Strategic Incentives for Keeping one Set of Books in International Transfer Pricing

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Discussion Paper No. 08-16
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February 2008

*This paper was inspired by discussions with participants at a doctoral workshop held by R. F. Göx at the University of Vienna in Summer 2006. We are particulary indebted to Georg Schneider for his valuable suggestions and to Thomas Pfeiffer for hosting the workshop. We also thank Sandra Anclam for useful comments.

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Abstract

This paper analyses the optimal accounting and transfer pricing policies of two multinational duopolists facing price competition in the final product market. Our main finding is that firms in industries with a small number of competitors may benefit from using the same transfer price for tax and managerial purposes, even if the tax and managerial objectives are conflicting. This result contrasts earlier theoretical research having established the superiority of separate prices for tax and managerial purposes in a non-strategic setting. We analyze two different tax environments and identify conditions for which a joint commitment to a policy of one set of books is a dominant strategy equilibrium for both scenarios. We find that the existence of this equilibrium is more likely if the products are close substitutes, so that there is a high intensity of competition in the product market. Our analysis broadens the theoretical understanding of the factors governing the optimal accounting policy and provides testable empirical predictions. According to our results, the practice of one set of books should be the prevalent accounting method in markets with a small number of competitors and similar products.
1 Introduction

The increasing globalization of the world economy in the past decade has not only accelerated the growth of existing and the creation of new multinational enterprises (MNE) but it has also significantly increased the internal trade within these multinationals. According to a recent report of the *Economist* (2004), the number of global enterprises has increased from a total of 37’000 MNEs with 175’000 foreign subsidiaries in the early nineties to a total of 64’000 MNEs with 870’000 subsidiaries in 2003. In addition, it has been found that around 60% of all global trade takes the form of internal transactions within MNEs. Not surprisingly, these trends have increased global tax competition and the importance of international tax management for MNEs.

Transfer prices are an important instrument for managing the global tax liability within MNEs. According to a recent survey conducted by *Ernst & Young* (2005a) more than 90% of the MNEs in the survey found transfer pricing important. Corporate tax directors even named transfer pricing as the most important item on their agendas. These findings can be explained by the increasing awareness of international tax authorities about the potential use of transfer prices as a device for shifting profits into low tax jurisdictions.\(^1\)

The management accounting literature has traditionally focused on the managerial aspects of transfer pricing and largely ignored the tax function of transfer pricing. Starting with *Hirshleifer* (1956), transfer pricing was primarily analyzed as an internal coordination mechanism enabling the management of decentralized firms to achieve goal congruence between the firms’ headquarters and the management of autonomous divisions.\(^2\) Only recently, managerial accounting research has begun to provide an integrated analysis of managerial and tax aspects of transfer pricing.

As long as tax and managerial objectives are not conflicting, the transfer pricing problem can be solved by using the same transfer price for tax reporting and for managerial purposes. Following the terminology of *Hyde and Choe* (2005), we refer to this case as keeping “one set

\(^1\)A large number of countries have recently released special legislation and documentation rules for international transfer prices, see *Ernst & Young* (2005a, 2005b) for details.

of books”. Because the optimal level of internal trade is generally achieved with transfers at marginal cost, a policy of one set of books will theoretically serve both objectives of transfer pricing whenever the global tax liabilities are minimized with the lowest possible transfer price. By contrast, Baldenius, Mehmed and Reichelstein (2004) show that firms are better off by using two sets of books, that is by decoupling tax transfer prices from managerial transfer prices, whenever the tax and the managerial objectives are conflicting. This result is intuitively appealing because it is generally difficult to achieve two conflicting objectives with one single instrument. In a related paper, Hyde and Choe (2005) analyze the interrelation between tax and incentive transfer prices and find that the optimal transfer prices with two sets of books are usually interdependent albeit serving different functions.

The empirical evidence on the optimal accounting policy is mixed. Recent survey results suggest that a large number of firms uses only one set of books. Ernst&Young (2003) reports that over 80 percent of the companies in their global firm sample use the same transfer prices for managerial and for tax purposes. On the other hand, Springsteel (1999) reports that 77 percent of the firms within a ”best practice group” use different transfer prices for tax and managerial purposes.

Earlier literature has tried to explain the mixed empirical evidence by the additional administrative expenses and the increased likelihood of a tax audit.\(^3\) We offer a new perspective on the issue by providing a strategic rationale for keeping one set of books. Our main finding is that firms in industries with a small number of competitors may benefit from using the same transfer price for tax and managerial purposes even if the tax and managerial objectives are conflicting. Our analysis is based on a model of two decentralized MNEs competing in prices in the final product market. As shown by Alles and Datar (1998) and Göz (2000), oligopolistic firms facing price competition have an incentive to set transfer prices strategically above marginal cost for reducing the intensity of competition in the final product market.

A major shortcoming of strategic transfer pricing is the fact that it requires an observable commitment to a particular set of transfer prices before the responsible division managers are setting their final product market prices.\(^4\) This requirement is a strong restriction for the strategic use of transfer prices that is typically not met by internal transfer prices. By

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\(^3\)See e.g. Kant (1988), Smith (2002a) and Smith (2002b).

