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One Set or Two Sets of Books: The Impact of a Strategic Tax Auditor

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Research Papers

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The Impact of a Strategic Tax Auditor

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Abstract

Using a game theoretical setting, this paper studies how a multinational company's (MNC) choice of using one set (OSB) or two sets of books (TSB) is affected by a strategically acting tax auditor (TA). First, a divisionalized MNC with a producing division in a low tax country and a selling division in a high tax country chooses either OSB or TSB. With OSB, the unique transfer price coordinates the quantity decision and determines the tax payments. With TSB, two transfer prices are used for both tasks. Second, a TA may audit the MNC's transfer prices.

It turns out that the TA's bargaining power and his personal audit costs critically influence the MNC's transfer pricing decision. For a low bargaining power and low audit costs, the MNC keeps OSB with positive probability. When the TA's bargaining power is high, the negotiation benefits from using a single transfer price are outweighed by the costs of a reduced flexibility. Then, the MNC keeps TSB with either tax aggressive or compliant reported transfer prices. In addition, a raise in the tax difference induces less tax aggressive behavior. Intuitively, tax aggressiveness should be even more attractive in this case. This intuition is not true in our setting since the TA's audit probability increases and, thus, makes profit shifting less attractive.

1 Introduction

The prevailing use of profit shifting devices such as debt financing structures or transfer prices is non-controversial. This is not in the interest of governments and tax authorities. In order to prevent unintended tax savings the tax authorities and governments started to become aware how tax regulation and enforcement affects taxpayers' behavior. According to EY's Global Transfer Pricing Survey 2013, transfer pricing remains to be a main issue of controversy between MNCs and tax authorities. The importance of addressing the unintended use of transfer pricing mechanisms for tax saving reasons is also highlighted by the Base Erosion and Profit Shifting (BEPS) project of the OECD. One fourth of the BEPS action areas especially concern transfer pricing topics. Several parts of the other action areas also affect transfer prices. One goal of the OECD's efforts concerning the documentation of transfer pricing and country-by-country reporting is to help tax authorities to most effectively deploy their audit resources (OECD, 2015, p. 9).

The transfer price information stems from the MNC's accounting system. Previous research illustrated that an MNC may either keep one set of books (OSB) or two sets of books (TSB). An accounting system comprising only OSB uses one transfer price both internally and externally (Göx and Schiller, 2006; Nielsen and Raimondos-Møller, 2012). With TSB the MNC uses two separate transfer prices, one for internal and the other for tax purposes. Springsteel (1999) finds that 77 percent out of a best practice group of large companies choose TSB. The detection of differing internal and tax transfer prices by the tax auditor (TA) may, if sufficiently different, undermine the economic credibility, hence leading to costly regulatory intervention (Narayanan and Smith, 2000, p. 507). For two separate transfer prices, comprehensive disclosure requirements impose additional costs on the firms for concealing the second set of books from the tax authority (Martini, 2015, p. 873). Moreover, a second set of books implies higher costs due to extra documentation and hence, administrative expenses rise (EY, 2013; Nielsen and Raimondos-Møller, 2012). In addition to the extra administrative and documentation costs of keeping a second set of books, the possibility of detection and intervention by the TA might further reduce the value of TSB (Smith, 2002a, p. 224). Companies argue that implementing TSB will invite increasing scrutiny by tax authorities (EY, 2003). Mills (1998) already points

out that book-tax differences create red flags for the IRS. She finds empirical evidence that the audit adjustments proposed by the IRS are increasing when the book-tax difference rises. Finding TSB in case of a tax audit is similar. If an audit takes place, the TA learns a possibly existing internal income due to the use of an internal transfer price. Previous research regularly assumed that the TA accepts any transfer price as long as it lies in a specific range that complies with the arm's length principle (for example Baldenius et al. (2004)). In the light of the recent developments concerning TAs' awareness of tax evasion, TAs seem to act strategically. TAs face a trade-off between audit costs and additional tax revenues when they audit an MNC's transfer prices and related books. These revenues may be gained due to the possible detection of non-compliance with the arm's length principle and henceforth adjusting the accepted transfer prices. The conjecture arises that an MNC considers the existing tax regulation and the enforcement through strategically acting TAs for the decision regarding the use of OSB or TSB. This leads us to the following research questions: (1) When will MNCs decide to use OSB or TSB in equilibrium? (2) Which factors influence the decision?

We examine these questions using a dynamic game of incomplete information with two players, namely the MNC and the TA. The MNC comprises a producing foreign division in a low tax jurisdiction and a selling domestic division in a high tax country. Transfer pricing is used for two purposes. On the one hand, the transfer price affects the quantity decision of the selling division's manager by internalizing the costs for the intermediate product obtained from the producing division. Thus, the transfer price is used by the MNC to adapt the selling division's objective, i.e. the division profit, according to the MNC's objective, the total profit. In a world without taxes, the optimal transfer price is set equal to marginal costs of the producing division (Hirshleifer, 1956). On the other hand, in a world with taxes, transfer pricing enables the MNC to shift profits from the high tax country to the low tax country. Thus, the MNC reduces its tax payments which directly increases its total profit. With TSB, the MNC can separately optimize both the internal and the tax effect of transfer pricing (Nielsen and Raimondos-Møller, 2012). As a consequence, TSB allow the MNC a finer optimization than OSB. However, in addition to the extra administrative and documentation costs for keeping a second set of books, the implementation of TSB instead of OSB may weaken the MNC's bargaining power in case of a tax audit. In particular, by choosing an external transfer price belonging to the appraised

range of acceptable arm's length prices (compliance range), an MNC avoids a transfer pricing adjustment in case of a tax audit. We extend former research by considering two different types of MNCs with two differing compliance ranges. That is, an MNC with low marginal costs faces a different range than an MNC with high marginal costs. Thus, the compliance range depends on the MNC's marginal costs. However, the marginal costs are not ex ante observable by the TA. Neither is the MNC's compliance ex ante verifiable. Hence, a low cost MNC might have an incentive to mimic a high marginal cost type. If a tax transfer price not belonging to the appraised compliance range is detected during the tax audit, the MNC and the TA negotiate about the applicable transfer price.

With TSB and detected non-compliance, the use of a second transfer price for internal purpuses is interpreted as evidence for the MNC's strong tax saving behavior. As a consequence, the TA enforces a tax transfer price belonging to the MNC's appraised compliance range. In contrast, OSB provides a convincing argument in case of litigation. The MNC uses the same transfer price for internal coordination as well as for tax purposes. Hence, a court may find the inappropriateness of TA's appraised compliance range. Therefore, with OSB, the reported transfer price influences the outcome of the negotiation and the TA might enforce a tax transfer price that does not belong to the appraised compliance range. In sum, for choosing between OSB and TSB the MNC faces a trade-off between flexibility in using transfer pricing for both internal and tax purposes and its bargaining power in a tax audit. This is in line with the recognition that differences in book and tax incomes may weaken the tax payer's position in audits (Mills, 1998, p. 345). In order to abstract from potential legal disputes between the TA and the MNC, the TA enforces the highest transfer price belonging to the appraised compliance range when TSB are kept. Any transfer price of this range fulfills the arm's length principle. The MNC accepts the highest transfer price of this range without objection.

We find that the bargaining power of the TA determines the equilibrium strategies. Our results show that if this power is high, OSB is no longer part of an equilibrium strategy. The intuition is as follows. If the bargaining power of the TA is high, the advantage of OSB compared to TSB diminishes. Thus, TSB is chosen because of the higher flexibility for internal coordination.

The level of audit costs of the TA also affects the equilibrium strategies. For a low level of audit costs, the TA will conduct an audit more frequently. Thus, the probability of detecting

non-compliance increases and a transfer pricing report due to tax saving motives becomes less attractive to the firm. Then, the MNC tends to keep TSB with a reported transfer price belonging to the true compliance range in equilibrium.

In addition, the findings in our paper show that for an increasing tax difference between the two countries the probability for using TSB in order to shift profits to the low tax jurisdiction decreases. This result seems to be counterintuitive because profit shifting should be especially important in a situation where the tax rate differential is high. This finding is due to the TA's awareness of the high tax savings potential. High tax savings possibilities come along with an increased scrutiny by the TA. This is incorporated by the MNC while making the transfer pricing decisions.

Most of the existing research investigates the interrelation between an internal and an external transfer price when the accounting system has already been designed (for example Baldenius et al. (2004) and Martini et al. (2012)). We extend former research by addressing the question whether tax regulation and strategically acting TAs can affect the choice of keeping OSB or TSB. Hence, in contrast to previous work, the choice of the accounting system is endogenous.

The paper proceeds as follows. In the next section the related literature is discussed. Then, the model is described, before the equilibrium analysis is presented and discussed in section 4. This discussion is followed by considerations regarding comparative statics. Section 5 concludes the paper.

2   Literature Review

A comprehensive overview concerning international transfer prices and its functions is provided by Sansing (2014). We focus on the literature which incorporates the trade-off between internal coordination and tax minimization. MNCs regularly incorporate differences in tax and tariff rates as additional aspect in their transfer pricing decision, see for example Schjelderup and Sorgard (1997) or Smith (2002a). Prior research has already shown that MNCs may use transfer prices as a device to shift profits from high to low tax jurisdictions. Particularly, existing research illustrates that the use of TSB is preferable against using a single price for internal and external purposes when an MNC's tax and incentive objectives are conflicting (Lemus, 2011, p. 3). The intuition of this result is straightforward. Keeping OSB necessarily contains a trade-off

between the conflicting objectives of tax minimization and quantity distortion. Narayanan and Smith (2000) find that tax adjusted marginal costs balances the conflicting objectives for a single set of books. In a TSB setting, Baldenius et al. (2004) obtain a similar result. They show that tax adjusted marginal costs should be used for internal purposes, while the external transfer price is straightforward the maximum of the compliance range accepted by the TA. However, these results ignore the potential case of non-compliance with the arm's length principle. Kant (1988), Smith (2002a), Hyde and Choe (2005), and Choe and Hyde (2007) show that a corner solution is no longer straightforward when adjustments by the TA are taken into account. Furthermore, Eden et al. (2005) show that the threat of transfer pricing penalties may already have extensive impacts on the targeted firms. In addition, fiscal authorities are modernized to ensure a government's fair share of corporate taxes (Elliott and Emmanuel, 2000, p. 216). Despite numerous governments' quests for higher tax payments, previous research has not considered the TA as strategic party. However, already Cools and Emmanuel (2006) highlight the necessity of taking into account fiscal regulations as an endogenous variable.

