibrium path the tax authorities' beliefs are "correct" ($\mu_d = p_d, \mu_f = p_f$, Definition 1 c)), they fully characterize the equilibrium reports p_d^{r*}, p_f^{r*}. In particular, the MNC chooses these reports so as to hold both tax authorities indifferent between all audit probabilities. Consequently, both tax authorities' second-order conditions equal zero (see Appendix B). Second, they are solved for μ_d and μ_f to obtain beliefs that render the tax authorities indifferent for any given combination of reports p_d^r, p_f^r. These beliefs are important to characterize the separating equilibrium in the next step.

[18] Erard and Feinstein (1994) note that, if the audit costs were to decrease or increase slightly after the report was filed, the tax authority would alter its strategy to audit either all or no taxpayers. This characteristic does not arise, however, when including a budget constraint for the tax authority (as introduced by Erard and Feinstein, 1994), or when audit costs are assumed to be strictly convex in the audit probability (as shown by Reinganum and Wilde, 1986a). The solution of Stage 2 of our model for convex audit costs for the special case $\psi' = 0$ is available from the authors upon request.

MNC's Decision

The MNC chooses p_d^r and p_f^r such as to maximize profit, anticipating the tax authorities' audit strategies. This gives the first-order conditions

$$\frac{\partial \Pi}{\partial p_d^r} = \tau_d q - q\theta_d \tau_d a_d(p_d^r, p_f^r) - q(p_d^r - p_d)\theta_d \tau_d \frac{\partial a_d}{\partial p_d^r} - q(p_f - p_f^r)\theta_f \tau_f \frac{\partial a_f}{\partial p_d^r} = 0, \tag{6}$$

$$\frac{\partial \Pi}{\partial p_f^r} = -\tau_f q + q\theta_f \tau_f a_f(p_d^r, p_f^r) - q(p_d^r - p_d)\theta_d \tau_d \frac{\partial a_d}{\partial p_f^r} - q(p_f - p_f^r)\theta_f \tau_f \frac{\partial a_f}{\partial p_f^r} = 0. \tag{7}$$

The first two terms in both equations show the direct effect of increasing the reported tax transfer prices. In the domestic country, tax-deductible expenses increase, shielding part of the tax base from taxation (first term); however, in case of an audit, back taxes and penalties increase (second term). In the foreign country, the signs are reversed, as lower reported transfer prices directly decrease the tax base and thus increase after-tax profit (first term), while, at the same time, increasing expected penalties (second term). The third and fourth terms measure the marginal change in audit probability. Since both tax authorities condition their audit probability on the reported tax transfer prices in *both* countries, altering p_d^r and p_f^r affects the audit probabilities in both countries. Therefore, whereas previous applications of this framework in a national context (Reinganum and Wilde, 1986a; Erard and Feinstein, 1994; Diller and Lorenz, 2015) involve ordinary differential equations, our international application involves a coupled system of partial differential equations.

Derivation of Equilibrium

According to Definition 1 c) of the separating equilibrium, on the equilibrium path, the tax authorities' beliefs correspond to the AL prices, $\mu_d = p_d, \mu_f = p_f$. Replacing AL prices p_d and p_f in (6) and (7) with beliefs[19] μ_d and μ_f, respectively, as obtained from (4) and (5), gives the coupled

[19] Reinganum and Wilde (1986a) observe in a first step from the consistency condition (here Definition 1 c)) that—on the equilibrium path—a taxpayer's income is identical to the tax authority's belief and is also equal to the inverse of the taxpayer's equilibrium report ("inverse reporting policy"). They then use the inverse reporting policy to replace the belief in the tax authority's first-order condition, and the taxpayer's income in the taxpayer's first-order condition. Finally, they solve the tax authority's first-order condition for the inverse reporting policy and use this to eliminate the inverse reporting policy from the taxpayer's first-order condition (c.f. Reinganum and Wilde, 1986a, pp. 744 f.).

system of partial differential equations:

$$\begin{aligned}
\tau_d q - q\theta_d \tau_d a_d(p_d^r, p_f^r) - b_d \psi(p_d^r - p_f^r)\frac{\partial a_d}{\partial p_d^r} - b_f \psi(p_d^r - p_f^r)\frac{\partial a_f}{\partial p_d^r} = 0 \\
-\tau_f q + q\theta_f \tau_f a_f(p_d^r, p_f^r) - b_d \psi(p_d^r - p_f^r)\frac{\partial a_d}{\partial p_f^r} - b_f \psi(p_d^r - p_f^r)\frac{\partial a_f}{\partial p_f^r} = 0.
\end{aligned} \tag{8}$$

In unilateral settings (e.g., Reinganum and Wilde, 1985), boundary conditions are specified such that the tax authority would never audit the taxpayer who reports the highest tax payment. This is justified by the belief that high (out-of-equilibrium) reports come from the taxpayer with the highest true tax base. In our bilateral setting, both tax authorities calculate beliefs given two reports (p_d^r, p_f^r). These beliefs are obtained by solving (4) for μ_d, and (5) for μ_f. Thus we obtain beliefs that render the tax authorities indifferent between auditing and not auditing for any combination of reports. However, a natural requirement about beliefs is that tax authorities must not map reports to types that do not exist.

For example, if the lowest domestic AL price is $\underline{p_d} = 3$, when observing any combination of reports p_d^r, p_f^r, the domestic tax authority must assign a belief μ_d of at least 3. This produces a lower boundary for the domestic tax authorities' beliefs $\underline{p_d^r}(p_f^r)$ such that $\underline{p_d^r} - \frac{b_d \psi(\underline{p_d^r} - p_f^r)}{q\tau_d\theta_d} = \underline{p_d}$. An upper boundary as well as the set of interior beliefs for the foreign tax authority are calculated analogously. The light green area in the center of Figure 3 indicates the set M of combinations of reports for which both tax authorities have interior beliefs; that is, they believe that the type that is associated with the reports is between $\underline{p_i}$ and $\overline{p_i}$. The solid purple line on the left, $\underline{p_d^r}(p_f^r)$, shows combinations of reports for which the domestic tax authority just believes that $\underline{p_d}$ is present and audits with probability zero. The upper solid yellow line $\overline{p_f^r}(p_d^r)$ indicates the combinations of

Inverse reporting policies in our model are $p_d(p_d^r, p_f^r) = p_d^r - \frac{b_d \psi(p_d^r - p_f^r)}{q\tau_d\theta_d}$ and $p_f(p_d^r, p_f^r) = p_f^r + \frac{b_f \psi(p_d^r - p_f^r)}{q\tau_f\theta_f}$. For simplicity, however, we refrain from making this intermediate step explicit and directly replace p_d and p_f in the first-order condition of the MNC by the beliefs μ_d and μ_f, as they result as the solution of equations (4) and (5).

reports that bring the foreign tax authority to believe that $\overline{p_f}$ is present and to audit with probability zero.[20]

According to this reasoning, we specify Dirichlet boundary conditions $a_d(\underline{p_d^r}(p_f^r), p_f^r) = 0$ and $a_f(p_d^r, \overline{p_f^r}(p_d^r)) = 0$ that are justified by the tax authorities' beliefs that any report $p_d^r < \underline{p_d^r}(p_f^r)$ comes from type $\underline{p_d}$ (domestic country, set $\underline{M_d}$ outlined in purple, left-hand side in Figure 3), and any report $p_f^r > \overline{p_f^r}(p_d^r)$ comes from type $\overline{p_f}$ (foreign country, set $\overline{M_f}$ outlined in yellow, at the top in Figure 3).

[Figure 3 and Figure 4 about here]

To the best of our knowledge, an analytical solution of the system (8) is impossible. Figure 4 (left and middle panel) shows a numerical solution, i.e., the tax authorities' equilibrium audit functions, depending on the MNC's reported tax transfer prices in both countries; the black solid (dashed) line indicates the equilibrium path in the domestic (foreign) country.

The following proposition summarizes the result. The proofs for all formal statements can be found in Appendix B. We also show an analytical solution of the equilibrium for the special case $\psi' = 0$ in Appendix C.

PROPOSITION 1. *In the game between the MNC, the domestic and foreign tax authorities, a separating equilibrium is given by the following strategies and beliefs:*

a) The domestic and foreign tax authorities audit with probability

$$a_d(p_d^r, p_f^r) = \begin{cases} 0 & (p_d^r, p_f^r) \in \underline{M_d} \\ a_d^\star(p_d^r, p_f^r) & (p_d^r, p_f^r) \in M \\ 1 & (p_d^r, p_f^r) \in \mathbb{R}^2 \setminus \{M \cup \underline{M_d}\} \end{cases}, a_f(p_d^r, p_f^r) = \begin{cases} 1 & (p_d^r, p_f^r) \in \mathbb{R}^2 \setminus \{M \cup \overline{M_f}\} \\ a_f^\star(p_d^r, p_f^r) & (p_d^r, p_f^r) \in M \\ 0 & (p_d^r, p_f^r) \in \overline{M_f}; \end{cases}$$

b) the MNC reports $p_d^{r*}(p_d, p_f)$ and $p_f^{r*}(p_d, p_f)$;

[20] In addition, in our bilateral case, appropriate beliefs need to be assigned for cases where a combination of reports points to an existing type (between $\underline{p_i}$ and $\overline{p_i}$) from the viewpoint of tax authority i, but points to a non-existing type $< \underline{p_i}$ or $> \overline{p_i}$ from the viewpoint of the other tax authority $-i$ (sets $\underline{M_{-i}} \setminus \{\underline{M_i} \cup \overline{M_i}\}$, $\overline{M_{-i}} \setminus \{\underline{M_i} \cup \overline{M_i}\}$ in Figure 3).

c) and the equilibrium point beliefs of the domestic and foreign tax authorities are given by

$$\mu_d(p_d^r,p_f^r)=\begin{cases}\underline{p_d} & (p_d^r,p_f^r)\in\mathbb{R}^2\setminus\{M\cup\overline{M_d}\}\\ p_d^r-\frac{b_d\psi(p_d^r-p_f^r)}{q\tau_d\theta_d} & (p_d^r,p_f^r)\in M\\ \overline{p_d} & (p_d^r,p_f^r)\in\overline{M_d}\end{cases},\mu_f(p_d^r,p_f^r)=\begin{cases}\underline{p_f} & (p_d^r,p_f^r)\in\underline{M_f}\\ p_f^r+\frac{b_f\psi(p_d^r-p_f^r)}{q\tau_f\theta_f} & (p_d^r,p_f^r)\in M\\ \overline{p_f} & (p_d^r,p_f^r)\in\mathbb{R}^2\setminus\{M\cup\underline{M_f}\},\end{cases}$$

where p_d^{r*},p_f^{r*} are solutions to (4) and (5), $a_d^\star,a_f^\star$ are solutions to the coupled system of partial differential equations (8) together with the Dirichlet boundary conditions $a_d(\underline{p_d^r}(p_f^r),p_f^r)=0,a_f(p_d^r,\overline{p_f^r}(p_d^r))=0$. M is a closed set of all vectors (p_d^r,p_f^r) such that $\{\underline{p_d^r}(p_f^r)\le p_d^r\le\overline{p_d^r}(p_f^r)\}\wedge\{\underline{p_f^r}(p_d^r)\le p_f^r\le\overline{p_f^r}(p_d^r)\}$ (reports that lead to interior beliefs), $\underline{M_i}$ is the set of all vectors (p_i^r,p_{-i}^r) with $p_i^r<\underline{p_i^r}(p_{-i}^r)$ and p_{-i}^r without restriction ("too low" reports), and $\overline{M_i}$ is the set of all vectors (p_i^r,p_{-i}^r) with $p_i^r>\overline{p_i^r}(p_{-i}^r)$ and p_{-i}^r without restriction ("too high" reports). Finally, $\underline{p_d^r}(p_f^r)$, $\overline{p_d^r}(p_f^r)$, $\underline{p_f^r}(p_d^r)$, $\overline{p_f^r}(p_d^r)$ are the solutions to $p_d^r-\frac{b_d\psi(p_d^r-p_f^r)}{q\tau_d\theta_d}=\underline{p_d}$, $p_d^r-\frac{b_d\psi(p_d^r-p_f^r)}{q\tau_d\theta_d}=\overline{p_d}$, $p_f^r+\frac{b_f\psi(p_d^r-p_f^r)}{q\tau_f\theta_f}=\underline{p_f}$, $p_f^r+\frac{b_f\psi(p_d^r-p_f^r)}{q\tau_f\theta_f}=\overline{p_f}$, respectively.

Proposition 1 a) characterizes the tax authorities' equilibrium audit strategies. Both audit any combination of reports in $\mathbb{R}^2\setminus M$ with probability zero or one, while reports in the set M are audited with a probability according to the solution of the coupled PDE system (8). Figure 4 (left and middle panel) depicts a numerical solution of the tax authorities' equilibrium audit functions.

If we insert the equilibrium tax transfer price reports p_d^{r*},p_f^{r*} from Proposition 1 b) into the equilibrium audit functions from Proposition 1 a) (equilibrium path), both functions directly depend on p_i. For notational convenience, we write $a_i^*(p_d,p_f)\equiv a_i^\star(p_d^{r*},p_f^{r*})$. Given our specification on the relationship between domestic and foreign AL prices, $p_d=p,p_f=p+\delta$, the equilibrium path audit functions have only one argument, p, and thus $a_i^*(p)$ (see Figure 4, right panel).

Proposition 1 c) implies that, for all reports that actually occur on the equilibrium path, the MNC overstates the domestic transfer price and understates the foreign one. This is consistent with its incentives. It benefits from reducing the tax base in the domestic (foreign) country by overstating (understating) the reported transfer price.