\(^4\)See Göz (2000) for a formal proof. Göz and Schönwede (2004) offer a path to circumvent this requirement by analyzing a game with unobservable transfer prices but risk averse managers.
contrast, tax transfer prices are generally well documented and hard to change once a firm has decided to apply a particular transfer pricing method. Consistent with these arguments, our analysis assumes that transfer prices for tax reporting are observable, whereas internal transfer prices are not observable.\(^5\) It follows that a firm keeping two sets of books can efficiently disentangle tax and managerial objectives but it cannot use its transfer prices strategically because the internal transfer price is unobservable. With one set of books, a potential conflict between tax and managerial objectives arises but this policy allows for the strategic use of transfer pricing because the division managers are forced to make their pricing decisions on the basis of the observable tax transfer price.

We show that the optimal solution of this fundamental trade-off between the two accounting policies under consideration depends on the relative importance of strategic versus managerial and tax considerations. We distinguish two cases. In the first case, the tax incentives call for a high transfer price, and in the second case a low transfer price is desirable for tax reporting. In the first case, strategic considerations and tax incentives are complementary objectives, whereas in the second case these objectives are conflicting. For both cases we identify conditions under which a joint commitment to a policy of one set of books is a dominant strategy equilibrium. We find that the existence of this equilibrium is more likely the easier the products can be substituted, or, equivalently, the higher the intensity of competition between the two firms.

Our analysis contributes to the transfer pricing literature by broadening the understanding of the potential incentives for the choice between one and two sets of books. As mentioned above, Baldenius, Melumad and Reichelstein (2004) have recently analyzed this question without considering strategic aspects of transfer pricing. Other papers have analyzed international transfer pricing in the context of oligopolistic product markets but none of the existing papers has analyzed the trade-off between one and two sets of books.\(^6\) Our analysis does not only broaden the theoretical understanding of the factors governing the optimal accounting policy but it also provides testable empirical predictions. According to our results, and holding other factors constant, the practice of one set of books should be the prevalent accounting method in markets with a small number of competitors and similar products, whereas for other industry structures the firms should be expected to use rather two than one set of books.

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\(^5\)See Narayanan and Smith (2000) for a corresponding assumption.

\(^6\)Recent examples are Schjelderup and Sorgard (1997), and Narayanan and Smith (2000). Both papers exogenously assume that the firms are using one set of books.
The remainder of our paper is organized as follows. In section 2 we outline the model assumptions. In section 3 we analyze the optimal transfer pricing policies for three different organizational settings. As a benchmark case, we first determine the optimal policy of a centralized firm. We continue with a divisionalized firm using two sets of books and end section 3 with the analysis of a decentralized firm using one set of books. In section 4 we provide an example of our general model and in section 5 we end the paper with a short summary and discussion of our results.

2 Model assumptions

We consider a model of two multinational enterprises \( M_i, i = 1, 2 \) each of them consisting of headquarters \( HQ_i \) and two divisions. The first division \( S_i \) (the "seller") is located in the same country as the firm’s headquarters. This domestic division produces an intermediate product at constant marginal cost \( c \) and sells it to a second division \( B_i \) (the "buyer"), which is located in a foreign country. The foreign division further processes the intermediate product and sells the final product to customers in the foreign country at price \( p_i \). For simplicity we normalize the further processing costs of division \( B_i \) to zero.

The final product market in the foreign country is exclusively served by the two subsidiaries \( B_i \) and \( B_j \), each of them offering a different brand within a broader product class. We assume that the firms compete in prices. The market demand for the final product of subsidiary \( B_i \) is a function of its own price \( p_i \) and the competitor’s price \( p_j \). The demand function \( q_i(p_i, p_j) \) satisfies the following conditions:

\[
\frac{\partial q_i}{\partial p_i} < 0, \quad \frac{\partial q_i}{\partial p_j} > 0, \quad \frac{\partial^2 q_i}{\partial p_i \partial p_j} \geq 0.
\] (1)

The products are substitutes, that is, the demand for the final product of subsidiary \( B_i \) decreases with its own price \( p_i \) and increases with the competitor’s price \( p_j \). The last condition in (1) implies that the marginal demand effect of a price change by firm \( i \) is (weakly) increasing in the price of firm \( j \). Suppose also that the following conditions hold:

\[
\frac{\partial q_i}{\partial p_j} = \frac{\partial q_j}{\partial p_i} \quad \text{and} \quad \frac{\partial q_j}{\partial p_i} < -\frac{\partial q_i}{\partial p_i}.
\] (2)

The first condition in (2) exhibits the symmetry of cross effects on demand, and the second condition states that both firms’ products are imperfect substitutes, so that one firm cannot capture the entire market by marginally undercutting its rival’s price.
We assume that the two divisions are set up as separate legal entities and taxed at flat tax rates in their respective countries of residence. The domestic tax rate equals $\tau$ and the foreign tax rate equals $\tau + \Delta$. The parameter $\Delta$ measures the tax rate difference between the two countries. To capture all possible tax environments, we do not restrict the sign of $\Delta$. If $\Delta > 0$, the home country is a tax heaven, and if $\Delta < 0$, the foreign country offers a tax advantage over the home country. For restricting the analysis to reasonable scenarios both tax rates are assumed to lie in the interval $[0, 1]$ implying that $\Delta \in [-\tau, 1 - \tau]$.