Capuzzi (2010) points out that the TA as well as MNCs can use the arm's length principle to increase their incomes by interpreting it in their favor. Wagenhofer (1994), Raimondos-Møller and Scharf (2002), as well as Keuschnigg and Devereux (2013) challenge the appropriateness of the arm's length principle in general. They argue that MNCs prevail in markets where they dominate trades between unrelated parties. In addition, Samuelson (1982) finds that MNCs are able to manipulate the arm's length limits. The arm's length principle is applied in nearly all countries with transfer pricing restrictions. Picciotto (1992) gives a detailed overview of the arm's length implementation and its historical development. Nevertheless, all of these papers take the decision whether to keep OSB or TSB as given. An exception is the work of Nielsen and Raimondos-Møller (2012). They investigate whether there might exist situations in which keeping OSB is preferable. However, their main research area is the field of interdependences between different transfer prices.

By applying the formula apportionment approach independence among different transfer prices might be obtained (Hyde and Choe, 2005). However, Martini et al. (2012) have already shown that under a formula apportionment approach MNCs have incentives to shift the tax base by adjusting investment levels. In contrast to affected investment levels, MNCs use ex post in-

come shifting with separate entities and transfer prices. They conclude that neither the formula apportionment approach nor the separate entity approach is always preferable. Despite these advantages and drawbacks regarding the tax regime, in almost all countries the single entity approach is applied. Therefore, we restrict our attention to taxation in terms of the separate entity approach.

Wagenhofer (1994) shows that cost based transfer pricing might induce first best solutions for internal purposes when there is asymmetric information between the participating divisions. We assume that an MNC's marginal cost plus an appropriate mark-up is the upper bound of the appraised compliance range. During the negotiation between the TA and the MNC, the applicable transfer price is determined. This transfer price might be greater than the upper bound of the appraised compliance range and includes a bargaining mark-up.

Keeping OSB or TSB when imperfect competition prevails is much better examined. Schjelderup and Sorgard (1997), Arya and Mittendorf (2008), Dürr and Göx (2011), and Lemus (2011) investigate whether OSB or TSB is preferable in a situation of imperfect competition. In their studies, a single transfer price additionally serves as a commitment device to soften competition in external markets. The results heavily depend on whether competitors are able to observe the use of a single transfer price or not. The accounting system cannot be used to influence competitors when the number of books is non-observable. In contrast to this literature, we assume that the TA is not able to observe whether OSB or TSB has been chosen. Neither of these studies include a strategic TA in their considerations. Moreover, most of the existing research does not consider the possibility of tax audits at all. One exception are Diller and Lorenz (2016). They extend the work of Baldenius et al. (2004) by examining a strategically acting TA. In line with former research, they take an MNC's decision whether to keep OSB or TSB as given. They assume the superiority of TSB because of the higher flexibility.

While taking a strategically acting TA into account one should bear in mind the possibility that some of the income shifting is tacitly tolerated by the government. It heightens the competitiveness of the jurisdiction. This is the rationale why TAs have some leeway while enforcing transfer pricing adjustments. Actually, transfer pricing regulation itself may act as a strategic device (Mansori and Weichenrieder, 2001, p. 1). This opinion is confirmed by the theoretical findings of Raimondos-Møller and Scharf (2002) and Smith (2002b). They showed that ex

post discretion over transfer prices may relieve ex ante distortions. Thus, lax transfer pricing regulations and enforcement may even lead to higher tax revenues in the low and the high tax jurisdiction.

3   Model Description

We consider an MNC operating in a low and a high tax jurisdiction. In contrast to former research, we endogenize the MNC's choice of the accounting system while taking into account a strategic TA. We consider a situation where the MNC decides whether to keep OSB or TSB. During a potential tax audit non-compliance of the used transfer price might be detected. For the sake of simplicity, we restrict our attention to two strategically acting players, namely the TA in the high tax country and the MNC.

3.1   Multinational Company

The MNC comprises a producing foreign division and a selling domestic division. In particular, the foreign division produces an intermediate product which is transformed to the final product by the domestic division. Without loss of generality, the domestic division's production costs are set equal to zero. There exists no external market for the intermediate product. The producing foreign division could face either high marginal costs c_H with probability β or low marginal costs c_L with $1 - \beta$, where $0 < \beta < 1$ and $0 \leq c_L < c_H$. The MNC observes the realized marginal costs at the beginning of the period. The TA knows the ex ante probability β and can observe the realized marginal costs during an audit. For any level of them, the MNC faces constant marginal costs. Hence, we abstract from any economies of scale or scope.

Per unit of intermediate good provided by the producing foreign division the selling domestic division pays an internal transfer price p_i. We assume administered transfer pricing. In particular, the headquarters chooses transfer prices in order to achieve congruence between the division managers' objectives (divisional profit) and the MNC's objective (global after-tax profit). The foreign division is located in a low tax jurisdiction, where its income is taxed at a rate t. Furthermore, the domestic division operates in a high tax jurisdiction with income tax rate $t + h$, where $0 \leq t, h \leq 1$ and $t + h \leq 1$. The parameter h captures the tax rate differential between the low and high tax jurisdiction. We assume taxation in terms of the source principle. Thus, the tax

liability of each division is determined by the division's income. Hence, the MNC is interested in a high external transfer price for tax purposes in order to shift as much income as possible into the low tax jurisdiction. As Baldenius et al. (2004) we allow negative pre-tax income for the foreign division.

We consider a monopolistic setting. The revenue function is given by $R(q) = \left(a - \frac{1}{2}q\right)q$, where q denotes the demanded quantity with $a \geq c_H$.[1] The manager of the domestic division is evaluated on the basis of pre-tax divisional profit.[2] Considering the internal transfer price the selling domestic division maximizes:

$$\Pi_D = \left(a - \frac{1}{2}q\right)q - p_i q.$$

The MNC's divisions are legally separate entities. Therefore, the domestic division chooses the quantity in order to maximize its profits:

$$q_D = a - p_i.$$

For tax purposes, the MNC may choose to use a transfer price that is different from the internal transfer price p_i. Nevertheless, the MNC can also decide to report the internal transfer price to the TA. Thus, the reported transfer price depends on whether OSB or TSB was chosen. For the sake of simplicity, we do not consider extra administrative and documentation costs for keeping TSB. It is straightforward that OSB becomes preferable, if the costs for keeping a second set of books become sufficiently high.[3] Ex ante the TA cannot verify whether the MNC keeps OSB or TSB. He only observes the reported transfer price p_r.

We assume in line with the extensive documentation requirements imposed on MNCs that in the case of a tax audit, the TA observes the realized marginal cost, and the internally used

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[1] For the sake of simplicity we assume a is sufficiently large. In particular, a is so large that a low cost type MNC keeping OSB finds it optimal to set $p_r = \overline{p_r}$.

[2] Other authors assume that the divisions maximize their after-tax profits. This assumption is also ad hoc in the transfer pricing setting. Baldenius et al. (2004) explicitly point out this fact and refer to the circumstance that some firms evaluate their divisional managers on a pre-tax basis. For further discussion about the advantage of pre- vs. after-tax profit maximization for divisional performance measurement see Nielsen and Raimondos-Møller (2012).

[3] If keeping TSB is costly OSB will occur more often in equilibrium. In fact, we strengthen our findings regarding OSB by neglecting the extra documentation and administrative costs for keeping a second set of books. If TSB becomes more expensive there is a shift to OSB. Even while ignoring these additional costs OSB is part of an equilibrium strategy.

transfer price when TSB are kept. The comprehensive documentation requirements stem from the OECD guidelines which serve in many countries as a kind of soft law as well as national requirements.[4] In line with the OECD guidelines and the monopolistic setting, the transfer price is set using a cost plus method. According to this transfer pricing method, marginal costs plus an appropriate mark-up fulfill the needs of the arm's length principle. Hence, the appraised upper bound for the reported transfer price of a low cost type MNC is given by $\underline{p_r} = c_L + m_L$, where $m_L \geq 0$ captures the accepted mark-up. Hence, the appraised arm's length compliance range for a low cost MNC is given by $\left[0, \underline{p_r}\right]$. The same arguments hold true for the high cost type. Thus, during an audit, the TA recognizes compliance with the arm's length principle when an MNC with $c = c_H$ sets its external transfer price equal to marginal costs plus an adequate mark-up $m_H \geq 0$, i.e. $\overline{p_r} = c_H + m_H$, where $\overline{p_r} > \underline{p_r}$. Moreover, we assume $m_H \leq m_L - c_H + c_L \frac{\delta(t+h)}{\delta(t+h)-h}$ in order to ensure $p_i \leq \underline{p_r}$. In particular, with this assumption we exclude any negotiation incentives concerning the mark-up when a compliant TSB strategy is chosen.[5] Therefore, the appraised arm's length compliance range for the high cost type is described by $[0, \overline{p_r}]$. Hence, for any realized marginal costs, the MNC might choose its reported transfer price from the range $[0, \overline{p_r}]$. However, this range does not necessarily comply with the arm's length principle. The low cost MNC has an incentive to mimic the high cost firm. If a low cost MNC uses $p_r \in (\underline{p_r}, \overline{p_r}]$ to calculate its taxable income, the TA will find non-compliance during an audit.

We summarize the MNC's possibilities of different strategy combinations in the following. After marginal costs are realized, the MNC has to decide on the accounting regime and which prices have to be applied. The possible strategies are depicted in figure 1.

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[4] For example, this assumption is in accordance with German tax treaties where firms have to provide documents that are relevant for the transfer pricing calculations. This is also the case for documents that are fully concerned with internal calculations. These do not have to comply with tax regulations or accounting standards (BMF 12.04.2005).