Discussion of MNC's Tax Transfer Price Reporting

Before addressing the MNC's optimal production quantity choice, we examine its reporting behavior in Stage 2, for a given quantity. This helps in identifying and isolating the different mechanisms at work. In particular, we investigate the influence of standards inconsistency δ and production quantity q on tax avoidance and reporting inconsistency and show how this is moderated by the level of reporting transparency ψ'. The results are necessary to analyze the effects of reporting transparency and standards inconsistency under an endogenous production quantity decision in Section IV. We define the following:

DEFINITION 2.

a) Reporting inconsistency is the difference between the domestic and the foreign report, $p_d^r - p_f^r$.

b) Tax avoidance in a country is the difference between the nominal tax payment and the tax payment based on the reports (i.e., excluding potential penalties and back taxes). That is, for the domestic country, $\tau_d q(p_d^r - p)$*, and for the foreign country,* $\tau_f q(p + \delta - p_f^r)$.

With truthful reporting, reporting inconsistency is equal to negative standards inconsistency ($p_d^r - p_f^r = -\delta$). This is also the lower boundary for reporting inconsistency. In this case, double taxation occurs. In contrast, if $p_d^r - p_f^r > 0$, this implies untaxed income.[21]

An increase in *standards inconsistency* δ means that the foreign AL price increases by δ, whereas the domestic AL price remains constant. Therefore, only the foreign tax authority's indifference condition is *directly* affected. In a first step, the MNC increases the foreign report in a one-to-one ratio to balance the foreign tax authorities' indifference condition. This leads to an *indirect* effect, as the now higher foreign report implies less reporting inconsistency (or increases double taxation), which increases the audit costs for both tax authorities. Compensating for this requires a slight decrease of the foreign report and an increase of the domestic report. Overall, for every dollar that the foreign AL price increases, the foreign report therefore increases by less than one dollar, and the

[21] Note that reporting inconsistency is a cross-country (bilateral) measure, whereas we measure tax avoidance unilaterally. This enables us to disentangle the effects induced by different standards (δ), and by strategic reporting of the MNC.

domestic report increases, although the domestic standard remains constant. Thus tax avoidance, as defined above, increases in both countries. The higher reporting transparency, the higher this secondary effect and hence the higher this increase in tax avoidance.

Without adjustments to the strategies, an increase in *production quantity* would increase tax avoidance. Since the tax authorities' audit costs (in contrast to the gains from an audit) are independent from quantity auditing becomes relatively cheaper. Balancing the indifference conditions of both tax authorities therefore requires reducing the domestic report and increasing the foreign report. As a direct effect, consequently, reporting inconsistency and the under- or overstatement per product decreases with higher quantity. This in turn increases both tax authorities' audit costs. As an indirect effect, the MNC can therefore take back part of its reporting adjustment. This indirect effect causes an increase in tax avoidance in both countries, which strengthens with reporting transparency.

According to this mechanism, without reporting transparency, the MNC as a reaction to changed standards inconsistency or production quantity, adapts reports so as to keep the overall amount of tax avoidance constant, leading to a change in reporting inconsistency. With reporting transparency, in contrast, the MNC adapts reports less intensively, causing a change in tax avoidance but damping the change in reporting inconsistency. The following proposition summarizes the results:

PROPOSITION 2. *Given the separating equilibrium characterized in Proposition 1 and given an exogenous production quantity q, the following applies:*

a) Both an increase in standards inconsistency δ and in production quantity q lead to a reduction in reporting inconsistency. This effect is more pronounced if reporting transparency is low.

b) Both an increase in standards inconsistency δ and in production quantity q lead to an increase tax avoidance in both countries. This effect is more pronounced if reporting transparency is high. Tax avoidance increases more in the domestic than in the foreign country iff $b_d\theta_f > b_f\theta_d$.

c) The level of both reporting inconsistency and tax avoidance is independent from the AL price.

IV. CHOICE OF PRODUCTION QUANTITY (FIRST STAGE)

We now turn to the MNC's problem of choosing an optimal production quantity, anticipating the game with both tax authorities characterized above. The MNC's equilibrium profit is given by

$$\Pi^*(q;p,\delta) = (1-\tau_d)R(q) + \tau_d pq - \tau_f q(p+\delta-c) - cq \\ \underbrace{+b_d\psi(p_d^{r*}-p_f^{r*})\left(\frac{1}{\theta_d}-a_d^*(p,q)\right)+b_f\psi(p_d^{r*}-p_f^{r*})\left(\frac{1}{\theta_f}-a_f^*(p,q)\right)}_{\geq 0,\text{ benefit from tax avoidance (post audit)}}. \quad (9)$$

Π^* consists of two parts. The first part (first four terms) shows the profit the MNC receives from truthfully (and inconsistently if $\delta > 0$) reporting the AL prices in both countries. The second part captures the MNC's benefit from tax avoidance. The benefit stems from reducing the tax base in both countries (last two terms of eq. (9)). The terms $\left(\frac{1}{\theta_i}-a_i^*\right)$ reflect that the yield from tax avoidance is scaled by the audit probability. If the tax authority i does not audit ($a_i = 0$), the MNC enjoys $\frac{b_i\psi}{\theta_i}$. If the audit probability approaches $\frac{1}{\theta_i}$, the MNC's benefit vanishes. Ignoring for a moment the influence of different production quantities on the reports and audit probabilities,[22] we can get some basic insights on how different AL prices affect the MNC's profit. First, according to Proposition 2 c), the difference between the domestic and foreign reports is constant in the AL price, and thus, $\psi(\cdot)$ does not vary as the AL price increases. However, the domestic audit probability a_d^* increases, and the foreign audit probability a_f^* decreases in p.[23] Consequently, our analysis reveals that an MNC with low AL price realizes greater tax avoidance in the domestic country compared

[22] While changing the level of production quantity q *does* affect reports (c.f. Proposition 2) and audit probabilities, it *does not* generate a switch from zero to a positive audit probability (in either country). Hence, there is no q where $\Pi^*(q)$ would not be differentiable because of a change of the audit probability from zero to positive. To see this, consider for example the domestic report. Given our specification $p_d = p, p_f = p+\delta$, the domestic report depends on p and q (among others parameters such as the tax rates and δ, which we can ignore for this argument), thus, $p_d^{r*}(p,q)$; likewise, the root of the audit function $a_d^*(p,q)$ moves along with q. The lowest report (the one that is associated with audit probability zero in the domestic country) is given by $p_d^{r*}(\underline{p},q)$. We know that $\frac{\partial p_d^{r*}}{\partial p} = 1$ for all q (Proposition 2 c) with proof). Thus, given any $\hat{p} > \underline{p}$ there can be no q such that there is a crossing between $p_d^{r*}(\underline{p},q)$ and $p_d^{r*}(\hat{p},q)$; in other words, the audit probability cannot be made zero by choosing q appropriately. The same kind of reasoning applies to the foreign report and audit function.

[23] Concerning the full model shown above, we cannot establish analytically that a_d^* increases and a_f^* decreases in p. However, we show this mechanism analytically for the special case $\psi' = 0$ (Appendix C); also, our numerical examples suggest this relationship.

to the foreign one. In contrast, an MNC with a higher AL price predominantly benefits from tax avoidance in the foreign country. This leads to a critical inference in our model: An MNC with an intermediate AL price exhibits only minor tax avoidance benefits in both the domestic and foreign countries.

The MNC's profit maximizing production quantity q^* is determined by the first-order condition:[24]

$$\frac{\partial \Pi^*(q)}{\partial q} = (1-\tau_d)R'(q) + p\tau_d - \tau_f(p+\delta-c) - c$$
$$+ \underbrace{\left(b_d\left(\frac{1}{\theta_d} - a_d^*\right) + b_f\left(\frac{1}{\theta_f} - a_f^*\right)\right)\psi'(\delta^r)\frac{\partial \delta^r}{\partial q}}_{\geq 0\text{, marginal benefit from tax avoidance}} - \underbrace{\left(b_d\frac{\partial a_d^*}{\partial q} + b_f\frac{\partial a_f^*}{\partial q}\right)\psi(\delta^r)}_{\text{marginal expected penalties}} = 0, \qquad (10)$$

where for convenience $\delta^r \equiv p_d^{r*} - p_f^{r*}$ denotes reporting inconsistency. The first four terms in (10) describe all influences on the production quantity decision that are unrelated to tax avoidance and are of little interest to us. The fifth term captures the benefit from tax avoidance that comes with marginally increasing the production quantity. Recall from above that $b_i\psi(\delta^r(q)))\left(\frac{1}{\theta_i} - a_i^*\right)$ measures the expected benefit from tax avoidance in country i; it increases in ψ. Increasing the quantity reduces reporting inconsistency ($\frac{\partial \delta^r}{\partial q} < 0$, see Proposition 2 a)) and thus increases the tax authority's audit costs, which in turn increases the MNC's slice of the pie. Thus the fifth term is positive. Finally, the last term in (10) captures the change in audit probability that comes with a marginally higher quantity. While we cannot in general determine the signs of $\frac{\partial a_i^*}{\partial q}$, they are positive in the special case of $\psi' = 0$ (constant reporting transparency)[25] and in our numerical examples.

Compared to a situation without tax avoidance, the transfer price reporting effects deduced here may therefore either increase or decrease production quantity. The dashed lines in Figure 5 indicate a situation without tax avoidance. Compared to this benchmark, in our numerical examples, the quantity is increased at both ends of the AL price range and reduced for intermediate AL prices (c.f.

[24] Establishing a general condition for concavity of the profit function Π^* (and thereby uniqueness and global optimality of the quantity implicitly determined by the first-order condition (10)) is not feasible since analytical solutions to a_d^* and a_f^* are not available. The second-order condition is always fulfilled in our numerical examples (Section V). Also, we characterize a condition that ensures concavity of the profit function for the special case $\psi' = 0$ in Appendix C.

[25] See Appendix C, Corollary 1.

Figure 5 top panels). Intuitively, the sum of marginal audit probabilities (and therefore marginal expected penalties) is highest for MNCs with intermediate AL prices, which translates to lower quantity.

The following proposition summarizes the influence of AL price p, standards inconsistency δ, and reporting transparency ψ' on MNC profit.

PROPOSITION 3. *Given the separating equilibrium shown in Section III, the following applies:*

a) The MNC's profit is convex in p with a minimum at $\check{p}$ *that satisfies* $\tau_d q + \psi(\delta^r) b_f \left(-\frac{\partial a_f^*}{\partial p}\right) = \tau_f q + \psi(\delta^r) b_d \frac{\partial a_d^*}{\partial p}$.[26]

b) Increasing the level of standards inconsistency δ *affects the MNC's profit via a negative tax rate effect, a positive tax avoidance effect induced by lower audit costs, and an audit effect with an indeterminate sign.*

c) Increasing reporting transparency affects MNC's profit via a tax avoidance effect that is negative if some of the MNC's worldwide income is untaxed and positive if the MNC suffers double taxation and via an audit effect with in indeterminate sign.

Proposition 3 a) implies that profit is minimal at the point where (expected) marginal effects of altering the AL price in the domestic and foreign countries are equal. Intuitively, this can be explained as follows. Consider a model with (only) truthful reporting. In this model, profit increases linearly with the AL price at a rate of $\Pi_p^{\text{"truthful"}} = q(\tau_d - \tau_f)$. This basic effect also exists in our model (with tax avoidance). Additionally, however, we account for audit probabilities, which are functions of the AL price. Audit pressure is highest for MNCs with intermediate AL prices, which damps profits. This is because MNCs with both high and low AL prices are de facto audited in one country only. (Recall that the equilibrium implies that the audit probability is zero for the lowest (highest) reported price in the domestic (foreign) country.) Both audit functions are concave.[27]

[26] This result assumes that the weighted sum of the equilibrium audit functions is concave ($b_d \frac{\partial^2 a_d^*}{\partial p^2} + b_f \frac{\partial^2 a_f^*}{\partial p^2} \leq 0$). The assumption is fulfilled in our numerical examples, and in the special case special case $\psi' = 0$.

[27] This can be shown analytically for the special case $\psi' = 0$, c.f. Corollary 1 in the Appendix, and is given in our numerical examples.

Increasing the AL price from $\underline{p}$, the foreign audit probability remains almost constant, whereas the domestic audit probability increases more (and vice versa when decreasing the AL price from $\overline{p}$). Therefore an intermediate AL price p is audited with a relatively high probability in both countries (c.f. Figure 4, right panel).

The tax rate effect that reduces profit following an increase in standards inconsistency δ according to Proposition 3 b) simply reflects an increased tax base in the foreign country. As a second effect, however, the MNC benefits from exploiting the tax authorities' higher audit costs that are a result of lower reporting inconsistency δ^r induced by higher standards inconsistency δ (c.f. Proposition 2 a)). Third, while we cannot determine the sign of the audit effect, it is positive in our numerical examples.

The effect of changing the level of reporting transparency depends on whether the MNC is subject to double taxation or generates untaxed income. In the case of double taxation, an increase in reporting transparency harms the tax authorities because it weakens their arguments to further broaden the tax base, resulting in higher audit costs, which benefits the MNC. In contrast, if some part of the worldwide tax base is untaxed, higher transparency reduces the MNC's benefit from tax avoidance and thus profit. Second, there is an audit effect with a generally indeterminate sign but that is positive in our numerical examples. Consistent with the intuition, in our numerical examples, the MNC overall benefits from greater reporting transparency if standards are inconsistent (Figure 5, bottom right panel). In the absence of standards inconsistency (Figure 5, bottom left panel), however, only MNCs with intermediate AL prices benefit from a high level of reporting transparency, whereas those with both low and high AL prices prefer a low level. Intuitively, MNCs with intermediate AL prices are heavily audited in both countries (c.f. Figure 4) and therefore especially benefit from a reduction in audit probability that is a result of higher transparency.

[Insert Figure 5 about here]

Double Taxation

According to our expert interviews and online survey, double taxation is a major concern for many transfer pricing experts.[28] Here we provide a quick overview of the implications of our model for this problem. Eq. (9) describes that double taxation can only (but need not) occur if the foreign country establishes generally higher tax transfer prices ($\delta > 0$). In this case (net of avoidance effects), the amount $q\delta$ is double taxed. If standards are equal ($\delta = 0$), the MNC always benefits from its ability to hide some income, as determined by the separating equilibrium (last two terms in (9)). For positive δ, effective double taxation occurs if the benefit from tax avoidance is lower than the amount of double taxation caused by higher foreign AL prices, $\tau_f q\delta$. Intuitively, if the foreign and the domestic AL price regulations are inconsistent, this inconsistency imposes double taxation ($\delta > 0$). If then the level of reporting transparency is high ($\psi(\cdot)$ decreases more intensively as reports become more inconsistent), more inconsistent reports are likely to be penalized. Thus the MNC cannot avoid being double taxed. By contrast, less reporting transparency provides the MNC with the possibility to mitigate double taxation by means of tax avoidance.