[5] The mark-up for the low cost type m_L and for the high cost type m_H can have the same value. $m_L \neq m_H$ is not necessary for obtaining the results of this paper.
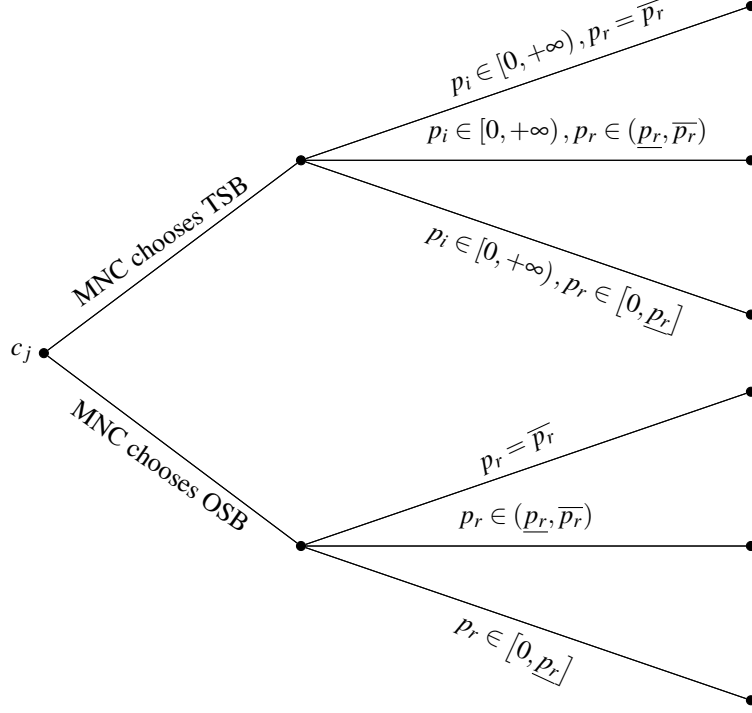
Figure 1: Possible strategy choices for an MNC with marginal costs c_j, where $j = H, L$

In the case of a tax audit, the MNC may be forced to pay the former saved tax liability plus a penalty. The TA and the MNC negotiate about the applicable transfer price p_n where p_n determines the subsequent tax payment. The tax authority can levy an additional penalty, which is captured by the penalty factor $\delta \geq 1$. Furthermore, we assume the penalty to be linear, that is δ multiplied with the evaded tax (Yitzhaki, 1974). Hence, in the case of a detected non-compliance, the MNC faces the following payment:

$$S^{MNC} = (t + h)q\delta \cdot \max\{p_r - p_n, 0\},$$

which comprises the former saved tax payments and a penalty stipulated for the tax evasion. Headquarters is interested in the global after-tax profit. The headquarters incorporates possible tax savings due to tax rate differentials as well as resulting penalties. Thus, headquarters maximizes:

$$\Pi^{MNC} = q\left[(1 - t - h)\left(a - \frac{1}{2}q\right) - (1 - t)c + hp_r\right] - S^{MNC}.$$

3.2 Tax Auditor

The TA is located in the high tax jurisdiction, i.e. in the home country of the domestic division.[6] We do not explicitly model the incentive problem between the tax authority and the TA. For the sake of simplicity, we assume that the incentive scheme is designed in a way that the TA is solely interested in maximizing the additional tax revenues which he generates for the tax authority. Thus, in contrast to the MNC, the TA does not take the additional penalty captured by δ into account. However, the TA must allow the appraised appropriate mark-up on the MNC's marginal costs even while finding a non-compliance. Hence, the smallest transfer price which can be enforced is $\underline{p_r}$. After negotiation with the MNC, the TA enforces the transfer price p_n. In the case of a detected non-compliance, the TA generates additional tax revenues:

$$S^{TA} = (t+h)\,q \cdot max\{p_r - p_n, 0\}.$$

On the other hand, he faces personal audit costs, $K_a > 0$, if he conducts an audit. Throughout the analysis we assume not prohibitively high audit cost.

We capture the TA's decision whether to conduct an audit or not using a binary variable:

$$x_a = \begin{cases} 1 & \text{if an audit takes place,} \\ \\ 0 & \text{if no audit is conducted.} \end{cases}$$

Thus, the TA maximizes:

$$E\left[\Pi^{TA}\right] = \begin{cases} E\left[S^{TA}\right] - K_a & \text{for } x_a = 1, \\ \\ 0 & \text{for } x_a = 0. \end{cases}$$

The TA's decision whether to conduct an audit or not takes place after the MNC's reporting strategy was determined. In equilibrium, the TA may decide to conduct an audit with positive probability. This audit probability is given by η.

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[6] We do not consider the TA in the low tax jurisdiction. The foreign TA anticipates that profits will be shifted into his jurisdiction.

3.3 Transfer Pricing Regimes

After an audit has taken place and non-compliance was detected the external transfer price is adjusted. TSB in combination with a non-compliance supports the TA's imputation of a reported transfer price due to strong tax saving motives. This weakens the MNC's bargaining power. This is strongly supported by the empirical findings of Mills (1998). There remains no room for the low cost MNC to persuade the TA to accept a transfer price other than one from the appraised compliance range. Thus, the TA argues that marginal costs plus an appraised appropriate mark-up, i.e. $c_L + m_L$, should be applied.[7] When the MNC keeps TSB and reports a price belonging to its true appraised compliance range, the MNC faces no transfer price adjustments in case of an audit.

TSB does not necessarily indicate an aggressive transfer pricing behavior. In particular, some profit shifting might be tacitly tolerated by governments to heighten its competitiveness compared to other tax jurisdictions. Solely tax aggressive behavior is targeted. Hence, the TA enforces $p_n = \underline{p_r}$ for a non-compliant, low cost MNC keeping TSB.

However, non-compliance can also be detected while the MNC keeps OSB. If OSB was found, the use of a single transfer price for both the quantity decision as well as for tax purposes strengthens the MNC's bargaining power. In particular, OSB indicates that transfer prices are driven by economic considerations rather than tax optimization (EY, 2001, 2003). The internal price equals the external one. This might indicate that the upper bound of the appraised arm's length compliance range is in fact too low. For internal coordination while keeping OSB, the MNC prefers a price above this range. In case of a litigation, the MNC has strong arguments for setting its transfer price not only due to tax saving motives. The reported transfer price serves for quantity decisions as well. Hence, the TA cannot provide sufficient evidence for tax motivated non-compliance. Thus, the TA and the MNC negotiate about the applicable transfer price. In particular, the TA and the MNC negotiate about the appropriate mark-up which might

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[7] Previous literature suggests that the TA enforces the internal transfer price for tax purposes as well. Since we assume the TA to maximize additional tax revenues and we require $p_i \leq p_r$ this seems to be intuitive. However, it is unreasonable that the arm's length price should be undercut due to former tax saving activities. In fact, this is some kind of worsening TSB in advance. Since we capture any penalty to be paid by the penalty factor δ we exclude this additional punishment of using TSB.

be different from the appraised mark-up m_L.[8] The extent of the negotiated mark-up depends on the TA's bargaining power which is captured by the parameter $\gamma \in [0, 1]$. The TA is interested in enforcing a transfer price belonging to the appraised compliance range. However, the MNC maximizes its overall after-tax profit. Hence, it is interested in a transfer price close to the actually used one. Therefore, for a non-compliant MNC keeping OSB, the transfer price after negotiation is $p_n = \gamma \underline{p_r} + (1 - \gamma) p_r$.

The timing of the game is depicted in figure 2.

t=0	t=1	t=2	t=3	t=4	t=5
Nature assigns type c_H or c_L, the realization is privately observed by MNC	MNC chooses OSB vs. TSB and decides about p_i and p_r	Domestic division chooses q	TA observes p_r and decides whether to conduct an audit	After an audit and detected non-compliance, TA and MNC negotiate about the transfer price p_n	Profits are realized, where required penalty is paid in the domestic country

Figure 2: Timeline

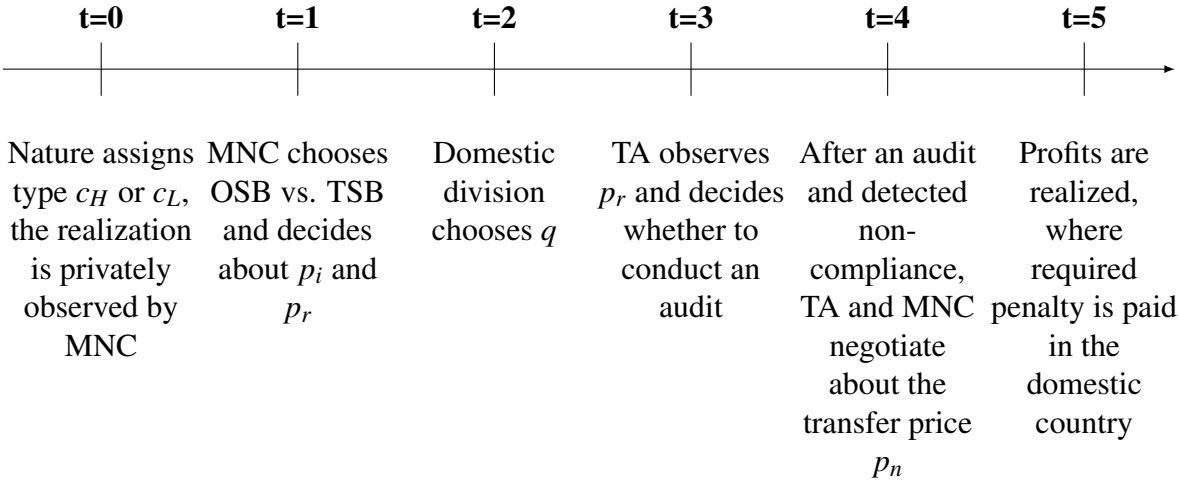[8] Without loss of generality, the divisions do not incur any fixed cost in the model. Thus, the mark-up solely affects the profit of the foreign division. According to the cost-plus method a mark-up on marginal costs is accepted. Independent of the use of OSB or TSB or a detected non-compliance, the TA allows this appraised mark-up on marginal costs. Hence, the MNC faces no risk of losing this surcharge.

4 Equilibrium Analysis

The TA's decision takes place after MNC has sent its transfer pricing report. Nevertheless, the game may be seen as strategically 'simultaneous' in the sense that the TA only observes the outcome of the chosen reporting strategy. The strategy itself remains concealed (Crawford and Sobel, 1982, p. 1433). Thus, we apply the weak perfect Bayesian equilibrium (PBE) concept.

4.1 Internal Prices and Dominated Strategies

In the extensive form of the game, many of the strategies can be eliminated in advance, since they are strictly dominated.[9] A high cost type MNC keeps TSB with $\overline{p_r}$. Hence, the MNC chooses its reported transfer price belonging to its compliance range. If an audit has taken place, neither transfer pricing adjustments nor penalization occur. Hence, the MNC maximizes its profits by decoupling its transfer prices for independent optimization of internal coordination and tax minimization.

However, an MNC with low costs has an incentive to mimic the high cost firm, at least with positive probability. Thus, the low cost MNC will set the reported transfer price equal to $\underline{p_r}$ or $\overline{p_r}$ because every transfer price below $\overline{p_r}$ reveals the MNC's low marginal costs. Hence, for $p_r = \overline{p_r}$, the TA may conduct an audit as long as the audit costs are not prohibitively high. With TSB, the internal transfer price includes an adjustment of marginal costs. In particular, the MNC uses tax adjusted marginal costs as internal transfer price in case of compliance. This price induces the domestic selling division to make the optimal quantity decision. Former research has already shown the optimality of this quantity (Baldenius et al., 2004). In the case of a reported transfer price not belonging to the compliance range the MNC takes into account the potential costs of a transfer pricing audit. Hence, by considering a strategic TA, tax and audit adjusted marginal costs are used for internal optimization. This finding is summarized in lemma 1.

Lemma 1. *When TSB are kept and the reported transfer price belongs to the compliance range*

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[9] The proof is stated in the appendix.

of the MNC, tax adjusted marginal costs c_j, $j = H, L$, are adopted for internal coordination:

$$p_i = \frac{1}{1-t-h}\left[(1-t)c_j - hp_r\right].$$

(1)

When a low cost MNC keeps TSB and chooses a non-compliant reported transfer price, possible payments due to detection are incorporated for internal coordination:

$$p_i = \frac{1}{1-t-h}\left[(1-t)c_L - h\overline{p_r} + \eta\delta(t+h)(\overline{p_r} - \underline{p_r})\right].$$

(2)

Proof. All proofs and thresholds are stated in the appendix. □

For a compliant external transfer price with TSB, the internal price matches the findings of Baldenius et al. (2004). When TSB with a non-compliant reported transfer price are used, the internal transfer price additionally takes into account the potential audit. Hence, an MNC keeps TSB tax aggessively will use tax and audit adjusted marginal costs for internal coordination. We summarize the used transfer prices of possible and not strictly dominated strategy choices in table 1.

MNC type	Accounting System and Transfer Pricing	Internal Transfer Price p_i	Transfer Price after Negotiation p_n
$c = c_H$	TSB with $p_r = \overline{p_r}$	$p_{iH} = \frac{1}{1-t-h}[(1-t)c_H - h\overline{p_r}]$	$p_n = \overline{p_r}$
$c = c_L$	TSB with $p_r = \overline{p_r}$	$p_{i1} = \frac{1}{1-t-h}\left[(1-t)c_L - h\overline{p_r} + \eta\delta(t+h)(\overline{p_r} - \underline{p_r})\right]$	$p_n = \underline{p_r}$
	TSB with $p_r = \underline{p_r}$	$p_{i2} = \frac{1}{1-t-h}[(1-t)c_L - h\underline{p_r}]$	$p_n = \underline{p_r}$
	OSB with $p_r = \overline{p_r}$	$p_i = \overline{p_r}$	$p_n = \gamma\underline{p_r} + (1-\gamma)p_r$

Table 1: Overview of possible transfer pricing choices

After all dominated strategies have been eliminated, the remaining game tree is as displayed in figure 3.
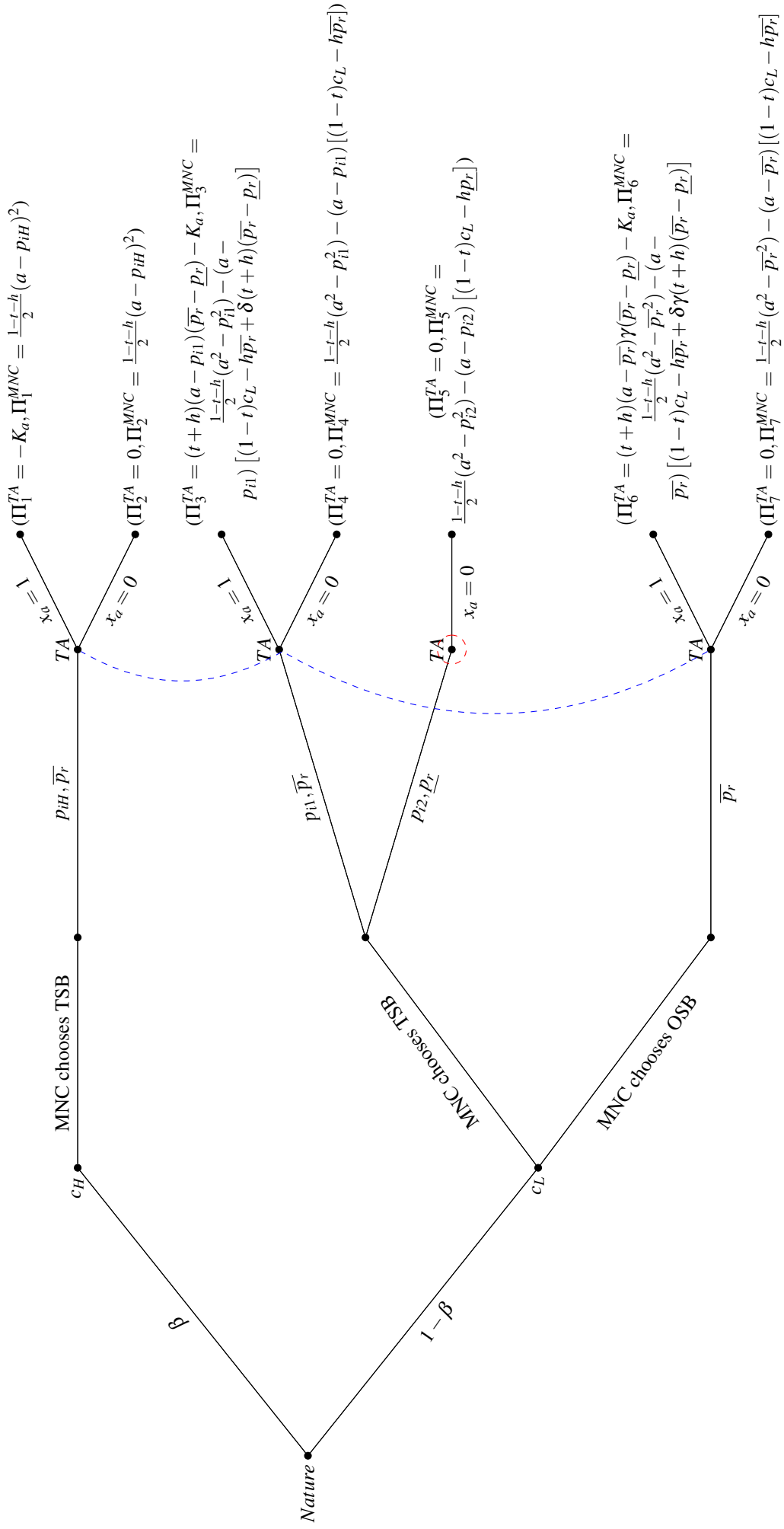
Figure 3: Game tree without dominated strategies

$$\left(\Pi_1^{TA} = -K_a, \Pi_1^{MNC} = \frac{1-t-h}{2}(a-p_{iH})^2\right)$$

$$\left(\Pi_2^{TA} = 0, \Pi_2^{MNC} = \frac{1-t-h}{2}(a-p_{iH})^2\right)$$

$$\left(\Pi_3^{TA} = (t+h)(a-p_{i1})(\overline{p_r}-\underline{p_r})-K_a, \Pi_3^{MNC} = \frac{1-t-h}{2}(a^2-p_{i1}^2)-(a-p_{i1})\left[(1-t)c_L-h\overline{p_r}+\delta(t+h)(\overline{p_r}-\underline{p_r})\right]\right)$$

$$\left(\Pi_4^{TA} = 0, \Pi_4^{MNC} = \frac{1-t-h}{2}(a^2-p_{i1}^2)-(a-p_{i1})\left[(1-t)c_L-h\overline{p_r}\right]\right)$$

$$\left(\Pi_5^{TA} = 0, \Pi_5^{MNC} = \frac{1-t-h}{2}(a^2-p_{i2}^2)-(a-p_{i2})\left[(1-t)c_L-h\underline{p_r}\right]\right)$$

$$\left(\Pi_6^{TA} = (t+h)(a-\overline{p_r})\gamma(\overline{p_r}-\underline{p_r})-K_a, \Pi_6^{MNC} = \frac{1-t-h}{2}(a^2-\overline{p_r}^2)-(a-\overline{p_r})\left[(1-t)c_L-h\overline{p_r}+\delta\gamma(t+h)(\overline{p_r}-\underline{p_r})\right]\right)$$

$$\left(\Pi_7^{TA} = 0, \Pi_7^{MNC} = \frac{1-t-h}{2}(a^2-\overline{p_r}^2)-(a-\overline{p_r})\left[(1-t)c_L-h\overline{p_r}\right]\right)$$

$x_a=1$ $x_a=0$ TA

$p_{iH},\overline{p_r}$ $p_{i1},\overline{p_r}$ $p_{i2},\underline{p_r}$ $\overline{p_r}$

MNC chooses TSB   MNC chooses TSB   MNC chooses OSB

c_H c_L

β $1-\beta$

Nature

4.2 Equilibrium Strategies

In a world with taxes, the reduced game tree in figure 3 and table 1 reveal that an MNC with high marginal costs c_H prefers to set the internal transfer price below the marginal costs of the foreign division. Moreover, the MNC uses TSB to decouple transfer prices used for internal and tax purposes. In the case of a tax audit, the high cost type faces no risk of penalization since $\overline{p_r}$ is assumed to comply with the arm's length principle. Hence, the TA never challenges a high reported transfer price while finding high marginal costs during an audit.[10] The MNC with low marginal costs might prefer to use one of three potential strategies. First, the MNC with low marginal costs can implement OSB and report a high transfer price. This distorts the MNC's quantity decision away from the optimal quantity. However, the MNC can shift some profits of the domestic division to the foreign division and thus, save some tax payments. Second, the MNC can use TSB with tax and audit adjusted marginal costs for internal quantity decisions and a high reported transfer price. This allows the MNC to implement an optimal quantity and shift profits from the high to the low tax jurisdiction. However, with TSB the MNC weakens its bargaining power in case of an audit. As a consequence, if the TA conducts an audit the penalty per unit sold of the final good is higher under TSB compared to the situation where the MNC uses only OSB. Third, the MNC can use TSB with a reported transfer price that complies with the arm's length principle. Then the external transfer price is not only set due to tax saving motives. While choosing a truthful report, the low cost type does not pretend facing high marginal costs. Hence, the MNC is not mimicking the high cost type. It chooses $\underline{p_r}$ as the reported transfer price and an optimal decoupled internal transfer price. If the TA observes a low reported transfer price, the TA never conducts an audit. The reason is that a low reported transfer price can never lead to any revenue for the TA.