V. AGGREGATE EFFECTS: TAX REVENUES AND WELFARE

Having analyzed firm-level effects, we next focus on aggregate effects, that is, countries' net tax revenues and global social welfare, which consists of consumer surplus, producer surplus, and net tax revenues. We provide numerical examples to illustrate the overall effects.

[28] See Appendix A, Table 4.

Net Tax Revenues

Introducing the MNC's equilibrium reporting policy and production decision into the tax authorities' objective functions (1) and (2), respectively, we obtain

$$T_d = \overbrace{\tau_d \left(R(q^*) - q^* p\right)}^{\text{nominal tax revenue}} - \overbrace{b_d \psi(\delta^r) \left(\frac{1}{\theta_d} - a_d^*\right)}^{\text{post-audit tax avoidance}} - \overbrace{a_d^* b_d \psi(\delta^r)}^{\text{audit cost}} \tag{11}$$

$$= \tau_d \left(R(q^*) - q^* p\right) - \frac{b_d \psi(\delta^r)}{\theta_d},$$

$$T_f = \underbrace{\tau_f q^* (p + \delta - c)}_{\text{nominal tax revenue}} - \underbrace{b_f \psi(\delta^r) \left(\frac{1}{\theta_f} - a_f^*\right)}_{\text{post-audit tax avoidance}} - \underbrace{a_f^* b_f \psi(\delta^r)}_{\text{audit cost}} \tag{12}$$

$$= \tau_f q^* (p + \delta - c) - \frac{b_f \psi(\delta^r)}{\theta_f}.$$

Tax revenues consist of three components. The first terms (nominal tax revenue) in eq. (11) and (12), respectively, capture the structure of tax revenues for truthful reporting, whereas the second terms (tax avoidance) describe the amount that is shifted from the tax authorities to the MNC. These terms (with the opposite sign) are also part of the MNC's profit function (eq. 9). The third terms (audit cost) indicate the cost of audit. When summing up the tax avoidance and the audit cost terms, the audit functions vanish. This happens because the extra taxes gained from audits in equilibrium need to match the costs of those audits.

There are constellations in which the domestic tax authority benefits from low reporting transparency and the potentially resulting lower production quantity while the foreign tax authority suffers. This is due to changes in nominal tax revenues, i.e., first terms of (11) and (12). Namely, for the domestic tax authority, a higher quantity reduces tax-deductible expenses $q^* p$ linearly, while sales revenues $R(q^*)$ are reduced according to the concave revenue function, which can ultimately imply increasing tax revenues.

For an intuitive explanation, suppose the revenue-maximizing domestic tax authority could determine the MNC's production quantity q (i.e., maximize (11) with respect to q). Then the optimal production quantity for the domestic tax authority often would be lower than the optimal

quantity q^* from the perspective of an MNC because, cum grano salis, the domestic tax authority's "equivalent marginal cost of production" p would exceed the MNC's marginal cost c. This illustrates that the domestic tax authority can benefit from a lower equilibrium production quantity q^*.[29] By contrast, the foreign tax authority suffers from a reduced quantity.

Reducing the level of reporting transparency (decreasing $|\psi'|$) in our numerical example below reduces production quantity in most cases[30], which may benefit the domestic tax authority via this tax base effect but always harms the foreign tax authority.

The countries' tax revenues are important components of global social welfare.

Components of Global Social Welfare

A common approach to measuring social welfare in the tax transfer pricing literature is by summing up consumer surplus, producer surplus / firm value, and tax revenue (Anand and Sansing, 2000; De Waegenaere and Sansing, 2010; De Waegenaere, Sansing, and Wielhouwer, 2012). To capture the welfare implications of tax avoidance explicitly, we additionally study the different components that constitute global social welfare. Consumer surplus, producer surplus, and tax revenues enter the stylized global social welfare function in expected value terms and are shown in Table 1.

[Insert Table 1 about here]

The first row shows consumer surplus. In our setting, the product is sold on the domestic market only, so consumer surplus only applies to the inhabitants of the domestic country. Tax avoidance and

[29] Our model does not incorporate optimal MNC *investment* and therefore does not depict effects due to incomplete deductibility of capital costs (which is referred to as standard corporate tax distortion; for transfer pricing settings, see, e.g., Haufler and Schjelderup (2000) and Juranek et al. (2018)). In particular, we assume that cq is fully deductible (because we interpret this amount as production cost rather than cost of capital). Incomplete deductibility of costs generally invokes underinvestment (which would translate to lower q in our model). The tax base effect shown by us—in contrast—is due to *"over-deductibility"* in the domestic country because the AL price is always above marginal production cost (and, in many cases, above marginal production cost plus marginal expected penalties). When assuming that c is not fully deductible in the foreign country, this would imply a c.p. lower optimal quantity. However, the *"over-deductibility"* in the domestic country would still be in place. The two effects are opposite. In total, our model therefore overemphasizes the tax base effect described above *if* c is regarded as an incomplete deductible cost of capital rather than marginal cost of production.

[30] Quantity increases as a result of lower reporting transparency for intermediate AL prices if standards are inconsistent (Figure 5, top right panel).

auditing affects consumer surplus via a changed production quantity q^*. Producer surplus (second row) is affected directly by standards inconsistency δ and indirectly (via tax avoidance possibilities) by both standards inconsistency and reporting transparency (c.f. Proposition 3). Nominal tax revenue (third row) allows us to illuminate the indirect influence of standards inconsistency and reporting transparency via changed production quantity. Finally, we examine audit cost, and pre-audit tax avoidance, i.e., the amount by which the MNC reduces the nominal tax payment before expected tax payment adjustments and penalties.

Numerical Examples

In this section, we provide numerical examples to explore the implications of our model, especially on domestic and foreign expected tax revenues and the different components of social welfare shown above. We model the product market using the sales revenue function $R(q) = q(k - lq)$, that is, quantity times sales price, where the sales price follows from a linear demand according to $k - lq$. k is the maximal sales price, and l denotes the price sensitivity of demand. Concerning AL prices, we assume a uniform distribution, $f(p) = \frac{1}{\overline{p} - \underline{p}}$. Finally, we model reporting transparency as $\psi(p_d^r - p_f^r) = 1 - \Psi \cdot (p_d^r - p_f^r)$, where Ψ is a parameter that measures the level of reporting transparency. Table 2 shows the baseline parameter values. Figure 6, Figure 7, and Figure 8 illustrate the implications of standards inconsistency and reporting transparency for expected net tax revenues, global social welfare as well as sales prices and reported prices.

[Insert Table 2 about here]

[Insert Figure 6, Figure 7, and Figure 8 about here]

Figure 6 shows the influence of reporting transparency and standards inconsistency on expected net tax revenues $E(T_d) = \int_{\underline{p}}^{\overline{p}} T_d f(p)\, dp, E(T_f) = \int_{\underline{p}}^{\overline{p}} T_f f(p)\, dp$, in the domestic (left) and foreign country (right). The red and blue dashed lines show the optimal level of reporting transparency for a given level of standards inconsistency from the viewpoint of the domestic and foreign tax

authorities, respectively. We explain the result and its intuition with the aid of Figure 7, which shows the components of net tax revenue: nominal tax revenue, tax avoidance, and audit cost.

For consistent standards ($\delta \to 0$), both tax authorities benefit in terms of expected net tax revenues from a high level of reporting transparency ($\psi' \to -0.4$). For both, this benefit mainly stems from both reduced tax avoidance and lower audit costs (Figure 7, middle left panel). As a weaker, second effect, production quantity increases (Figure 5, top left panel), which benefits the foreign tax authority but hurts the domestic one (Figure 7, top left panel).

In contrast, when standards are inconsistent ($\delta \to 1.4$), the production effect gains importance relative to the tax avoidance effect. Intuitively, the MNC compensates for the inconsistent standards in such a way that the reports are approximately consistent or even anticipate double taxation, which in turn inhibits the ability of the tax authorities to challenge the reports. As a result, the level of tax avoidance remains about constant over all levels of reporting transparency (see Figure 7, middle right panel). Production quantity decreases, however, which benefits the domestic tax authority. Thus there are levels of standards inconsistency for which the domestic country prefers an intermediate or even low level of reporting transparency.

Consumers benefit from the higher production quantity that comes with consistent standards and high reporting transparency (Figure 7, bottom panels). Producers, by contrast, benefit from high reporting transparency only if standards are inconsistent. Inconsistent standards motivate the MNC to anticipate some of the inconsistency in the reports. The difference between reports (gray area in Figure 8) shrinks or even implies double taxation, which in turn impedes the tax authorities from enforcing the respective AL prices. If standards are consistent, however, MNCs with intermediate AL prices benefit from high transparency (because they enjoy the lower audit probability that comes with it), while those with high or low AL prices benefit from low reporting transparency (because they face a low total audit probability anyway; see the explanations on Proposition 3 for details). Given that producer surplus equates expected MNC profit, i.e., the integral over all AL prices p, the "optimal" level of reporting transparency also depends on the distribution of AL prices. In our

numerical example, there is an interior maximum with low reporting transparency (yellow line in the bottom left panel of Figure 7).

[Insert Table 3 about here]

Table 3 summarizes our numerical results. The panel in the middle shows a benchmark scenario, where all MNCs report truthfully and there is no auditing. We study combinations of consistent-to-inconsistent standards ($\delta \in \{0, 0.7, 1.4\}$), and high-to-low reporting transparency ($\psi' \in \{-0, .36, -0.2, -0.04\}$).

Column 3 shows the minimum sales price for different parameter constellations. In all cases, the minimum sales prices are higher than the upper bounds of the AL price range, $\overline{p_i}$, which comports with common transfer pricing regulation. Column 4 shows the minimal and maximal production quantities. Column 8 shows expected net tax revenue, and Columns 5–7 display its components (nominal tax revenue, tax avoidance, audit cost). Finally, Columns 9 and 10 show producer and consumer surplus, respectively.

The example demonstrates that, with low reporting transparency ($\psi = -0.04$), overall social welfare declines as the inconsistency in standards grows, as shown in Column 10. Despite this loss in social welfare, individual countries benefit and experience an increase in net tax revenues, as indicated in Column 8. Notably, this occurs even though tax avoidance, referenced in Column 6, also rises.

Overall we show numerically that more reporting transparency in most cases benefits the foreign low-tax country, enhances total surplus, and reduces tax avoidance. The domestic high-tax country, however, may nevertheless prefer an intermediate level of reporting transparency if standards are inconsistent. Even though we cannot deduce these results analytically, in sensitivity analyses, they turn out to be robust toward parameter changes.

VI. CONCLUSIONS

We study how tax transfer pricing harmonization affects MNC's tax avoidance and production decisions in the presence of strategically acting tax authorities. Specifically we investigate how consistency of transfer pricing standards among countries and reporting transparency, for example, achieved by tax information exchange agreements or country-by-country reporting, affect profit at firm level and tax revenues at country level.

We analyze a separating equilibrium and find that tax avoidance can be reduced by making standards more consistent and that this effect is more pronounced for high reporting transparency. Furthermore, both standards consistency and reporting transparency affect MNC's production decision and in turn its profit. This effect depends on the specific AL price and can be positive or negative, shaping also tax revenues in the involved countries. Thus our model predicts, for example, that an increase in reporting transparency boosts firm profits under inconsistent standards but can increase or decrease them under consistent standards. In our numerical analysis, we reveal particularly surprising results at the country level. High reporting transparency, which yields more consistent reporting, does not uniformly enhance tax revenues for both countries. Specifically, while the low-tax country always prefers high reporting transparency, the high-tax country reaps benefits only when standards consistency complements high reporting transparency. Conversely, with inconsistent standards, the high-tax country may be better off with low reporting transparency. The findings should be tested empirically.

Maximizing global social welfare necessitates high levels of both reporting transparency and standards consistency. Nonetheless, through the lens of either the MNC or any single tax authority, the optimal level of reporting transparency might be intermediate or low. This misalignment of interests poses substantial challenges for international reforms aiming for high reporting transparency to curb tax avoidance.

Our contribution is threefold. First, we extend the literature on tax transfer pricing by modeling an MNC that can report inconsistent transfer prices. Second, we study the effects of transfer pricing harmonization, operationalized by two pivotal dimensions. We demonstrate that altering both

reporting transparency and standards inconsistency translates into real effects at the firm level and revenue and welfare effects at the aggregate levels. Third, we make a methodological contribution by demonstrating how the game-theoretic model on tax evasion with heterogenous taxpayers by Reinganum and Wilde (1986a) can be expanded to situations with two monitoring agencies that exchange information.

Ongoing legislative trends and initiatives to enhance standards consistency and reporting transparency as pursued by the Inclusive Framework, alongside technological innovations such as e-invoicing and blockchain, are steering the world toward a harmonized international tax regime. This trajectory, while advantageous for mitigating double taxation and tax avoidance, comes with caveats. Our research indicates that, despite high reporting transparency being conducive to increase global welfare, policymakers should be aware that this policy impinge on the tax revenues of high-tax importing countries if consistency is not maintained in standards, too.

When interpreting our results, keep in mind that we assume that an MNC's AL price is exogenously given. This assumption implies that we describe a short-term situation, in which an MNC cannot alter the AL price. In the long term, however, MNCs can influence the AL price of a given product by reallocating the functions, assets, and risks associated with production. Hence future research should endogenize this allocation decision to study a long-term situation.

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APPENDIX A — EVIDENCE ON TAX TRANSFER PRICING INCONSISTENCY

Anecdotal evidence made us aware that MNCs might report different transfer prices to the involved tax authorities. Since previous literature assumes that taxpayers report only one uniform tax transfer price to the tax authorities, we conducted an *online survey* of transfer pricing practitioners and several *expert interviews*[31] to back up our deviation from the usual consistency assumption.