The following two propositions show how the TA's audit costs K_a, the level of the penalty factor δ and the bargaining power γ affect the chosen equilibrium strategies. The specific internal transfer prices of table 1 are used in the propositions. The first proposition looks at low audit costs of the TA while the second proposition deals with high audit costs.

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[10] In the following, we explictly point out while considering a high cost MNC. Otherwise, we discuss an MNC with low marginal costs.

Proposition 1. *An MNC of type c_H always chooses TSB with a reported transfer price $\overline{p_r}$ and uses tax adjusted marginal costs for internal coordination. For $\delta > \delta_c$ and low audit costs $K_a < K_{a1}$, the equilibrium strategies of an MNC with low marginal costs c_L and the TA are as follows:*[11]

- *In the case of $\gamma < \gamma_\delta$, the MNC randomizes between TSB with $\underline{p_r}$ and OSB with $\overline{p_r}$. OSB is chosen with probability:*

$$\tau_{1,V} = \frac{K_a}{(1-\beta)(t+h)(a-\overline{p_r})\gamma(\overline{p_r}-\underline{p_r})} \tag{3}$$

and TSB with probability $1 - \tau_{1,V}$. The TA conducts an audit with probability:

$$\eta_V = \frac{1}{(a-\overline{p_r})[\delta(t+h)\gamma(\overline{p_r}-\underline{p_r})]}\left[\frac{1-t-h}{2}(p_{i2}^2 - \overline{p_r}^2) + ah(\overline{p_r}-\underline{p_r})\right. \tag{4}$$
$$\left. + c_L(1-t)(\overline{p_r}-p_{i2}) + h(\underline{p_r}p_{i2} - \overline{p_r}^2)\right].$$

- *In the case of $\gamma > \gamma_\delta$, the MNC randomizes between TSB with $\overline{p_r}$ and TSB with $\underline{p_r}$. TSB with $\overline{p_r}$ are chosen with probability:*

$$\tau_{2,VI} = \frac{K_a}{(1-\beta)(t+h)(a-p_{i1})(\overline{p_r}-\underline{p_r})} \tag{5}$$

and TSB with $\underline{p_r}$ with probability $1 - \tau_{2,VI}$. The TA audits a high reported transfer price $\overline{p_r}$ with audit probability:

$$\eta_{VI} = \frac{h}{\delta(t+h)}. \tag{6}$$

Proof. All proofs and thresholds are stated in the appendix. □

The second proposition addresses the case of high audit costs for the TA. In this case, the TA might conduct an audit with positive probability despite suffering from non negligible audit costs.

Proposition 2. *An MNC of type c_H always chooses TSB with a reported transfer price $\overline{p_r}$ and uses tax adjusted marginal costs for internal purposes. For a high level of audit costs, the equilibrium strategies of an MNC with low marginal costs c_L and the TA are as follows:*

- *In the case of $\gamma < \gamma_\delta$ and $K_{a1} < K_a < K_{a2,1}$, the MNC randomizes between TSB with $\overline{p_r}$ and OSB with $\overline{p_r}$. The MNC chooses OSB with probability:*

$$\tau_{1,IV} = \frac{K_a - (1-\beta)(t+h)(a-p_{i1})(\overline{p_r}-\underline{p_r})}{(1-\beta)(t+h)(\overline{p_r}-\underline{p_r})[\gamma(a-\overline{p_r})-(a-p_{i1})]} \tag{7}$$

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[11] Setting δ larger than δ_c simplifies the analysis. For $\delta < \delta_c$, $K_a < K_{a1}$, and $\gamma < \gamma_\delta$, an equilibrium might occur in which the MNC always keeps OSB with $\overline{p_r}$.

and TSB with $\overline{p_r}$ with probability $1 - \tau_{1,IV}$. The TA audits the reported transfer price with probability:

$$\eta_{IV} = \frac{1}{\delta(\overline{p_r} - \underline{p_r})(t+h)} \left[A - \sqrt{A^2 - (\overline{p_r} - c_L)^2 (1-t)^2} \right] \tag{8}$$

with $A := a(1-\gamma)(1-t-h) + \gamma \overline{p_r}(1-t-h) + h\overline{p_r} - c_L(1-t)$.

- *In the case of $\gamma > \gamma_\delta$ and $K_{a1} < K_a < K_{a2,2}$, the MNC randomizes between TSB with $\overline{p_r}$ and TSB with $\underline{p_r}$. Randomization probabilities are described in (5) and for the TA in (6).*

Proof. All proofs and thresholds are stated in the appendix. □

The findings of proposition 1 and 2 are illustrated in figure 4. The MNC never chooses OSB when the bargaining power of the TA is above the threshold of γ_δ. Hence, the bargaining power of the TA determines whether the reduced flexibility of OSB is outweighed by an improved bargaining power of the MNC in case of a detected non compliance or not. The dark gray area shows that for not prohibitively high audit costs the MNC always randomizes between the two TSB strategies. So, the MNC randomizes between mimicking the high cost type and a truthful report.
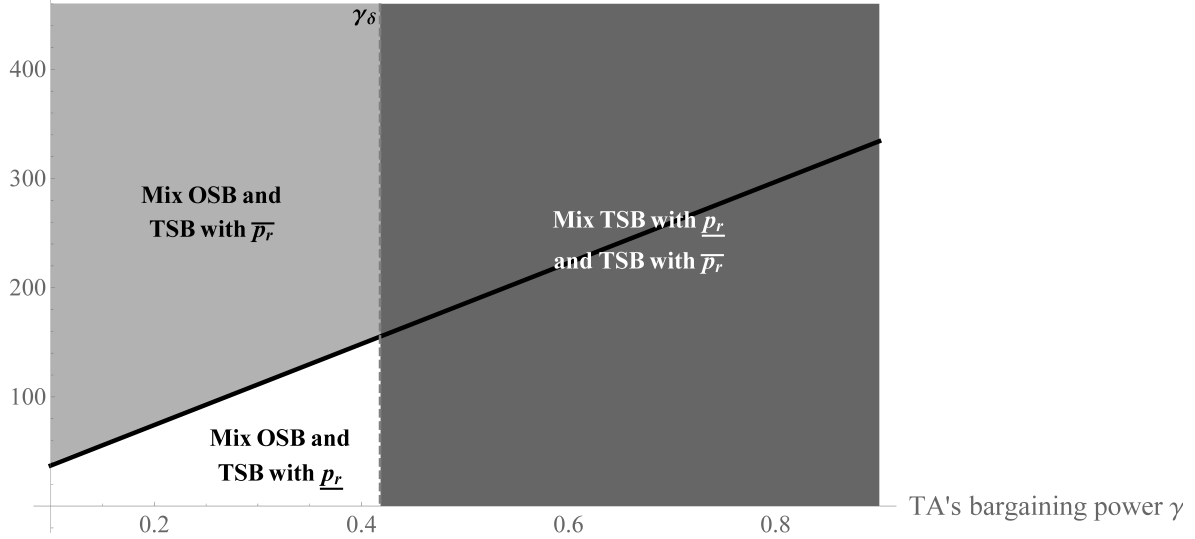

Figure 4: Equilibrium Analysis (plotted for $a = 200, c_H = 80, m_H = 10, c_L = 65, m_L = 10, t = 0.2, \beta = 0.5, h = 0.25$, and $\delta = 2.5$)

When the TA's bargaining power is high the TA can enforce his interests independent of MNC's accounting strategy. The advantage of OSB compared to TSB is lost. But if the TA's bargaining power is low, the MNC might randomize with OSB. However, keeping OSB is never chosen as a pure strategy in equilibrium because the low cost type always has an incentive to deviate. If

the audit costs for the TA are low, the MNC randomizes between OSB with $\overline{p_r}$ and TSB with $\underline{p_r}$. Due to the low audit costs, the MNC expects a frequent audit. Hence, it balances the conflicting objectives while taking into account possible transfer pricing adjustments and penalties. For smaller audit incentives of the TA, the reduced flexibility of OSB outweigh the increased risk of penalization while keeping TSB with $\overline{p_r}$. That is, while auditors personal costs are high(light gray area), the MNC randomizes between OSB and TSB with $\overline{p_r}$.

Proposition 1 and 2 highlight that for not prohibitively high audit costs, the MNC randomizes with OSB as long as the bargaining power γ stays below its respective threshold.[12] For almost any level of audit costs and bargaining power, the MNC keeps TSB with a high transfer price with positive probability. Solely, for a low bargaining power of the TA and low audit costs, the MNC does not keep TSB with an untruthful report. In this case the MNC randomizes between OSB and TSB with $\underline{p_r}$. Hence, in this case the MNC can be prevented from tax aggressive behavior. With audit cost below K_{a1} and γ above the threshold, the probability for TSB with $\overline{p_r}$ is low. If there are high audit costs, the probability for TSB with $\overline{p_r}$ is higher.

From these reported results, we point out some economic implications.

At first, we are interested in the effects of the bargaining power. When the bargaining power of the TA is high, the MNC randomizes between the two TSB strategies and does not choose OSB. The reason is that the advantage of the bargaining power for the MNC is small and so, the disadvantage of OSB in comparison to TSB is large. Therefore, the decoupling provides better management incentives to ensure optimal quantity decisions.