We surveyed senior tax transfer pricing managers from major German multinational companies, distributing invitations through two professional networks[32] from Dec. 10, 2020, to Jan. 20, 2021. Of the 45 experts who participated anonymously, 23 completed the survey. Most have over 10 years of experience in this field, primarily holding a Master's degrees, and 26.1 percent with a Ph.D., dedicating about 70 percent of their work time to tax transfer pricing. The results are summarized in Figure 4. 78.3 percent explained that they have indeed reported different tax transfer prices across countries, with 43.5 percent having reported inconsistent prices occasionally or more often. All experienced transfer pricing inconsistencies during audits, with 87 percent encountering this (very) often. Double taxation is a common issue, while undertaxation is rare. Most double taxation cases—but by no means all—can be mitigated through mutual agreement procedures. However, participants noted a strong increase in double taxation due to transfer pricing differences in the past five years and anticipate further escalation.

[Insert Table 4 and Table 5 about here]

Further, we conducted six semi-structured expert interviews with German multinational company representatives, Big4 tax advisory firms, and the German Federal Central Tax Office (BZSt) emphasizing the importance of inconsistencies in transfer pricing regimes and reports. Experienced

[31] The Ethics Committee approved the survey and interviews on 14 July 2021.

[32] The Taxation Committee of the German Chemical Industry Association (German: Verband der Chemischen Industrie e.V. (VCI).) distributed the link to more than 20 tax managers of multinational companies in the chemical industry which represent about 30 percent of the DAX companies, as well as several M-DAX companies and multinational family businesses. Further, we distributed the survey via the Transfer Pricing working group of the German Consortium for Economic Management (German: Arbeitsgemeinschaft für wirtschaftliche Verwaltung e.V.), which covers all industries and is a non-profit association funded by the German Federal Ministry for Economic Affairs and Climate Action.

in transfer pricing, the interviewees answered our specific questions but could also provide additional context. The interviews were scheduled for 30 minutes and typically lasted 35 minutes, with one extending to 95 minutes. They were conducted over the phone by the same author. We ensured confidentiality, promising not to publish any identifying details. The candid nature of the responses is evident, and Table 5 categorizes these by topic.

APPENDIX B — PROOFS

Proof of Proposition 1

In general, we proceed similar to Reinganum and Wilde (1986a, p. 750) on a unilateral situation (and for the case of constant/linear audit costs).

Since, with constant audit costs, both tax authorities are indifferent between auditing and not auditing on the equilibrium path and in the region M, their second-order conditions are equal to zero. The MNC's second-order conditions are given by

$$\frac{\partial^2 \Pi}{\partial p_d^{r2}} = -q\theta_d \tau_d \left(p_d^r - p_d\right) \frac{\partial^2 a_d}{\partial p_d^{r2}} - q\theta_f \tau_f \left(p_f - p_f^r\right) \frac{\partial^2 a_f}{\partial p_d^{r2}} - 2q\theta_d \tau_d \frac{\partial a_d}{\partial p_d^r} \leq 0,$$
$$\frac{\partial^2 \Pi}{\partial p_f^{r2}} = -q\theta_d \tau_d \left(p_d^r - p_d\right) \frac{\partial^2 a_d}{\partial p_f^{r2}} - q\theta_f \tau_f \left(p_f - p_f^r\right) \frac{\partial^2 a_f}{\partial p_f^{r2}} + 2q\theta_f \tau_f \frac{\partial a_f}{\partial p_f^r} \leq 0.$$

Since we cannot analytically solve the coupled PDE system, we cannot in general ensure that the MNC's second-order conditions always hold. Given the boundary conditions, $\frac{\partial a_d}{\partial p_d^r} > 0, \frac{\partial a_f}{\partial p_f^r} < 0$ needs to be true in a neighbourhood of $\underline{p_d^r}$ and $\overline{p_f^r}$, respectively, and our numerical examples suggest that this relations hold throughout the domain of $a_d^\star$ and $a_f^\star$. The second-order conditions are fulfilled in our numerical examples. Also, $a_d' > 0$ and $a_f' < 0$ in the special case $\psi' = 0$, see (22) and (23).

If the second-order conditions hold, by construction, reports p_d^{r*}, p_f^{r*} are optimal given the tax authorities' audit functions. Thus, while both tax authorities are indifferent between auditing and not auditing for equilibrium path reports p_d^{r*}, p_f^{r*} *and* off-equilibrium reports $(p_d^r, p_f^r) \in M$, the MNC prefers equilibrium path reports over all reports $(p_d^r, p_f^r) \in M$ that are not (p_d^{r*}, p_f^{r*}).

Simply speaking, for reports within M the tax authorities' beliefs move along with the reports such as to keep them indifferent (light green set M in Figure 3). As the reports hit the boundaries of M, however, the beliefs become fixated: Since it is common knowledge that $\underline{p_i}$ is the lowest existing AL price, no report can bring the domestic tax authority to belief that the report comes from a nonexistent type $< \underline{p_d}$ (and similarly for high reports, and for the foreign tax authority). Thus, for reports outside of M (white and gray areas in Figure 3), the tax authorities' beliefs become constants ($\overline{p_i}$ or $\underline{p_i}$). Inserting a constant belief μ_i^c, observe that the left-hand side of the domestic tax authority's first-order condition (4) increases in p_d^r, and the left-hand side of the foreign tax authority's first-order condition (5) decreases in p_d^f:

$$\frac{d}{dp_d^r}\left(\tau_d\theta_d q(p_d^r-\mu_d^c)-b_d\psi(p_d^r-p_f^r)\right)=\tau_d\theta_d q-b_d\psi'>0, \tag{13}$$

$$\frac{d}{dp_f^r}\left(\tau_f\theta_f q(\mu_f^c-p_f^r)-b_f\psi(p_d^r-p_f^r)\right)=-\tau_f\theta_f q+b_f\psi'<0. \tag{14}$$

We will first investigate the tax authorities' optimal behavior when they observe reports in the set $\mathbb{R}^2\setminus M$ and subsequently study the MNC's respective best responses.

Domestic Tax Authority By construction, the domestic tax authority is indifferent (equivalently, its first-order condition is zero) for reports in the area M. For reports on $\underline{p_d^r}(p_f^r)$ it is also indifferent, and its belief is $\underline{p_d}$. If p_d^r falls below $\underline{p_d^r}(p_f^r)$, according to (13), its first-order condition becomes negative, and, consequently, it audits with probability 0 (area $\underline{M_d}$). If p_d^r rises above $\underline{p_d^r}(p_f^r)$ (reports are in $\mathbb{R}^2\setminus\{M\cup\underline{M_d}\cup\overline{M_d}\}$), the domestic tax authority's first-order condition becomes positive and it audits with probability 1. Finally, for reports on $\overline{p_d^r}(p_f^r)$, it is indifferent, and its belief is $\overline{p_d}$. If p_d increases (reports are in $\overline{M_d}$), its first-order condition becomes positive and it audits always.

Foreign Tax Authority The same reasoning applies. The foreign tax authority is indifferent if reports are on $\overline{p_f^r}(p_d^r)$ alongside with belief $\overline{p_f}$. Since the left-hand side of the foreign tax authority's first-order condition—given a constant belief—decreases in p_f^r (c.f. eq. 14), if p_f^r rises above $\overline{p_f^r}(p_d^r)$, the foreign tax authority's optimal action is to audit with probability zero (area $\overline{M_f}$). In

contrast, if p_f^r falls (reports are in $\mathbb{R}^2 \setminus \{M \cup \overline{M_f} \cup \underline{M_d}\}$), the first-order condition becomes positive and the foreign tax authority audits. Finally, the foreign tax authority is indifferent between auditing and not auditing for reports on $\underline{p_f^r}(p_d^r)$ alongside with belief $\underline{p_f}$. If p_f^r decreases further, the foreign tax authority audits with probability 1.

MNC We now show that it is not optimal for the MNC to report in the off-equilibrium region $\mathbb{R}^2 \setminus M$. We first show that Π is either continuous or jumps downwards from M to $\mathbb{R}^2 \setminus M$ by comparing Π given reports on the boundary of M with Π given reports slightly outside of M. We then use the derivatives with respect to the reports to show that the MNC would not report in $\mathbb{R}^2 \setminus M$.

Consider first reports $(p_d^{r1}, p_f^{r1}) \in \underline{M_d} \cap \overline{M_f}$. Both tax authorities do not audit these reports. We have $\lim_{\varepsilon \to 0} \Pi(p_d^{rx} - \varepsilon, p_f^{rx} + \varepsilon, 0, 0) = \Pi(p_d^{rx}, p_f^{rx}, a_d^\star(p_d^{rx}, p_f^{rx}), a_f^\star(p_d^{rx}, p_f^{rx}))$ with (p_d^{rx}, p_f^{rx}) the single element of $\overline{p_f^r}(p_d^r) \cap \underline{p_d^r}(p_f^r)$, that is, Π is continuous between M and $\underline{M_d} \cap \overline{M_f}$. Verbally, (p_d^{rx}, p_f^{rx}) is the combination of reports that is located on the top left corner of M, were both tax authorities audit with probability zero. $\lim_{\varepsilon \to 0}(p_d^{rx} - \varepsilon, p_f^{rx} + \varepsilon)$ are reports that are located slightly outside M and inside $\underline{M_d} \cap \overline{M_f}$, that are also audited with probability zero. Furthermore, $\frac{\partial \Pi(p_d^{r1}, p_f^{r1}, 0, 0)}{p_d^r} = \tau_d q > 0, \frac{\partial \Pi(p_d^{r1}, p_f^{r1}, 0, 0)}{p_f^r} = -\tau_f q < 0$, thus, the MNC would like to increase the domestic report and decrease the foreign report.

Next, regard reports $(p_d^{r2}, p_f^{r2}) \in \overline{M_d} \cap \underline{M_f}$. Both tax authorities always audit these reports. If the MNC reports the single element $(p_d^{ry}, p_f^{ry}) \in \overline{p_d^r}(p_d^r) \cap \underline{p_f^r}(p_f^r)$, both tax authorities audit with a probability between zero and one. Reporting $(p_d^{ry} + \varepsilon, p_f^{ry} - \varepsilon)$, for small ε, causes both audit probabilities to jump to 1, and, thus MNC profit jumps downwards. To conclude the argument, we have $\frac{\partial \Pi(p_d^{r2}, p_f^{r2}, 1, 1)}{p_d^r} = -\tau_d q(\theta_d - 1) < 0, \frac{\partial \Pi(p_d^{r2}, p_f^{r2}, 1, 1)}{p_f^r} = \tau_f q(\theta_f - 1) > 0$, thus, the MNC aims to decrease the domestic report and increase the foreign report. Similar reasoning applies to reports in $\overline{M_d} \setminus \{\underline{M_f} \cup \overline{M_f}\}$, and in $\underline{M_f} \setminus \{\underline{M_d} \cup \overline{M_d}\}$, that are also audited with probability 1 in both countries.

Reports $(p_d^{r3}, p_f^{r3}) \in \overline{M_f} \setminus \{\underline{M_d} \cup \overline{M_d}\}$ are audited with probability 1 (0) by the domestic (foreign) tax authority. Similar to the above reasoning, consider reports on $\overline{p_f^r}(p_d^r)$ (on the "upper border" of M). These reports are audited with probability 0 by the foreign tax authority, and with a probability

between 0 and 1 by the domestic tax authority. Slightly increasing the foreign report causes the domestic audit probability to jump to 1, which implies a downward jump in Π. In addition, we have $\frac{\partial \Pi(p_d^{r3},p_f^{r3},1,0)}{p_d^r} = -\tau_d q(\theta_d - 1) < 0, \frac{\partial \Pi(p_d^{r3},p_f^{r3},1,0)}{p_f^r} = -\tau_f q < 0$, thus, the MNC would like to decrease both the domestic and foreign report. Similar reasoning applies to reports in $\overline{M_d} \cap \overline{M_f}$.

Finally, consider reports $(p_d^{r4}, p_f^{r4}) \in \underline{M_d} \setminus \{\underline{M_f} \cup \overline{M_f}\}$ that are audited with probability 1 (0) by the foreign (domestic) tax authority. Reports on $\underline{p_d^r}(p_f^r)$ (the "left border" of M) are audited with a probability between 0 and 1 by the foreign tax authority, and with probability 0 by the domestic tax authority. Slightly decreasing the domestic report causes the foreign audit probability to jump to 1, hence, Π jumps downwards. $\frac{\partial \Pi(p_d^r,p_f^r,0,1)}{p_d^r} = \tau_d q > 0, \frac{\partial \Pi(p_d^r,p_f^r,0,1)}{p_f^r} = \tau_f q(\theta_f - 1) > 0$ implies that the MNC aims to increase both reports. Similar reasoning applies to reports in the set $\underline{M_d} \cap \underline{M_f}$.

Thus, it is not optimal for the MNC to report in $\mathbb{R}^2 \setminus M$. Also—since we exclude negative penalties—, it can not be optimal for the MNC to report $p_d^r < p_d$ and / or $p_f^r > p_f$, because it would always be possible to costlessly save taxes by increasing p_d^r to p_d and decreasing p_f^r to p_f. □

Proof of Proposition 2

Given the requirement $\mu_d = p_d, \mu_f = p_f$, and applying $p_d = p, p_f = p + \delta$, we obtain from Equations (6) and (7) the system

$$\begin{aligned} FOC_d &\equiv \tau_d \theta_d q(p_d^r - p) - b_d \psi(p_d^r - p_f^r) = 0 \\ FOC_f &\equiv \tau_f \theta_f q(p + \delta - p_f^r) - b_f \psi(p_d^r - p_f^r) = 0. \end{aligned} \tag{15}$$

Let $FOC = \begin{pmatrix} FOC_d & FOC_f \end{pmatrix}^\intercal, p^r = \begin{pmatrix} p_d^r & p_f^r \end{pmatrix}^\intercal$, and denote $J_{FOC} = \frac{dFOC}{dp^r}$ the Jacobian matrix of the system (15). Finally, $\frac{dFOC}{dz} = \begin{pmatrix} \frac{\partial FOC_d}{\partial z} & \frac{\partial FOC_f}{\partial z} \end{pmatrix}^\intercal$ is a vector of negative partial derivatives with respect to exogenous variable z (where z stands for one of the exogenous variables δ, q). The Jacobian determinant $\det(J_{FOC}) = (b_f q \theta_d \tau_d + b_d q \theta_f \tau_f)\psi' - q^2 \theta_d \tau_d \tau_f \theta_f < 0$ is different from zero. Thus, by the implicit function theorem, the derivatives of the equilibrium reports p_d^*, p_f^* with respect to exogenous variable z in a neighbourhood of the equilibrium values are given by $-J_{FOC}^{-1} \cdot \frac{dFOC}{dz}$.

Influence of standards inconsistency The implicit derivatives of p_d^r and p_f^r with respect to δ are given by $1 > \frac{\partial p_d^{r*}}{\partial \delta} = -b_d \tau_f \theta_f \psi' \cdot Z \geq 0$, and $1 \geq \frac{\partial p_f^{r*}}{\partial \delta} = (-b_d \tau_f \theta_f \psi' + \theta_d q \tau_d \tau_f \theta_f) Z > 0$, where $Z \equiv 1/(-\psi' \cdot (b_d \tau_f \theta_f + b_f \theta_d \tau_d) + \theta_d q \tau_d \tau_f \theta_f) > 0$. Both derivatives are positive (recall that per assumption $\psi' \leq 0$), smaller than 1, and it is easy to see that $\frac{\partial p_d^{r*}}{\partial \delta} < \frac{\partial p_f^{r*}}{\partial \delta}$. Following Definition 2, a change in reporting inconsistency is given by $\frac{\partial p_d^{r*}}{\partial \delta} - \frac{\partial p_f^{r*}}{\partial \delta}$. We obtain $-1 \leq \frac{\partial p_d^{r*}}{\partial \delta} - \frac{\partial p_f^{r*}}{\partial \delta} = -\theta_d q \tau_d \tau_f \theta_f Z < 0$. Thus, higher standards inconsistency reduces reporting inconsistency.

Next, a change in tax avoidance in the domestic and foreign country is given by $\tau_d q \frac{\partial p_d^{r*}}{\partial \delta} = -b_d q \tau_d \tau_f \theta_f \psi' \cdot Z \geq 0$, and $\tau_f q \left(1 - \frac{\partial p_f^{r*}}{\partial \delta}\right) = -b_f q \tau_d \tau_f \theta_d \psi' \cdot Z \geq 0$, respectively. Tax avoidance increases stronger in the domestic than in the foreign country iff $b_d \theta_f > b_f \theta_d$.

Influence of production quantity Implicitly differentiating p_d^{r*} and p_f^{r*} with respect to q gives $\frac{\partial p_d^{r*}}{\partial q} = \frac{-q\theta_d \tau_d \theta_f \tau_f \left(p_d^{r*} - p\right) + \psi' \cdot d\theta_d \tau_d \left(p_d^{r*} - p\right) - \psi' \cdot b_d \theta_f \tau_f \left(p + \delta - p_f^{r*}\right)}{qZ^{-1}} = -\frac{\psi \cdot b_d \theta_f \tau_f}{qZ^{-1}} < 0$, and $\frac{\partial p_f^{r*}}{\partial q} = \frac{q\theta_d \tau_d \theta_f \tau_f \left(p + \delta - p_f^{r*}\right) + \psi' b_f \theta_d \tau_d \cdot \left(p_d^{r*} - p\right) - \psi' b_d \theta_f \tau_f \cdot \left(p + \delta - p_f^{r*}\right)}{qZ^{-1}} = \frac{\psi \cdot b_f \theta_d \tau_d}{qZ^{-1}} > 0$. In the second steps we make use of the tax authorities' first-order conditions and Definition 1 c); namely, we introduce $p = \mu_d = p_d^{r*} - \frac{b_d \psi}{q \tau_d \theta_d}, p + \delta = \mu_f = p_f^{r*} + \frac{b_f \psi}{q \tau_f \theta_f}$.

The change in reporting inconsistency after an increase of production quantity is given by $\frac{\partial p_d^{r*}}{\partial q} - \frac{\partial p_f^{r*}}{\partial q} = -\psi \cdot (b_d \theta_f \tau_f + b_f \theta_d \tau_d) Z/q < 0$.

The change in tax avoidance is given by $\frac{d}{dq}(\tau_d q (p_d^{r*} - p)) = \tau_d \left(p_d^{r*} - p + q \frac{\partial p_d^{r*}}{\partial q}\right) = -b_d(\delta + p_d^{r*} - p_f^{r*}) \tau_d \tau_f \theta_f \psi' \cdot Z > 0$ in the domestic country, and in the foreign country by $\frac{d}{dq}(\tau_f q (p + \delta - p_f^{r*})) = \tau_f \left(p + \delta - p_f^{r*} - q \frac{\partial p_f^{r*}}{\partial q}\right) = -b_f(\delta + p_d^{r*} - p_f^{r*}) \theta_d \tau_d \tau_f \psi' \cdot Z > 0$.

Influence of AL price The derivatives with respect to p are $\frac{\partial p_d^{r*}}{\partial p} = \frac{\partial p_f^{r*}}{\partial p} = 1$. Therefore, reporting inconsistency and tax avoidance in both countries are not affected by a change in AL prices. □

Proof of Proposition 3

Define the value function $V(p, \delta) \equiv \Pi^* (q^*; p, \delta)$.

a) Using the envelope theorem, the condition for an extremum $\frac{\partial V^*}{\partial p} = 0$ gives $q^*(\tau_d - \tau_f) + \psi(\delta^r)\left(-b_d\frac{\partial a_d^*}{\partial p} - b_f\frac{\partial a_f}{\partial p}\right) = 0$. Rearranging delivers the equation stated in the Proposition. Furthermore, $\frac{\partial^2\Pi^*(q^*(p);p,\delta,\psi)}{\partial p^2} = \Pi^*_{pp} + (q^*)''\Pi^*_q + (q^*)'\Pi^*_{qp} + (q^*)'\left(\Pi^*_{qp} + (q^*)'\Pi^*_{qq}\right)$, where subscripts denote partial derivatives. From the first-order condition we know that $\Pi^*_q\big|_{q=q^*} = 0$; implicitly differentiating with respect to p gives $(q^*)' = -\frac{\Pi^*_{qp}}{\Pi^*_{qq}}$. Using these results gives $\frac{\partial^2\Pi^*}{\partial p^2} = \Pi^*_{pp} - \frac{\left(\Pi^*_{qp}\right)^2}{\Pi^*_{qq}}$. If the second-order condition holds, $\Pi^*_{qq} < 0$, hence, the second term is positive. Finally, $\Pi^*_{pp} = \psi(\delta^r)\left(-b_d\frac{\partial^2 a_d^*}{\partial p^2} - b_f\frac{\partial^2 a_f^*}{\partial p^2}\right)$. The second derivatives of the audit functions are negative for $\psi' = 0$ (Appendix C). In our numerical simulations we have found their weighted sum to be negative.

b) Again using the envelope theorem, $\frac{\partial V}{\partial \delta} = -\tau_f q + \left(b_d\left(\frac{1}{\theta_d} - a_d^*\right) + b_f\left(\frac{1}{\theta_f} - a_f^*\right)\right)\psi'(\delta^r)\frac{\partial \delta^r}{\partial \delta} - \left(b_d\frac{\partial a_d^*}{\partial \delta} + b_f\frac{\partial a_f^*}{\partial \delta}\right)\psi(\delta^r)$. As a direct effect, higher foreign standards reduce profit via higher tax payments (first term). As a second effect, however, higher standards inconsistency reduces reporting inconsistency ($\frac{\partial \delta^r}{\partial \delta} < 0$, c.f. Proposition 2 a)), which in turn increases the tax authorities' audit costs ($\psi' < 0$ by assumption). Therefore, the marginal benefit from tax avoidance increases (second term). Finally, increasing standards inconsistency affects audit probabilities (third term).

In the special case $\psi(\cdot) = \psi_0$, we have $\psi' = 0$, and the audit functions no longer depend on δ (c.f. Appendix C). Thus, the second and third terms vanish and the derivative is negative ($\frac{\partial V}{\partial \delta} = -\tau_f q$).

c) Let Ψ denote a parameter that describes shape of the transparency function, formally, $\psi(\delta^r, \Psi)$, with $\frac{\partial \psi}{\partial \Psi}\Big|_{\delta^r > 0} < 0$, $\frac{\partial \psi}{\partial \Psi}\Big|_{\delta^r < 0} > 0$. Using the envelope theorem, one obtains $\frac{\partial V}{\partial \Psi} = \left(b_d\left(\frac{1}{\theta_d} - a_d^*\right) + b_f\left(\frac{1}{\theta_f} - a_f^*\right)\right)\left(\frac{\partial \psi}{\partial \Psi} + \frac{\partial \psi}{\partial \delta^r}\frac{\partial \delta^r}{\partial \Psi}\right) - \left(b_d\frac{\partial a_d^*}{\partial \Psi} + b_f\frac{\partial a_f^*}{\partial \Psi}\right)\psi(\delta^r) = \left(b_d\left(\frac{1}{\theta_d} - a_d^*\right) + b_f\left(\frac{1}{\theta_f} - a_f^*\right)\right) \times$ $\times q\theta_d\tau_d\tau_f\theta_f Z\frac{\partial \psi}{\partial \Psi} - \left(b_d\frac{\partial a_d^*}{\partial \Psi} + b_f\frac{\partial a_f^*}{\partial \Psi}\right)\psi(\delta^r)$. The sign of the first term depends on whether reporting inconsistency is negative ($\delta^r < 0$, i.e., double taxation), or positive. With double taxation, higher Ψ increases the tax authorities' audit costs, which is beneficial for the MNC and increases profit. If reporting inconsistency is positive (tax avoidance), higher Ψ decreases the audit costs, which reduces profit. The second term's sign depends on the audit functions and is indeterminate.

In the special case $\psi(\cdot) = \psi_0 \equiv -\Psi$, $\frac{\partial \psi}{\partial \delta^r} = 0$, $\frac{\partial \psi}{\partial \Psi} = -1$, and getting the derivatives of the audit functions from Appendix C shows $\frac{\partial a_d^*}{\partial \Psi} > 0$, $\frac{\partial a_f^*}{\partial \Psi} > 0$, thus, $\frac{\partial V}{\partial \Psi} < 0$. □

APPENDIX C — SPECIAL CASE: $\psi' = 0$

With $\psi' = 0$, the tax authorities' audit costs no longer depend on the size of the difference of the reports and we can simply write $\psi(p_f^r - p_f^r) \equiv \psi_0$. Furthermore, the domestic (foreign) tax authority's point belief and audit probability only depends on the domestic (foreign) report.

The tax authorities' first-order conditions (4) and (5) are then given by

$$\frac{\partial T_d}{\alpha_d} = \tau_d \theta_d q(p_d^r - \mu_d(p_d^r)) - \psi_0 b_d = 0, \tag{16}$$

$$\frac{\partial T_f}{\partial \alpha_f} = \tau_f \theta_f q(\mu_f(p_f^r) - p_f^r) - \psi_0 b_f = 0, \tag{17}$$

and MNC's first-order conditions (6) and (7) are given by

$$\frac{\partial \Pi}{\partial p_d^r} = -q\theta_d \tau_d \left(p_d^r - p_d\right) a_d'\left(p_d^r\right) - q\theta_d \tau_d a_d\left(p_d^r\right) + q\tau_d = 0, \tag{18}$$

$$\frac{\partial \Pi}{\partial p_f^r} = -q\theta_f \tau_f \left(p_f - t_f\right) a_f'\left(t_f\right) + q\theta_f \tau_f a_f\left(t_f\right) - q\tau_f = 0. \tag{19}$$

We obtain from (16) and (17) $\mu_d(p_d^r) = p_d^r - \frac{\psi_0 b_d}{\tau_d \theta_d q}, \mu_f(p_f^r) = p_f^r + \frac{\psi_0 b_f}{\tau_f \theta_f q}$, and, setting $\mu_d = p_d, \mu_f = p_f$ (part c) of Definition 1), $p_d^{r*} = p_d + \frac{\psi_0 b_d}{\tau_d \theta_d q}, p_f^{r*} = p_f - \frac{\psi_0 b_f}{\tau_f \theta_f q}$. We proceeding as explained in the main text. Introducing the beliefs obtained from the tax authorities' first-order conditions into (18) and (19), we obtain the first order non-homogeneous linear differential equations

$$-\psi_0 b_d a_d'(p_d^r) - q a_d(p_d^r)\theta_d \tau_d + q\tau_d = 0, \tag{20}$$

$$-\psi_0 b_f a_f'(p_f^r) + q\theta_f \tau_f a_f(p_f^r) - q\tau_f = 0. \tag{21}$$

We show the solution exemplary for (20). A solution can be found, e.g., by means of an integrating factor.[33] Writing for convenience $z \equiv \frac{q\tau_d}{\psi_0 b_d}$, the standard form of (20) is given by $a_d' + \theta_d z a_d = z$.

[33] This is a standard solution method for first order non-homogeneous linear differential equations. In general terms, one multiplies through with the integrating factor $e^{\int \pi(s)ds}$, where $\pi(s)$ is the coefficient of the function one searches for (in our case the coefficient of $a_d(p_d^r)$, hence $\pi(p_d^r) = \theta_d z$), and then observes that the left-hand side can be seen as a derivative computed by the product rule.