Then, we are interested in the effects of the personal audit costs of the TA. For a decrease in the audit costs, the TA conducts an audit more frequently. Hence, being tax aggressive becomes more expensive for the MNC. Specifically, as shown in proposition 1 and illustrated in figure 4, the MNC randomizes between TSB with $\overline{p_r}$ and TSB with $\underline{p_r}$ for a high bargaining power of the TA. The probability of keeping TSB with $\overline{p_r}$ decreases for declinig audit costs of the TA. This is caused by the TA's higher scrutiny. Then, keeping TSB with $\underline{p_r}$ becomes more likely. This reduces the MNC's tax aggressiveness. For a low bargaining power of the TA, OSB becomes

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[12] The threshold γ_δ can be negative. Specifically, γ_δ is inversely U-shaped in the tax difference h. When γ_δ is negative, OSB is no longer part of an equilibrium strategy. Then, the left part of figure 4 does not occur.

more favorable. Thus, for high audit costs, the MNC randomizes between OSB and TSB with $\overline{p_r}$. In this case, lower audit costs lead to a lower probability of keeping TSB with $\overline{p_r}$. For low audit costs, a higher scrutiny by the TA induces the MNC to randomize between OSB and TSB with $\underline{p_r}$. Keeping TSB with $\underline{p_r}$ is not considered tax aggressive. Hence, for any level of the TA's bargaining power, an MNC becomes less tax aggressive for decreasing audit costs.

4.3 Properties of Equilibrium Strategies

Next to the level of the audit costs and the bargaining power of the TA, the tax difference between the two jurisdictions influences the MNC's willingness to keep TSB with the high transfer price. As long as audit costs are not prohibitively high, the MNC tends to refrain from keeping TSB with the high transfer price for a raise in the tax rate difference. In particular, for an increase in the tax difference, the MNC keeps TSB and reports the high transfer price with a smaller probability. This result is caused by the strategic behavior of the TA. For a low bargaining power of the TA and low audit costs, the MNC does not keep TSB with the high transfer price at all. Otherwise, the MNC keeps TSB with a high transfer price with positive probability which declines for a raising tax difference. Specifically, a high tax difference implies a high tax saving potential for the MNC. The TA is aware of the high tax saving potential. Thus, he displays more scrutiny. This increases the MNC's expected penalization cost which is incorporated in the transfer pricing decision. In this situation, the weakened bargaining power associated with TSB is particularly harmful for the MNC. In sum, for an increase in the tax difference, the MNC is inclined to keep TSB with the high transfer price $\overline{p_r}$ less often because of the TA's raised scrutiny. This finding is summarized in proposition 3 and illustrated in figure 5 for a high bargaining power of the TA.[13]

Proposition 3. *For a high (low) bargaining power of the TA as well as not prohibitively high audit costs, the MNC's probability to keep TSB with the high transfer price $\overline{p_r}$ decreases (does not increase) for an increase in the tax difference h.*

Next, we are interested in the effects of a change in the tax difference on the internal transfer prices and the produced quantity. An increase in the tax difference *h*, makes shifting profit to the low tax country more attractive. When the MNC keeps TSB, the reported transfer price is

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[13] Thus, figure 5 corresponds to the setting depicted in the right part of figure 4.
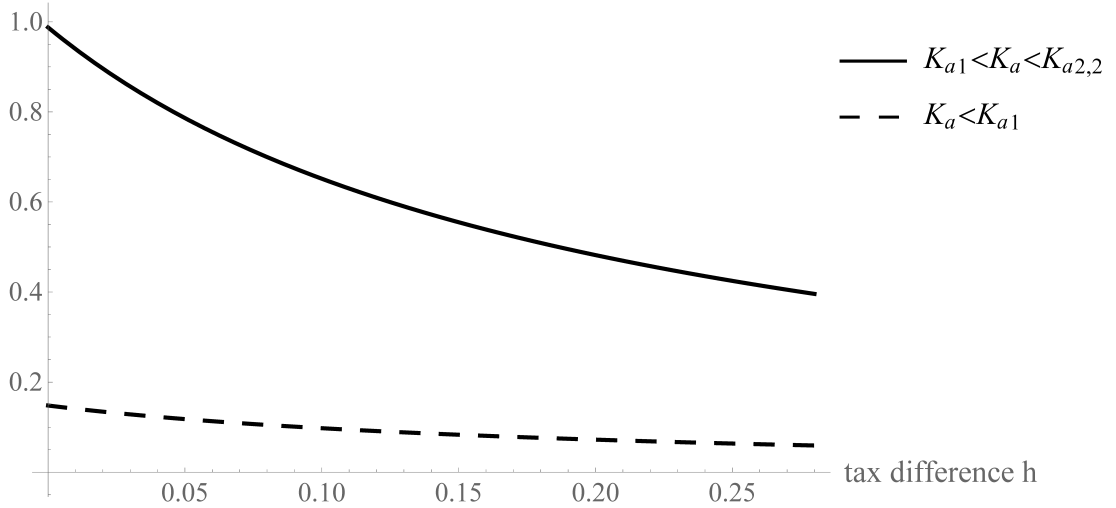
Figure 5: Probability of TSB with $\overline{p_r}$ considering the tax rate differential h (plotted for $a = 200, c_H = 80, m_H = 10, c_L = 65, m_L = 10, t = 0.2, \beta = 0.5, \gamma = 0.5$, and $\delta = 2.5$; For $h \in [0, 0.28]$, the thresholds K_{a1} and $K_{a2,2}$ lie in the intervals $[82.50, 198.00]$ and $[202.50, 505.39]$, respectively. The probability for the case $K_{a1} < K_a < K_{a2,2}$ ($K_a < K_{a1}$) is depicted for $K_a = 200$ ($K_a = 30$).)

already set to optimize the tax payments. Then, a high cost type MNC can shift more profit to the foreign division by producing and selling a higher quantity q. Increasing the quantity also has an indirect effect on the MNC's profit. The price per unit sold decreases and the contribution margin per unit sold becomes smaller. However, for a higher tax difference, the decrease in the contribution margin is outweighed by the positive effects of a higher quantity. A low cost type MNC either aggressively reduces its tax payments by mimicking the high cost type MNC or non-aggressively by reporting the highest appraised tax transfer price for low marginal costs $\underline{p_r}$. A non-aggressive reporting strategy faces the same trade-off between a smaller contribution margin and the direct effects of increasing the quantity as the high cost type MNC. In addition to these two effects, an aggressive MNC also considers the raised scrutiny of the TA associated with an increase in the tax difference. As discussed in proposition 3, the MNC reduces the probability to keep TSB with a high transfer price. This anticipation of the TA's raised scrutiny allows an aggressive MNC to also beneficially raise its quantity for an increase in the tax difference.

Proposition 4. *For TSB and not prohibitively high audit costs, a raise in the tax difference h, decreases the internal transfer prices and thus, increases the produced and sold quantity q of the MNC.*

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5 Conclusion

Former research has already shown that keeping OSB in markets with imperfect competition might become optimal despite the MNC's reduced flexibility in optimizing both internal decision making and tax payments. However, these results depend crucially on whether competitors are able to observe when one transfer price is used to align conflicting objectives or not. To the best of our knowledge, we are the first to introduce a strategic tax auditor in a setting where the MNC can choose between keeping OSB versus TSB. The findings illustrate that an MNC might keep OSB in equilibrium. In particular, this is the case for a low bargaining power of the TA. The findings of the equilibrium analysis show that the outcome of the game depends on a variety of factors. Hence, it is not straightforward which equilibrium and which strategies occur. In general, the conclusion of former research that TSB dominates OSB cannot be confirmed. In the examined setting, the MNC faces a trade-off between flexibility and expected penalty payments. By keeping TSB, an MNC can separately induce the optimal quantity decision and minimize tax payments. However, in contrast to keeping OSB, an MNC suffers from a weakened bargaining power. Thus, an MNC with TSB incurs higher penalty payments in the case of a detected non-compliance during a tax audit. The costs associated with TSB exceed the benefits from flexibility if the MNC has a good bargaining power while keeping OSB. Then, an MNC keeps OSB.

Another relevant aspect is the tax spread between the foreign and the domestic country. The findings show that when this parameter increases MNC's tax aggressiveness decreases. Specifically, we find that the probability of keeping TSB with a transfer pricing report which aims to minimize taxes decreases for an increase in the tax difference between the jurisdictions. On the one hand, as expected, a high tax difference yields a high tax saving potential. By keeping TSB with a high transfer pricing report, the MNC can exploit the high tax difference by shifting profit to the low tax country. However, the TA is aware of the MNC's incentive to shift profits. Thus, the high tax saving potential invites increasing scrutiny by the TA. This raises the expected costs stemming from the weakened bargaining power while keeping TSB with a transfer price that does not comply with the arm's length principle. As a consequence, with an increasing tax difference profit shifting becomes riskier and less attractive for the MNC. Then,

the MNC increasingly refrains from keeping TSB with a high reported transfer price.

These results highlight that tax regulation and enforcement affect taxpayer's behavior in a non-trivial way. In particular, an MNC's choice of keeping OSB versus TSB and the related potential tax saving behavior can be influenced by tax legislation and enforcement. This paper illustrates that both the level of audit costs of the TA as well as the TA's bargaining power in case of a detected non-compliance determine the MNC's tax related equilibrium behavior. As a consequence, the findings are highly relevant for a number of institutional players, for example, legislators, tax authorities, MNCs, as well as supranational units like the EU and the OECD.

6 Appendix

6.1 Proof regarding Dominated Strategies

The following strategies are dominated:

- When the MNC reports $p_r = \underline{p_r}$, the MNC incurs the highest possible tax payments. Thus, a tax audit cannot result in additional tax revenues. Consequently, the TA never audits a low reported transfer price.

- For $p_r > \overline{p_r}$, the TA can claim a high fee without costs. Thus, setting $p_r > \overline{p_r}$ is never chosen by the MNC.

- The TA cannot generate any additional tax revenues in a tax audit when the MNC is of type $c = c_H$ and chooses a $p_r \leq \overline{p_r}$. Thus, the MNC can keep TSB without any additional costs. The MNC minimizes the tax payments by setting $p_r = \overline{p_r}$.