Multiplying through with the integrating factor $e^{\theta_d z p_d^r}$ gives $e^{\theta_d z p_d^r} a_d' + \theta_d z e^{\theta_d z p_d^r} a_d = e^{\theta_d z p_d^r} z \Leftrightarrow \frac{d}{dp_d^r}\left(e^{\theta_d z p_d^r} a_d\right) = e^{\theta_d z p_d^r} z$. Integrating both sides delivers $e^{\theta_d z p_d^r} a_d = \frac{1}{\theta_d} e^{\theta_d z p_d^r} + C \Leftrightarrow a_d(p_d^r) = \frac{1}{\theta_d} + e^{-\theta_d z p_d^r} C$, where C is a constant. The boundary condition for this differential equation is given by $a_d(\underline{p_d^r}) = 0$. This is justified by the domestic tax authority's belief that any report $p_d^r < \underline{p_d^r}$ comes from type $\underline{p_d}$. This gives $C = -\frac{1}{\theta_d} e^{\theta_d z \underline{p_d^r}}$, and, hence, $a_d(p_d^r) = \frac{1}{\theta_d}\left(1 - e^{-\frac{\theta_d q \tau_d}{\psi_0 b_d}(p_d^r - \underline{p_d^r})}\right)$.

The solution to (21) is similar; in this case the integration constant is determined by the foreign tax authority's belief that any report $p_f^r > \overline{p_f^r}$ comes from type $\overline{p_f}$, thus, $a_f(\overline{p_f^r}) = 0$, and one obtains $a_f(p_f^r) = \frac{1}{\theta_f}\left(1 - e^{-\frac{\theta_f \tau_f q}{b_f \psi_0}\left(\overline{p_f^r} - p_f^r\right)}\right)$. The MNC's second-order conditions are given by

$$\frac{\partial^2 \Pi}{\partial p_d^{r2}} = -q\theta_d \tau_d \left(p_d^r - p_d\right) a_d''\left(p_d^r\right) - 2q\theta_d \tau_d a_d'\left(p_d^r\right) < 0, \tag{22}$$

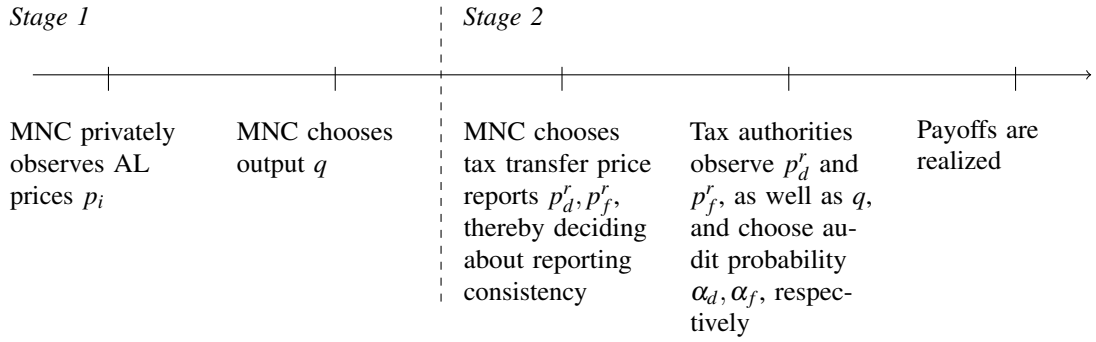
$$\frac{\partial^2 \Pi}{\partial p_f^{r2}} = -q\theta_f \tau_f \left(p_f - p_f^r\right) a_f''\left(p_f^r\right) + 2q\theta_f \tau_f a_f'\left(p_f^r\right) < 0. \tag{23}$$

Introducing the tax authorities' equilibrium audit policies and the MNC's tax transfer price reports gives $\frac{\partial^2 \Pi}{\partial p_d^{r2}} = -\frac{\theta_d q^2 \tau_d^2 e^{-\frac{\theta_d q \tau_d \left(p_d - \underline{p_d}\right)}{\psi_0 b_d}}}{\psi_0 b_d} < 0, \frac{\partial^2 \Pi}{\partial p_f^{r2}} = -\frac{q^2 \theta_f \tau_f^2 e^{-\frac{q\theta_f \tau_f \left(\overline{p_f} - p_f\right)}{\psi_0 b_f}}}{\psi_0 b_f} < 0$. Thus, the MNC's equilibrium report is optimal. In contrast, the tax authorities' second order conditions are equal to zero, which implies that in equilibrium they are indifferent.Checking the respective incentives of MNC and tax authorities for out-of-equilibrium reports is similar as shown in Proof of Proposition 1.

COROLLARY 1. *With fixed audit costs and $\psi(\cdot) = \psi_0$, the domestic audit function increases, and the foreign audit function decreases in the reported transfer price. Both audit functions are concave in the reported transfer prices. The equilibrium path audit functions $a_i(p_i^{r*})$ increase in q.*

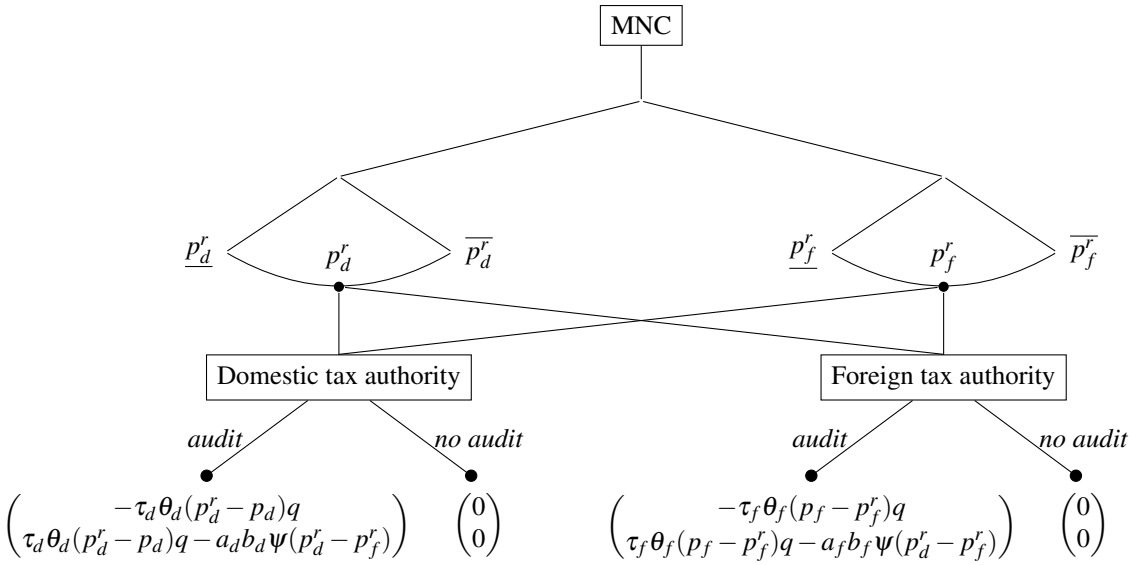
Proof. Differentiating with respect to the reported transfer prices gives $\frac{\partial a_d}{\partial p_d^r} = \frac{q\tau_d e^{-\frac{q\theta_d \tau_d \left(p_d^r - \underline{p_d^r}\right)}{\psi_0 b_d}}}{\psi_0 b_d} > 0, \frac{\partial a_f}{\partial p_f^r} = -\frac{q\tau_f e^{-\frac{q\theta_f \tau_f \left(\overline{p_f^r} - p_f^r\right)}{\psi_0 b_f}}}{\psi_0 b_f} < 0, \frac{\partial^2 a_d}{\partial (p_d^r)^2} = -\frac{q^2 \theta_d \tau_d^2 e^{-\frac{q\theta_d \tau_d \left(p_d^r - \underline{p_d^r}\right)}{\psi_0 b_d}}}{\psi_0^2 b_d^2} < 0, \frac{\partial^2 a_f}{\partial (p_f^r)^2} = -\frac{q^2 \theta_f \tau_f^2 e^{\frac{q\theta_f \tau_f \left(p_f^r - \overline{p_f^r}\right)}{b_f \psi_0}}}{b_f^2 \psi_0^2} < 0$. Differentiating with respect to quantity q gives $\frac{\partial a_d(p_d^{r*})}{\partial q} = \frac{\tau_d (p - \underline{p}) e^{-\frac{q\theta_d \tau_d (p - \underline{p})}{\psi_0 b_d}}}{\psi_0 b_d} > 0, \frac{\partial a_f(p_f^{r*})}{\partial q} = \frac{\tau_f (\overline{p} - p) e^{-\frac{q\theta_f \tau_f (\overline{p} - p)}{\psi_0 b_f}}}{\psi_0 b_f} > 0$. □

Figure 1: Timeline of Events



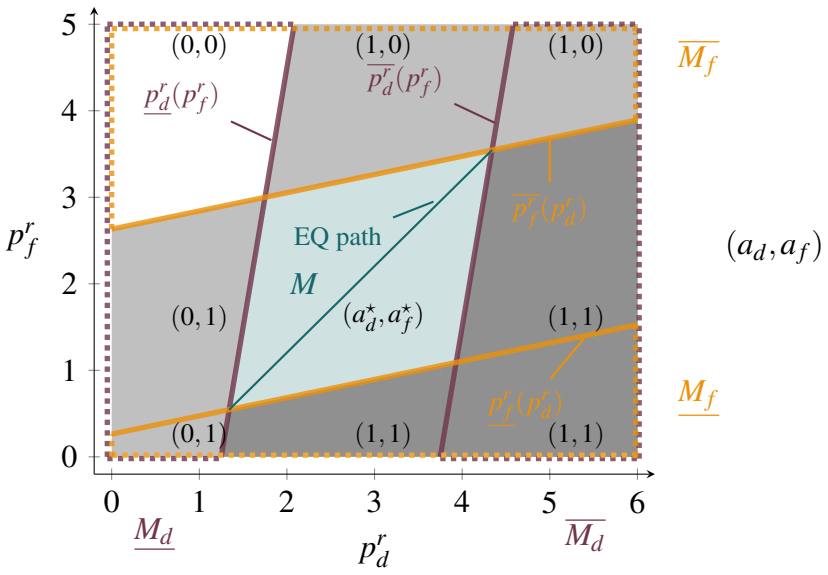
Note: After privately observing AL prices $p_d, p_f = p_d + \delta$, the MNC decides on the quantity to be produced and sold in the domestic market. The determination of the optimal quantity is referred to as *stage one.* Second, the MNC sets the tax transfer prices and submits an income report alongside with a transfer pricing documentation, which informs the tax authorities about the reported tax transfer prices p_d^r and p_f^r, and quantity q. Subsequently, both tax authorities decide about the audit probability. This process is referred to as *stage two.* Finally, payoffs are realized.

Figure 2: Strategies



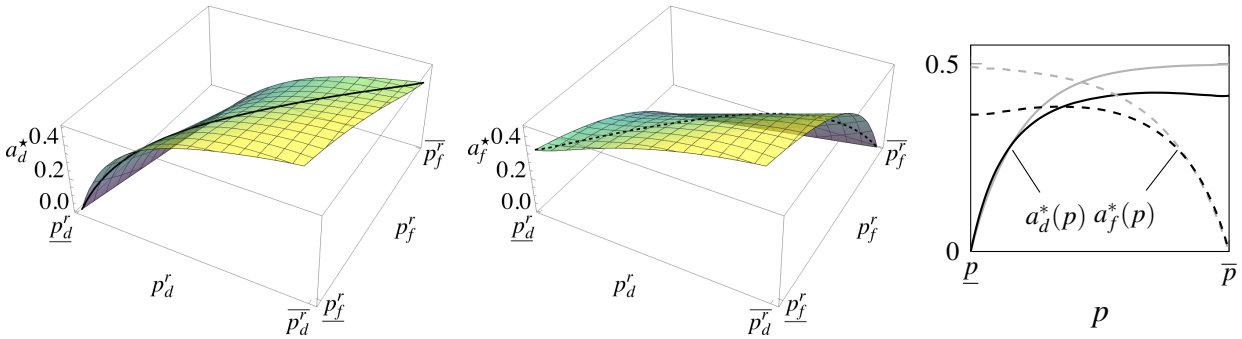
Note: This figure shows the strategies of the MNC and the domestic and foreign tax authorities. Given a production quantity q, the MNC chooses a vector of reported tax transfer prices (p_d^r, p_f^r) and submits an income report alongside with a transfer pricing documentation, which informs the tax authorities about the (reported) transfer prices and quantity q. The tax authority receives the reports and additional bilateral tax information provided via tax transparency devices such as Tax Information Exchange Agreements or Country by Country Reporting. Subsequently, both tax authorities decide on the audit probability. Tax authorities' audit costs are reduced by the factor $\psi(\cdot)$ depending on the level of inconsistency of the reports, i.e., the difference $p_d^r - p_f^r$. Payoffs are realized. For simplicity, we only depict the payoffs that are directly determined by the tax authorities' audit decisions.

Figure 3: Equilibrium and Out-of-Equilibrium Regions



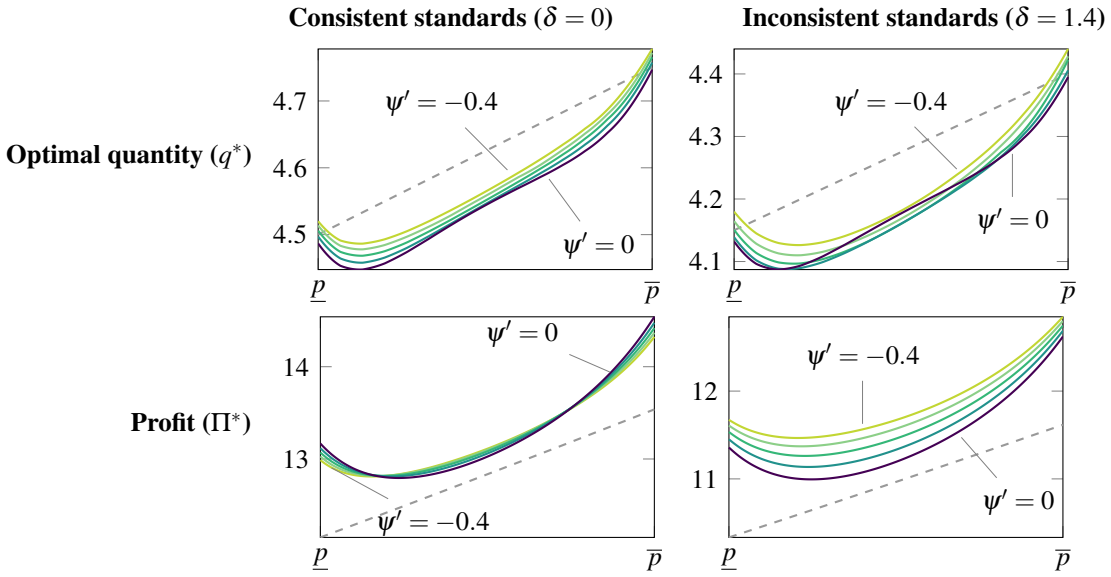
Note: The green diagonal line shows the combinations of observable domestic (p_d^{r*}) and foreign reported transfer prices (p_f^{r*}) (equilibrium path). The light green set M encompasses combinations of off-equilibrium reports that are audited in *both* countries with probabilities according to $a_d^\star$ and $a_f^\star$, respectively. The other eight sets bring both tax authorities to believe that either $\underline{p}_i$ or $\overline{p}_i$ is at hand. Darker shades of gray indicate a larger overall audit probability. Audit probabilities are shown in brackets. The areas outlined in purple (yellow) indicate the sets of reports that are too low ($\underline{M}_i$) and too high ($\overline{M}_i$) from the perspective of tax authority i. Dotted lines indicate that the sets extend to infinity.

Figure 4: Equilibrium Audit Functions.



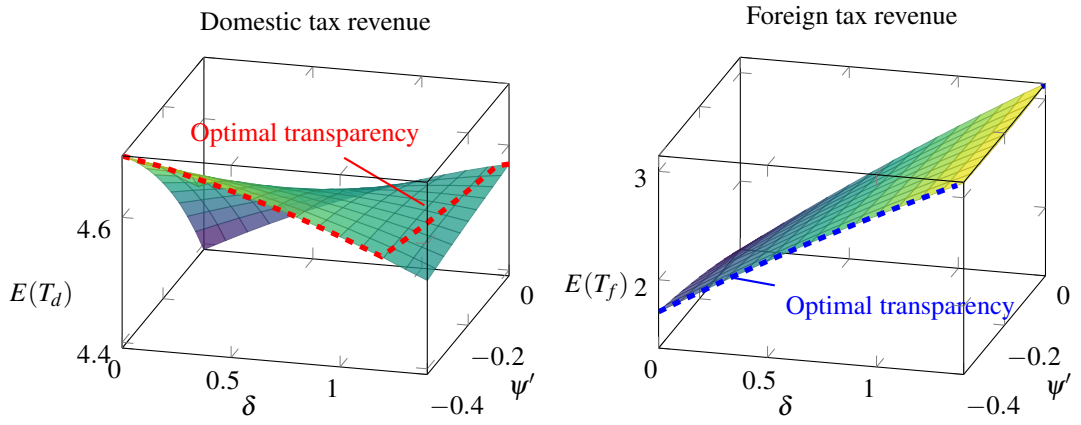
Note: Equilibrium audit functions of the domestic ($a_d^\star$, left panel) and foreign ($a_f^\star$, middle panel) tax authorities, depending on the domestic (p_d^r) and foreign report (p_f^r). The black solid (dashed) line indicates the equilibrium path in the domestic (foreign) country. We use the baseline parameter values shown in Table 2 and assume a production quantity $q = 4.42$. Right panel: Equilibrium path audit functions of the domestic (solid line) and foreign (dashed line) tax authority, depending on the AL price p. $a_d^*(p)$ and $a_f^*(p)$ are calculated given profit maximizing production quantity q as determined in Section IV. The light gray lines show the analytical solution to the audit functions for $\psi' = 0$ (see Appendix B).

Figure 5: Firm Level Effects of AL Price, Reporting Transparency, and Standards Inconsistency.



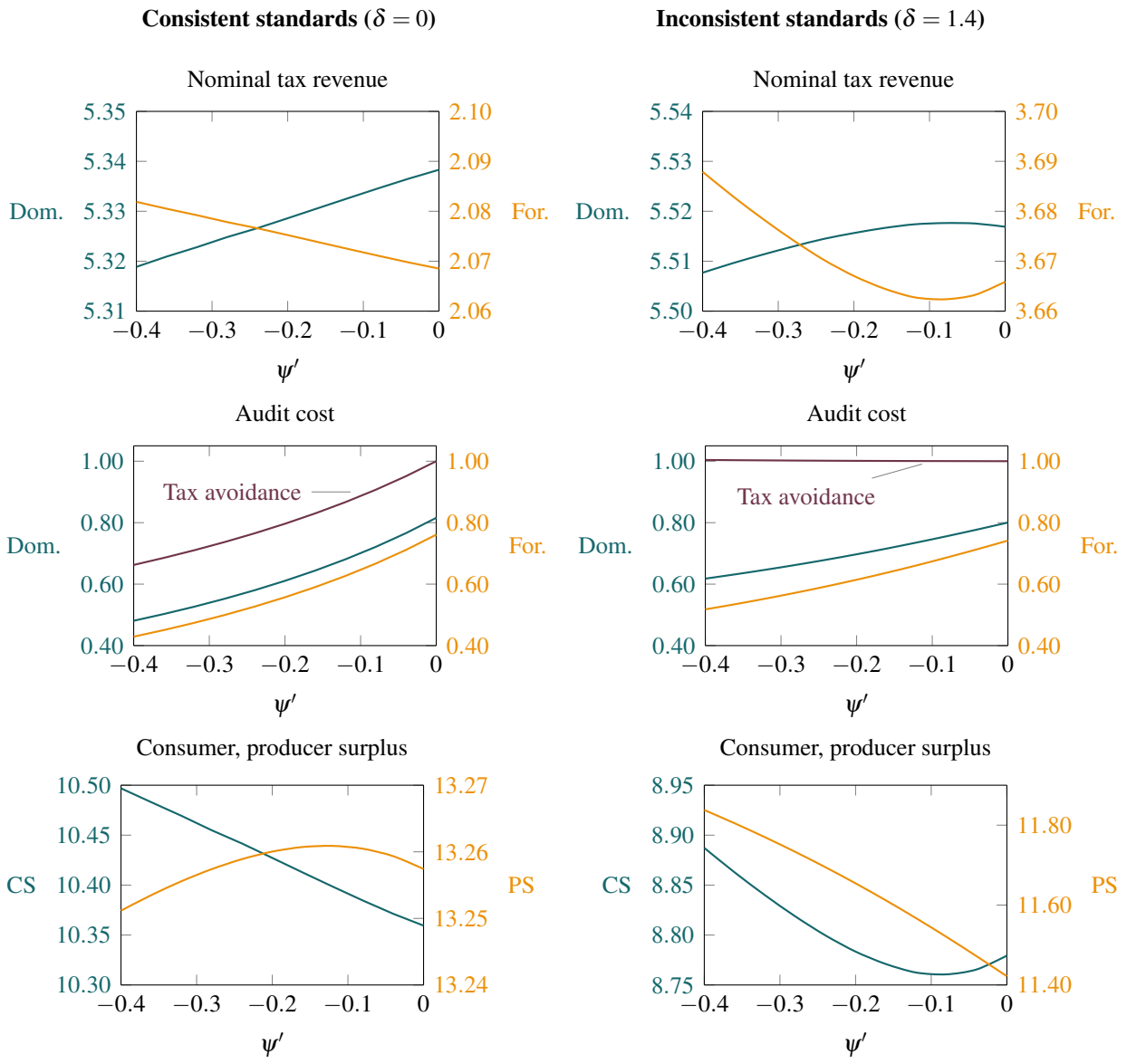
Note: The figure shows firm profit (bottom row) given optimal quantity (top row), depending on the AL price p for different level of reporting transparency ψ'. The graphs are color-coded, with yellow illustrating the case of high reporting transparency ($\psi' = -0.4$). As reporting transparency decreases (ψ' increases in steps of 0.1), the graphs become darker in color. The darkest graph, depicted in a dark purple shade, represents absence of reporting transparency ($\psi' = 0$). The left panels show a situation with full standards consistency ($\delta = 0$), whereas the right panels show a situation with high standards inconsistency ($\delta = 1.4$). We obtain numerical solutions using the revenue function $R(q) = q(k - lq)$, specify reporting transparency as $\psi(\delta^r) = (1 - \Psi\delta^r)$, and use the parameter values shown in Table 2. The gray dashed lines indicate a benchmark situation without tax avoidance and auditing.

Figure 6: Impact of Reporting Transparency and Standards Inconsistency on Net Tax Revenues.



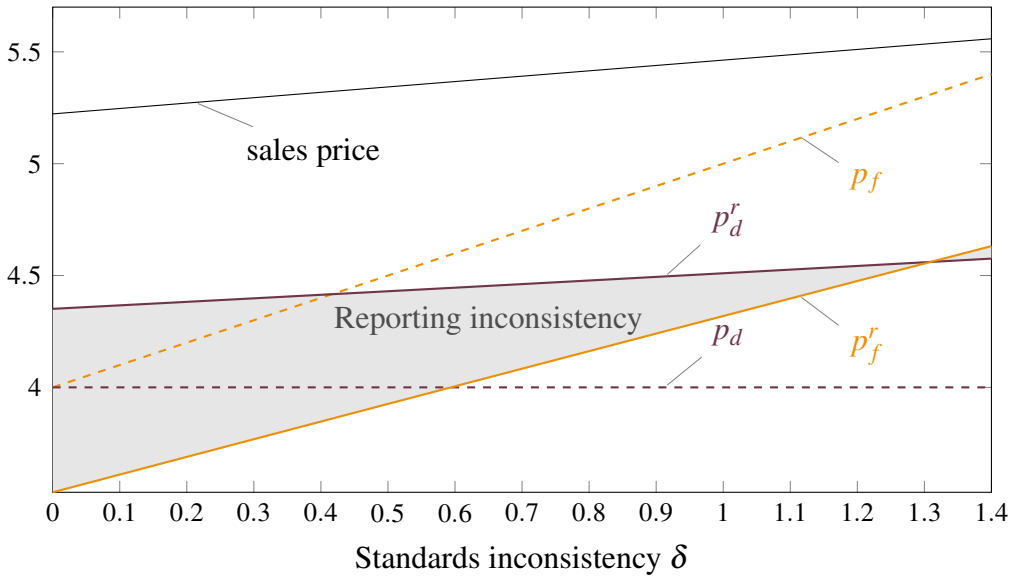
Note: The figure shows expected net tax revenue of the domestic (left) and foreign (right) country depending on the level of standards inconsistency δ and reporting transparency ψ'. The red and blue dashed lines indicate the optimal level of reporting transparency for a given level of standards inconsistency from the viewpoint of the domestic and foreign country. By trend, If standards are consistent, both countries benefit from high reporting transparency ($\psi' = -0.4$). As standards become more inconsistent, the domestic country prefers an intermediate level of reporting transparency, and, eventually, is best off without transparency ($\psi' = 0$).

Figure 7: Components of Global Social Welfare



Note: The figure shows components of social welfare (c.f. Table 1) depending on the level of reporting transparency ψ', for consistent ($\delta = 0$, left) and inconsistent standards ($\delta = 1.4$, right). Petrol (yellow) lines show the results for the domestic (foreign) country. The red lines in the middle row show pre-audit tax avoidance according to Definition 2 b).

Figure 8: Sales Price, AL Prices, and Reported Prices



Note: Reported transfer prices in the domestic (purple solid line) and foreign country (yellow solid line), depending on reporting inconsistency (foreign AL price markup) δ. The light gray area indicates the level of reporting inconsistency. The black line shows the sales price assuming linear demand, $k - lq^*$. The dashed lines indicate AL prices p_d and p_f. We use the baseline parameters in Table 2, $\psi' = -0.4$, and a domestic AL price $p_d = 4$. The figure shows that the results shown in Proposition 2 still hold when accounting for an endogenous production quantity. Higher standards inconsistency δ leads to less inconsistent reports, and, eventually (for $\delta \gtrsim 1.3$), to double taxation. A change in the foreign standard (i.e., a change in δ) not only affects the foreign report, but also—to a lesser extent—the domestic report.
The figure also shows that—given the chosen parameters—the reported prices are always between the marginal production cost c and the sales price.

Table 1: Components of Global Social Welfare

Consumer surplus	$\int_{\underline{p}}^{\overline{p}} \left(\int_0^{q^*(p)} \frac{R(q)}{q}\, dq - q^*(p) \frac{R(q^*(p))}{q^*(p)} \right) f(p)\, dp$	
Producer surplus	$\int_{\underline{p}}^{\overline{p}} \max_q \Pi^*(q;p) f(p)\, dp$	
	Domestic country	Foreign country
Nominal tax revenue	$\int_{\underline{p}}^{\overline{p}} \tau_d (R(q^*) - q^* p) f(p)\, dp$	$\int_{\underline{p}}^{\overline{p}} \tau_f q^* (p + \delta - c) f(p)\, dp$
Audit cost	$\int_{\underline{p}}^{\overline{p}} a_d^* b_d \psi(p_d^{r*} - p_f^{r*}) f(p)\, dp$	$\int_{\underline{p}}^{\overline{p}} a_f^* b_f \psi(p_d^{r*} - p_f^{r*}) f(p)\, dp$
Pre-audit tax avoidance	$\int_{\underline{p}}^{\overline{p}} \frac{b_d}{\theta_d} \psi(p_d^{r*} - p_f^{r*}) f(p)\, dp$	$\int_{\underline{p}}^{\overline{p}} \frac{b_f}{\theta_f} \psi(p_d^{r*} - p_f^{r*}) f(p)\, dp$
	$= \int_{\underline{p}}^{\overline{p}} \tau_d q^* (p_d^{r*} - p) f(p)\, dp$	$= \int_{\underline{p}}^{\overline{p}} \tau_f q^* (p + \delta - p_f^{r*}) f(p)\, dp$
Global Social Welfare	$\overbrace{\int_{\underline{p}}^{\overline{p}} \left(R(q^*(p)) - c q^*(p) - \psi(p_d^{r*} - p_f^{r*})(b_d a_d^* + b_f a_f^*) \right) f(p)\, dp}^{\text{Sum of producer surplus (= expected MNC profit) and net tax revenue}}$	
	$+ \underbrace{\int_{\underline{p}}^{\overline{p}} \left(\int_0^{q^*(p)} \frac{R(q)}{q}\, dq - q^*(p) \frac{R(q^*(p))}{q^*(p)} \right) f(p)\, dp}_{\text{Consumer surplus}}$	

Note: The table shows the different parts of social welfare. We take expected values over all AL prices p. In our setting, the product is sold on the domestic market only, therefore, the "consumer surplus" part (first row) applies to the inhabitants of the domestic country. Worldwide "producer surplus" equates expected MNC profit since we abstract from fixed production costs. "Nominal tax revenue" assumes that the tax is based on the AL price p, but the quantity q^* is affected by tax avoidance and auditing. "Audit cost" is the expected amount that the tax authority in equilibrium invests in auditing. "Pre-audit tax avoidance" is the amount by which the company reduces the nominal tax payment before expected back taxes and penalties.
Regarding only the parts inside the integrals, net tax revenues as shown in Equations (11) and (12) are obtained by calculating: "nominal tax revenue" − "audit cost" − ("pre-audit tax avoidance" − "audit cost") = "nominal tax revenue" − "pre-audit tax avoidance".
The last row, "global social welfare", displays the sum of producer surplus, consumer surplus, and net tax revenue. While some authors multiply tax revenues with a weight (e.g. Hebous and Keen, 2023), we follow the common approach in the tax transfer pricing literature by taking the unweighted sum (Anand and Sansing, 2000; De Waegenaere and Sansing, 2010; De Waegenaere, Sansing, and Wielhouwer, 2012).