- The TA cannot generate any additional tax revenues in a tax audit when the MNC is of type $c = c_L$ and chooses a $p_r \leq \underline{p_r}$. Thus, the MNC can keep TSB without any additional costs. The MNC sets the internal transfer price so that the profit is maximized. Without any additional costs, this strategy results in a better quantity decision by the domestic division than under OSB with $p_r \leq \underline{p_r}$. Thus, OSB with $p_r \leq \underline{p_r}$ is strictly dominated by TSB with $p_r = \underline{p_r}$.

- For TSB with a $p_r \in \left(\underline{p_r}, \overline{p_r} \right)$, the MNC of type $c = c_L$ prefers one of the not included corner solutions. Thus, using $p_r = \overline{p_r}$ ($p_r = \underline{p_r}$) strictly dominates the use of a p_r close to $p_r = \overline{p_r}$ ($p_r = \underline{p_r}$).

- For a high prohibitive price a, the MNC of type $c = c_L$ keeping OSB prefers the transfer price $p_r = \overline{p_r}$ to any $p_r \in \left(\underline{p_r}, \overline{p_r} \right)$. $\qquad \square$

6.2 Proof of Lemma 1

This proof is organized in two steps. First, the case is considered in which the MNC reports a transfer price that is acceptable for its marginal costs. Second, the case is considered in which a low cost type MNC mimics a high cost MNC.

Step 1: For an MNC of type c_j with $j = H, L$, the TA does not contest a reported transfer price that belongs to the range $[0, \overline{p_r}]$ or $[0, \underline{p_r}]$, respectively. Thus, the MNC's profit with marginal costs c_j is determined by

$$\Pi^{MNC}(p_i, p_r) = (a - p_i)\left[(1 - t - h)\left(a - \frac{1}{2}(a - p_i)\right) - (1 - t)c_j + hp_r\right]. \tag{9}$$

The FOC of equation 9 with respect to p_r is $(a - p_i)h > 0$. The Hessian matrix of equation 9 is not strictly definite. Hence, the MNC prefers to set p_r as large as possible, i.e. $\overline{p_r}$ ($\underline{p_r}$) for $c_j = c_H$ ($c_j = c_L$).

$$FOCp_i : -(1 - t - h)p_i + (1 - t)c_j - hp_r = 0$$

$$SOCp_i : -(1 - t - h) < 0$$

Thus, the FOC for p_i determines a local maximum:

$$p_i = \frac{1}{1 - t - h}\left[(1 - t)c_j - hp_r\right].$$

Step 2: For an MNC of type c_L, the TA might want to contest a reported transfer price that belongs to the range $(\underline{p_r}, \overline{p_r}]$. Then, the MNC's profit is determined by

$$\Pi^{MNC}(p_i, p_r) = (a - p_i)\left[(1 - t - h)\left(a - \frac{1}{2}(a - p_i)\right) - (1 - t)c_L + hp_r\right] \tag{10}$$

$$-\eta\delta(t + h)(a - p_i)(p_r - \underline{p_r}).$$

The FOC of equation 10 with respect to p_r is $(a - p_i)[h - \eta\delta(t + h)]$. The Hessian matrix of equation 10 is not strictly definite. Hence, the MNC prefers to either set p_r as large or as small as possible. The case in which the MNC wants to set a small transfer price is already described in step 1. Thus, we next consider the case in which $\overline{p_r}$ is preferred.

$$FOCp_i : -(1 - t - h)p_i + (1 - t)c_L - h\overline{p_r} + \eta\delta(t + h)(\overline{p_r} - \underline{p_r}) = 0$$

$$SOCp_i : -(1 - t - h) < 0$$

Thus, the FOC for p_i determines a local maximum:

$$p_i = \frac{1}{1-t-h}\left[(1-t)c_L - h\overline{p_r} + \eta\delta(t+h)(\overline{p_r} - \underline{p_r})\right].$$

$\square$

6.3 Proof of Proposition 1 and Proposition 2

The following proof is organized in several steps. For all steps, let ρ be the TA's belief that an MNC reporting a high transfer price, $p_r = \overline{p_r}$, has high marginal costs, $c = c_H$. In addition, $\tau = (\tau_1, \tau_2, \tau_3)$ is the randomized strategy of the MNC for $c = c_L$. τ_1 (τ_2/τ_3) denotes the MNC's chosen probability to set OSB with a high reported transfer price $p_r = \overline{p_r}$ (TSB with a high reported transfer price $p_r = \overline{p_r}$/TSB with a low reported transfer price $p_r = \underline{p_r}$). When observing a high reported transfer price $p_r = \overline{p_r}$, the TA chooses to (not) conduct an audit with probability η ($1 - \eta$). Note that an MNC with $c = c_H$ always chooses TSB with a high reported transfer price $p_r = \overline{p_r}$ and the TA never audits a low reported transfer price $p_r = \underline{p_r}$.

Step 1: Under which conditions does the MNC randomize between OSB with $p_r = \overline{p_r}$ and TSB with $p_r = \overline{p_r}$? The MNC randomizes the strategies OSB with a high transfer price and TSB with a high transfer price if and only if, the expected profit of these two strategies are the same and this expected profit is higher than the expected profit obtainable with TSB with a low transfer price:

$$E\left[\Pi \mid c = c_L, OSB, p_r = \overline{p_r}\right] = \eta\Pi_6^{MNC} + (1-\eta)\Pi_7^{MNC},$$

$$E\left[\Pi \mid c = c_L, TSB, p_r = \overline{p_r}\right] = \eta\Pi_3^{MNC} + (1-\eta)\Pi_4^{MNC},$$

$$\eta\Pi_6^{MNC} + (1-\eta)\Pi_7^{MNC} = \eta\Pi_3^{MNC} + (1-\eta)\Pi_4^{MNC}$$

$$\iff \eta = \frac{1}{\delta(\overline{p_r} - \underline{p_r})(t+h)}\left[A \pm \sqrt{A^2 - (\overline{p_r} - c_L)^2(1-t)^2}\right],$$

where $A := a(1-\gamma)(1-t-h) + \gamma\overline{p_r}(1-t-h) + h\overline{p_r} - c_L(1-t)$. We assume throughout the paper, that a is sufficiently large so that $A > 0$ and $A \pm \sqrt{A^2 - (\overline{p_r} - c_L)^2(1-t)^2} > 0$. Thus, the MNC is indifferent between OSB with $p_r = \overline{p_r}$ and TSB with $p_r = \overline{p_r}$ for

$$\eta_{IV} := \frac{1}{\delta(\overline{p_r} - \underline{p_r})(t+h)}\left[A - \sqrt{A^2 - (\overline{p_r} - c_L)^2(1-t)^2}\right] > 0.$$

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η_{IV} is smaller than 1 if and only if

$$\delta \geq \frac{A - \sqrt{A^2 - (\overline{p_r} - c_L)^2 (1-t)^2}}{(t+h)(\overline{p_r} - \underline{p_r})} =: \delta_4. \tag{11}$$

In addition, $E\left[\Pi \mid c = c_L, OSB, p_r = \overline{p_r}\right] \geq E\left[\Pi \mid c = c_L, TSB, p_r = \underline{p_r}\right]$ if and only if

$$\eta_{IV} \leq \eta_V \iff \delta_4 \leq \delta_c,$$

where δ_c is defined in step 2.

For observing a high reported transfer price, the TA wants to randomize between conducting and not conducting an audit if and only if

$$\tau_1 = \frac{K_a - (1-\beta)(t+h)(a - p_{i1})(\overline{p_r} - \underline{p_r})}{(1-\beta)(t+h)(\overline{p_r} - \underline{p_r})[\gamma(a - \overline{p_r}) - (a - p_{i1})]} := \tau_{1,IV}.$$

$\tau_{1,IV}$ is positive and smaller than 1 if and only if $K_{a1} < K_a < K_{a2,1}$, where

$$K_{a1} := (1-\beta)(t+h)(\overline{p_r} - \underline{p_r})\gamma(a - \overline{p_r}) \tag{12}$$

and

$$K_{a2,1} := (a - p_{i1})(1-\beta)(t+h)(\overline{p_r} - \underline{p_r}). \tag{13}$$

In sum, randomizing between OSB with $p_r = \overline{p_r}$ and TSB with $p_r = \overline{p_r}$ can occur for $K_{a1} < K_a < K_{a2,1}$, $\delta > \delta_4$, and $\delta_4 \leq \delta_c$. In this case, $\tau_2 = 1 - \tau_{1,IV}$, $\eta = \eta_{IV}$, and $\rho = \beta$ constitutes a weak PBE.

Step 2: Under which conditions does the MNC randomize between OSB with $p_r = \overline{p_r}$ and TSB with $p_r = \underline{p_r}$? The MNC randomizes the strategies OSB with a high transfer price and TSB with a low transfer price if and only if, the expected profit of these two strategies are the same and this expected profit is higher than the expected profit obtainable with TSB with a high transfer price:

$$E\left[\Pi \mid c = c_L, OSB, p_r = \overline{p_r}\right] = \eta \Pi_6^{MNC} + (1-\eta)\Pi_7^{MNC},$$

$$E\left[\Pi \mid c = c_L, TSB, p_r = \underline{p_r}\right] = \Pi_5^{MNC},$$

$$\eta \Pi_6^{MNC} + (1-\eta)\Pi_7^{MNC} = \Pi_5^{MNC}$$

$$\Longleftrightarrow \eta = \frac{1}{(a - \overline{p_r})[\delta(t+h)\gamma(\overline{p_r} - \underline{p_r})]}$$

$$\left[\frac{1-t-h}{2}(p_{i2}^2 - \overline{p_r}^2) + ah(\overline{p_r} - \underline{p_r}) \right.$$

$$\left. + c_L(1-t)(\overline{p_r} - p_{i2}) + h(\underline{p_r}p_{i2} - \overline{p_r}^2) \right] := \eta_V.$$

We assume throughout the paper, that a is sufficiently large so that $\eta_V > 0$. η_V is smaller than 1 if and only if

$$\delta \geq \frac{1}{(a - \overline{p_r})[(t+h)\gamma(\overline{p_r} - \underline{p_r})]} \quad (14)$$

$$\left[\frac{1-t-h}{2}(p_{i2}^2 - \overline{p_r}^2) + ah(\overline{p_r} - \underline{p_r}) \right.$$

$$\left. + c_L(1-t)(\overline{p_r} - p_{i2}) + h(\underline{p_r}p_{i2} - \overline{p_r}^2) \right] := \delta_c.$$

In addition, $E\left[\Pi \mid c = c_L, OSB, p_r = \overline{p_r}\right] \geq E\left[\Pi \mid c = c_L, TSB, p_r = \overline{p_r}\right]$ if and only if

$$\eta_{IV} \leq \eta_V \Longleftrightarrow \delta_4 \leq \delta_c,$$

where δ_4 is defined in (11).

For observing a high reported transfer price, the TA wants to randomize between conducting and not conducting an audit if and only if

$$\tau_1 = \frac{K_a}{(1-\beta)(t+h)(\overline{p_r} - \underline{p_r})\gamma(a - \overline{p_r})} := \tau_{1,V}.$$

$\tau_{1,V}$ is positive. In addition, it is smaller than 1 if and only if $K_a \leq K_{a1}$ of (12).

In sum, randomizing between OSB with $p_r = \overline{p_r}$ and TSB with $p_r = \underline{p_r}$ can occur for $K_a < K_{a1}$, $\delta > \delta_c$, and $\delta_4 \leq \delta_c$. In this case, $\tau_3 = 1 - \tau_{1,V}$, $\eta = \eta_V$, and $\rho = \beta$ constitutes a weak PBE.

Step 3: Under which conditions does the MNC randomize between TSB with $p_r = \overline{p_r}$ and TSB with $p_r = \underline{p_r}$? The MNC randomizes the strategies TSB with a high transfer price and TSB with a low transfer price if and only if, the expected profit of these two strategies are the same and this expected profit is higher than the expected profit obtainable with OSB with a high transfer price:

$$E\left[\Pi \mid c = c_L, TSB, p_r = \overline{p_r}\right] = \eta \Pi_3^{MNC} + (1-\eta)\Pi_4^{MNC},$$

$$E\left[\Pi \mid c = c_L, TSB, p_r = \underline{p_r}\right] = \Pi_5^{MNC},$$

$$\eta \Pi_3^{MNC} + (1-\eta)\Pi_4^{MNC} = \Pi_5^{MNC}$$

$$\iff \eta \in \left\{ \frac{h}{\delta(t+h)}, \frac{h}{\delta(t+h)} + \frac{2\left[a(1-t-h) - c_L(1-t)\right]}{\delta(\overline{p_r} - \underline{p_r})(t+h)} \right\}.$$

We assume throughout the paper, that a is big. Conducting an audit is associated with costs for the TA. Thus, the TA audits with probability

$$\eta_{VI} = \frac{h}{\delta(t+h)} > 0.$$

η_{VI} is smaller than 1.

In addition, $E\left[\Pi \mid c = c_L, TSB, p_r = \overline{p_r}\right] \geq E\left[\Pi \mid c = c_L, OSB, p_r = \overline{p_r}\right]$ if and only if

$$\eta_V \leq \eta_{VI} \iff \delta_c \leq \frac{h}{t+h}.$$

For observing a high reported transfer price, the TA wants to randomize between conducting and not conducting an audit if and only if

$$\tau_2 = \frac{K_a}{(1-\beta)(t+h)(\overline{p_r} - \underline{p_r})(a - p_{i1})} := \tau_{2,VI}.$$

$\tau_{2,VI}$ is positive. In addition, it is smaller than 1 if and only if $K_a < K_{a2,2}$, where

$$K_{a2,2} := (a - p_{i1})(1 - \beta)(t+h)(\overline{p_r} - \underline{p_r}). \tag{15}$$

In sum, randomizing between TSB with $p_r = \overline{p_r}$ and TSB with $p_r = \underline{p_r}$ can occur for $K_a < K_{a2,2}$ and $\delta_c \leq \frac{h}{t+h}$. In this case, $\tau_3 = 1 - \tau_{2,VI}$, $\eta = \eta_{VI}$, and $\rho = \beta$ constitutes a weak PBE.

Step 4: What are the properties of δ_c and δ_4?

For $0 < \gamma < \gamma_\delta$, we obtain $\delta_c > \delta_4$, $\delta_4 < 1$, and $\delta_c > \frac{h}{t+h}$, where

$$\gamma_\delta := \frac{1}{2h(a - \overline{p_r})(\overline{p_r} - \underline{p_r})} \tag{16}$$

$$\left[2ah(\overline{p_r} - \underline{p_r}) - (1-t-h)(\overline{p_r}^2 - p_{i2}^2) + 2(1-t)c_L(\overline{p_r} - p_{i2}) - 2h(\overline{p_r} - p_{i2}\underline{p_r})\right].$$

For $\gamma_\delta < \gamma \leq 1$, we obtain $\delta_c < \frac{h}{t+h}$ and $\delta_c < \delta_4 < \frac{h}{t+h}$ is smaller than 1. Thus, for $\gamma_\delta < \gamma \leq 1$,

δ_c is also smaller than 1. $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ □

6.4 Proof of Proposition 3

For $\gamma > \gamma_\delta$ and $K_a < K_{a2,2}$, the MNC keeps TSB with $\overline{p_r}$ with probability $\tau_{2,VI}$ and uses the internal transfer price

$$p_{i1} = \frac{1}{1-t-h}\left[(1-t)c_L - h\overline{p_r} + \eta_{VI}\delta(t+h)(\overline{p_r} - \underline{p_r})\right] = \frac{1}{1-t-h}\left[(1-t)c_L - h\underline{p_r}\right].$$

$$\frac{dp_{i1}}{dh} = \frac{1}{(1-t-h)^2}\left[(1-t)(-c_L - \underline{p_r})\right] < 0 \qquad\qquad (17)$$

Therefore,

$$\frac{d\tau_{2,VI}}{dh} = \underbrace{\frac{\partial\tau_{2,VI}}{\partial h}}_{<0} + \underbrace{\frac{\partial\tau_{2,VI}}{\partial p_{i1}}}_{>0}\underbrace{\frac{dp_{i1}}{dh}}_{<0} < 0.$$

For $\gamma < \gamma_\delta$ and $K_a \in (K_{a1}, K_{a2,1})$, the MNC keeps TSB with $\overline{p_r}$ with probability $\tau_{2,IV}$ and uses the internal transfer price

$$p_{i1} = \frac{1}{1-t-h}\left[(1-t)c_L - h\overline{p_r} + \eta_{IV}\delta(t+h)(\overline{p_r} - \underline{p_r})\right].$$

$$\frac{\partial\tau_{2,IV}}{\partial h} = (-1)\cdot\underbrace{\left[(1-\beta)(t+h)(\overline{p_r} - \underline{p_r})[a - p_{i1} - \gamma(a - \overline{p_r})]\right]^{-2}}_{>0}\cdot$$

$$\underbrace{K_a\left[(1-\beta)(\overline{p_r} - \underline{p_r})[a - p_{i1} - \gamma(a - \overline{p_r})]\right]}_{>0} < 0.$$

$$\frac{\partial\tau_{2,IV}}{\partial p_{i1}} = (-1)\cdot\underbrace{\left[(1-\beta)(t+h)(\overline{p_r} - \underline{p_r})[a - p_{i1} - \gamma(a - \overline{p_r})]\right]^{-2}}_{>0}\cdot$$

$$\left[\underbrace{(1-\beta)(t+h)(\overline{p_r} - \underline{p_r})}_{>0}\underbrace{(K_{a1} - K_a)}_{<0 \text{ for } K_a \in (K_{a1}, K_{a2,1})}\right] > 0.$$

$$\frac{dp_{i1}}{dh} = \frac{1}{(1-t-h)^2}\left[(1-t-h)\right. \qquad\qquad (18)$$

$$\left. \left[A(a - \overline{p_r})(1-\gamma)\left(A^2 - (\overline{p_r} - c_L)^2(1-t)^2\right)^{-\frac{1}{2}}\right] - \sqrt{A^2 - (\overline{p_r} - c_L)^2(1-t)^2}\right].$$

For $A > 0$ and $A^2 - (\overline{p_r} - c_L)^2(1-t)^2$, $\frac{dp_{i1}}{dh}$ is negative. In sum,

$$\frac{d\tau_{2,IV}}{dh} = \underbrace{\frac{\partial\tau_{2,IV}}{\partial h}}_{<0} + \underbrace{\frac{\partial\tau_{2,IV}}{\partial p_{i1}}}_{>0}\underbrace{\frac{dp_{i1}}{dh}}_{<0} < 0.$$

For $\gamma < \gamma_\delta$ and $K_a < K_{a1}$, the MNC keeps TSB with $\overline{p_r}$ with probability 0. $\qquad\square$

6.5 Proof of Proposition 4

A high cost type MNC uses the internal transfer price

$$p_{iH} = \frac{1}{1-t-h}\left[(1-t)c_H - h\overline{p_r}\right].$$

$$\frac{dp_{iH}}{dh} = (-1)\frac{1}{(1-t-h)^2}\left[(1-t)m_H\right] < 0.$$

A low cost type MNC keeping TSB with $\underline{p_r}$ uses the internal transfer price

$$p_{i2} = \frac{1}{1-t-h}\left[(1-t)c_L - h\underline{p_r}\right].$$

$$\frac{dp_{i2}}{dh} = (-1)\frac{1}{(1-t-h)^2}\left[(1-t)m_L\right] < 0.$$

For $\gamma > \gamma_\delta$, a low cost type MNC keeping TSB with $\overline{p_r}$ uses the internal transfer price

$$p_{i1} = \frac{1}{1-t-h}\left[(1-t)c_L - h\overline{p_r} + \eta_{VI}\delta(t+h)(\overline{p_r} - \underline{p_r})\right] = \frac{1}{1-t-h}\left[(1-t)c_L - h\underline{p_r}\right].$$

According to equation 17 $\frac{dp_{i1}}{dh}$ is negative.

For $\gamma < \gamma_\delta$, a low cost type MNC keeping TSB with $\overline{p_r}$ uses the internal transfer price

$$p_{i1} = \frac{1}{1-t-h}\left[(1-t)c_L - h\overline{p_r} + \eta_{IV}\delta(t+h)(\overline{p_r} - \underline{p_r})\right].$$

According to equation 18 $\frac{dp_{i1}}{dh}$ is negative. $\qquad\square$

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