Table 2: Symbols, Exemplary Functions and Parameter Values

Description	Symbol	Specification / Value
Exemplary functions		
Revenue function	$R(q)$	$q(k-lq)$
Reporting transparency function	$\psi(p_d^r - p_f^r)$	$\left(1-\Psi\cdot(p_d^r - p_f^r)\right)$
(Exogenous) parameters		
Domestic tax authority's marginal audit cost	b_d	2
Foreign tax authority's marginal audit cost	b_f	2
Marginal cost of production	c	1
Maximal sales price	k	10
Price sensitivity	l	1
Lowest AL price	$\underline{p}$	1
Highest AL price	$\overline{p}$	4
Standards inconsistency: foreign AL price markup	δ	$[0, 1.4]$
Penalty rate domestic country	θ_d	2
Penalty rate foreign country	θ_f	2
Tax rate domestic country	τ_d	0.4
Tax rate foreign country	τ_f	0.3
Reporting transparency	$\psi' = -\Psi$	$[-0.4, 0]$
(Endogenous) variables / strategies		
	General	*In equilibrium*
Reported transfer prices	p_d^r, p_f^r	p_d^{r*}, p_f^{r*}
Reporting inconsistency	$p_d^r - p_f^r$	$\delta^r \equiv p_d^{r*} - p_f^{r*}$
Audit policy	α_d, α_f	$a_d(p_d^r, p_f^r), a_f(p_d^r, p_f^r)$

Note: Overview over symbols, exemplary functions and baseline parameter values for the numerical examples.

Table 3: Numerical Example

(1) Reporting trans-parency	(2) Standards inconsis-tency	(3) Minimum sales price	(4) Quantity range	(5) Nominal tax revenue domestic / foreign	(6) Tax avoidance domestic / foreign*	(7) Audit cost domestic / foreign	(8) Net tax revenue domestic / foreign	(9) Producer Surplus	(10) Consumer Surplus	(11) Global Social Welfare
$\psi' = -\Psi$	δ	$\min_p(k - lq^*(p))$	$[\min_p q^*(p), \max_p q^*(p)]$							
Benchmark: no tax avoidance (truthful reporting)										
–	0	5.25	[4.50,4.75]	5.29 / 2.10	–	–	5.29 / 2.10	12.84	10.70	30.93
–	0.7	5.43	[4.33,4.58]	5.40 / 2.96	–	–	5.40 / 2.96	11.88	9.90	30.15
–	1.4	5.60	[4.15,4.40]	5.49 / 3.74	–	–	5.49 / 3.74	10.97	9.14	29.33
Separating equilibrium										
−0.36	0	5.22	[4.48,4.78]	5.32 / 2.08	0.69	0.50 / 0.45	4.64 / 1.39	13.25	10.48	29.77
−0.36	0.7	5.39	[4.30,4.61]	5.43 / 2.92	0.85	0.58 / 0.50	4.58 / 2.07	12.50	9.65	28.80
−0.36	1.4	5.56	[4.12,4.44]	5.51 / 3.68	1.00	0.58 / 0.53	4.51 / 2.68	11.80	8.86	27.85
−0.2	0	5.23	[4.47,4.77]	5.33 / 2.08	0.80	0.61 / 0.56	4.53 / 1.28	13.26	10.43	29.50
−0.2	0.7	5.41	[4.28,4.59]	5.44 / 2.91	0.90	0.66 / 0.59	4.54 / 2.01	12.43	9.59	28.56
−0.2	1.4	5.58	[4.10,4.42]	5.52 / 3.67	1.00	0.66 / 0.61	4.51 / 2.67	11.65	8.78	27.62
−0.04	0	5.25	[4.45,4.75]	5.34 / 2.07	0.95	0.77 / 0.71	4.39 / 1.12	13.26	10.37	29.13
−0.04	0.7	5.42	[4.27,4.58]	5.44 / 2.91	0.98	0.77 / 0.71	4.46 / 1.93	12.35	9.55	28.29
−0.04	1.4	5.60	[4.09,4.40]	5.52 / 3.66	1.00	0.77 / 0.71	4.52 / 2.66	11.47	8.77	27.42

Note: This table shows the results of our numerical example, using the baseline parameters in Table 2, and varying the level of reporting transparency ψ', and standards inconsistency δ. The panel in the middle shows a benchmark case where the MNC truthfully (and inconsistently if $\delta > 0$) reports p_d, p_f, and the tax authorities do not audit. The panel in the bottom shows the results of our model. The results on the minimum sales price show that our choice of upper bound of AL prices $\overline{p}_d = 4, \overline{p}_f = 4 + \delta$ is reasonable in that it does not exceed the sales price.

The column "Tax avoidance" shows the expected value of pre-audit tax avoidance (c.f. Definition 2 b)) as shown in Figure 7. This amount is reduced as a result of audits via back taxes and penalties, the sum of which is equal to audit costs. Since nominal tax revenue, tax avoidance, and audit costs are additive separable (c.f. Equations 11, 12) expected net tax revenues is given by subtracting column six from column five.

*Tax avoidance is symmetrical (the amount of tax avoidance in the domestic and foreign country is identical) if penalties and audit costs are identical in both countries $\theta_d = \theta_f$ and $b_d = b_f$, which we assume here (c.f. Table 2).

Table 4: Online Survey: Results

Experience with inconsistent tax transfer prices

	Very often	Often	Occasionally	Seldom	Never
	Inconsistent tax transfer prices were . . .				
. . . reported	4.3 %	.0 %	39.1 %	34.8 %	21.7 %
. . . result of an audit	30.4 %	56.5 %	13 %	.0 %	.0 %
	Inconsistent tax transfer prices led to . . .				
. . . double taxation	19.0 %	47.6 %	23.8 %	9.5 %	.0 %
. . . undertaxation	.0 %	4.8 %	9.5 %	23.8 %	61.9 %
	If the sets of feasible domestic and foreign tax transfer prices intersect . . .				
. . . a single price is chosen	43.5 %	21.7 %	26.1 %	4.3 %	4.3 %
. . . different prices are chosen	8.7 %	4.3 %	8.7 %	30.4 %	47.8 %
	If the sets of feasible domestic and foreign tax transfer prices are disjunct . . .				
. . . a single price is chosen	7.2 %	18.8 %	29.0 %	20.3 %	24.6 %
. . . different prices are chosen	4.3 %	8.7 %	17.4 %	26.1 %	43.5 %

Note: The panel shows percentage shares of a total of 23 answers, with the exception of the question on the effects (double taxation, undertaxation), where we have a total of 21 answers. Regarding questions 3 and 4, participants were provided two examples. To simulate a situation with intersecting sets, the range of acceptable arm's-length prices was 2–4 from a domestic perspective and 3–5 from a foreign perspective (possible answers: "4 in both countries"; "4 in Germany, 3 in the foreign country"). In the situation with disjunct sets, the range of acceptable arm's-length prices was 2–4 from a domestic perspective and 6–8 from a foreign perspective (possible answers: "4 in both countries", "5 in both countries", "6 in both countries", "4 in Germany, 6 in the foreign country"). Participants were then asked to choose what price would be employed in the domestic and foreign country, respectively. Participants were not provided with tax rates and the direction of the transaction.

Experience with mutual agreement procedures

Double taxation was avoided by means of a mutual agreement procedure

Always	Very often	Often	Occasionally	Seldom	Never
10.0 %	20.0 %	20.0 %	30.0 %	10.0 %	10.0 %

Note: The panel shows percentage shares of a total of 20 answers.

Perceived and expected development of double taxation

Assessment of the development over time of the problem of double taxation

	Strong increase	Increase	No significant change	Decrease	Strong decrease
Past five years	35.0 %	60.0 %	5.0 %	.0 %	.0 %
Next five years	61.9 %	28.6 %	9.5 %	.0 %	.0 %

Note: The panel shows percentage shares of a total of 20 answers (past five years) and 21 answers (next five years).

Table 5: Interview: Interviewees' Quotes by Topic

Question / topic	Topic-specific responses of six tax transfer pricing experts of major German multinational corporations, Big4 companies, or German Federal Central Tax Office
	MNCs / Tax Advisory Companies
Transfer pricing inconsistencies in tax filing *Are there any country combinations for which you/taxpayers expect that the tax authorities will have different ideas about the level of transfer prices for a specific product or service when you/the taxpayer file your/their tax return?*	Well, the issue doesn't start in the documentation, but in the pricing. And that is simply a very difficult issue. There are already some large corporations . . . that say, for example, Brazil, there are simply unilateral regulations that prevent you from charging a license for certain things. . . . that is actually what many people do, [they] wait and see what will happen during the audit; but inconsistent pricing is dangerous in that you ultimately lose credibility in any other country.
	The answer is that a number of taxpayers differentiate and set a different transfer price in anticipation of a discussion during the tax audit.
	In other words, we are applying different transfer prices for the same business model and are thus responding to the differences in the local tax audits.
	We have said that transfer pricing is not an exact science, we have a bandwidth and we have some space to move around within that bandwidth.
	It's actually always the BRICS countries, plus countries like Italy.
	Italy, Brazil are certainly such countries. China, too. Especially when it comes to something like licenses, for example.
	You have already mentioned Brazil. In fact, there is no other way, because there is no double taxation agreement and because of the very specific regulations there is no other way to handle it.
	Tax Administration
	Of course, they now have room to maneuver and they assess individual countries differently. I am firmly convinced of that.
	MNCs / Tax Advisory Companies
Transfer pricing inconsistencies after tax audit *For which country combinations have you/taxpayers experienced different transfer prices for a particular product or service as a result of an audit?*	But now you have to realize that there are a few countries that always prefer to pursue their own approach, they are the usual suspects, namely China and India when it comes to service billing. So, in India no one manages to push through their normal transfer pricing system with the normal markup. At least, I don't know of anyone who can do it. It's [the markup is] much higher than almost anywhere else.
	And what I'm also noticing at the moment, so besides countries, that are the usual suspects, Brazil, Argentina and co., is Russia strangely enough.
	In principle, this can happen in all country combinations. I've seen it happen in all country combinations, and it always depends very much on the facts of the case, and you can't put it down to a specific transaction; it's simply because transfer prices are not black or white, but gray, so to say.
	I think all country combinations are possible now. It's more a question of materiality, whether you then say you're going to take this a step further. So we see many issues in Eastern Europe, because the tax authorities there take a very formalistic approach.
	So that also has nothing to do with what is an OECD country or not. This is an issue for all tax authorities.
	Well, Brazil is a special case, they have different regulations anyway.

	Tax Administration
	… you also have to see that of course the audit documents are sometimes different in the different countries.
	MNCs / Tax Advisory Companies
Reason for inconsistencies *What was the reason for the difference?* • *Different interpretation of the same transfer pricing method (e. g., different markup for "cost plus"; due to different data basis, different interval widths, etc.)?* • *Application of different methods?* • *Stronger evaluation of the role of the market in the context of the location of value creation?* • *Other?*	Unfortunately it is not possible to trace it back to one thing. It starts when they develop an appetite, they poke around everywhere, then they want to see the function and risk profile a little differently and question that.
	… you practically have to choose between a rock and a hard place; then you have a problem in Italy if you include the three percent, because the Italians then say, listen, you know very well that we don't recognize that. ... If you then say, if you cave in on the advance payment, and Italy actually only charges two percent, then you have problems in Germany, because from the point of view of the German auditor, you are foregoing one percent royalty income from Italy for reasons of proximity, and you are doing that on purpose again. And this takes us back to this issue of criminal law, and the German auditor will always say that you have to proactively show this, you voluntarily include this one percent as income in your tax return, even though you didn't receive it.
	[Europe:] … this is rather about technical details, such as the database studies that are used, for example, to determine the profitability that third parties could determine or achieve. The Eastern European countries are very formalistic in this respect.
	Tax Administration
	So, if you look at transfer pricing documentation and specifically at the decisive points, namely functions and risks, you often only have pages of checkboxes where certain functions are listed and then you have three crosses, four crosses, five crosses. But the other company only has two crosses or one cross. This is sometimes handled differently and what is then lacking is really the facts on both sides. What are really the functions and risks that are performed by the two companies? And if I only see one side of things, that's often not enough.
	And then, of course, there is always the tendency of every financial administration to pull in as much as possible into their own country. This means that we often do not have a solution to the double taxation cases and therefore have to carry out a mutual agreement procedure.