The firms’ headquarters use transfer prices for the allocation of global profits and for coordinating internal trade between the two divisions $S_i$ and $B_i$. As in Baldenius, Melumad and Reichelstein (2004), we allow the firm to use two different transfer prices for tax reporting and for regulating internal trade. We refer to this case as keeping two sets of books. We denote the tax transfer price with $t_i$, and the internal transfer price with $T_i$. In the absence of any strategic rationale for transfer pricing, this decoupling of transfer pricing functions can help the firm to avoid potential conflicts between the two objectives of global tax minimization and of coordinating internal trade and thereby improve its profitability.

If firms are facing oligopolistic competition, a new perspective of transfer pricing arises, namely the option of altering the intensity of competition in the final product market. As shown by Göx (2000), however, transfer pricing can generally only play a strategic role if both firms can make an observable commitment to a particular transfer price before the responsible division managers are setting their final product market prices. This type of commitment is a strong requirement that is typically not met by internal transfer prices.

By contrast, tax transfer prices are usually very well documented and hard to change once a firm has decided to apply a particular transfer pricing method. In what follows, we therefore assume that the tax transfer price $t_i$ is observable, whereas the internal transfer price $T_i$ is not. This setting gives rise to a new trade-off that we will analyze in our paper: If the firm is keeping two sets of books it can efficiently disentangle tax and managerial objectives in transfer pricing but it cannot use its transfer prices strategically because the internal transfer price is unobservable. If the firm uses only one set of book it introduces a potential conflict between tax and managerial objectives but it allows for the strategic use of transfer pricing because the division managers are forced to make their pricing decisions in the final product market on the basis of the observable tax transfer price $t_i$. In other words, it is no longer evident that keeping two sets of books is always the dominant accounting policy.
Following earlier literature, we assume that all firms in the industry can arbitrarily choose a tax transfer price from an allowable range of arm’s length prices whithstanding a possible examination of tax authorities in the two countries of residence. We define this range as an interval $[\mathcal{L}, \mathcal{T}]$ requiring that the lower bound $\mathcal{L}$ must not be lower than marginal cost ($\mathcal{L} \geq \mathcal{C}$) and that the upper bound $\mathcal{T}$ must not exceed the final product price ($\mathcal{T} \leq \mathcal{P}_i$). Intuitively, these limits can be seen as the justifiable bounds for external transactions between rational players. No firm would sell its products below marginal cost, and internal customer should not be paying more for the intermediate product than external customers pay for the final product.\footnote{See e.g. Samuelson (1982).}

The time line of the game is as follows. On stage one headquarters of $M_1$ and $M_2$ decide on the type of their accounting system, that is if they keep one or two sets of books. On stage two, the two headquarters set their transfer prices, and on stage three the managers of division $B_1$ and $B_2$ decide on the final product market prices. In the next section, we derive the equilibrium of our three stage game.

### 3 Optimal product and transfer pricing

#### 3.1 Tax transfer pricing with centralized product pricing

As a benchmark case, we first analyze briefly the case of tax transfer pricing combined with centralized product pricing. From the assumptions about demand, cost and taxes, the global after tax profit of $M_i$ equals:

$$\Pi_i = \alpha \cdot (R_i(p_i, p_j) - c \cdot q_i(p_i, p_j)) + \Delta \cdot (t_i - c) \cdot q_i(p_i, p_j)$$

where $\alpha = 1 - \tau - \Delta$ and $R_i(p_i, p_j) = p_i \cdot q_i(p_i, p_j)$ (3)

The profit function in (3) comprises the after tax difference between revenues and cost and a tax effect capturing the impact of the firm’s transfer pricing policy on its global tax bill. This second term equals zero if the tax rates in both countries are identical ($\Delta = 0$), or if the transfer price equals marginal cost ($t_i = c$). For determining the optimal transfer price, the firm maximizes the profit function in (3) with respect to $t_i$. Because $\partial \Pi_i / \partial t_i = \Delta \cdot q_i(p_i, p_j)$, the firm’s transfer pricing policy is uniquely determined by the sign of the tax difference.
between the two countries. The optimal tax transfer price equals:

\[ t^*_i = \begin{cases} \frac{\xi}{\tau} & \text{if } \Delta < 0 \\ \frac{\tau}{\xi} & \text{if } \Delta > 0 \end{cases} \tag{4} \]

for an arbitrary demand quantity \( q_i \). If foreign taxes are lower than domestic taxes (\( \Delta < 0 \)),
the optimal transfer price for tax reporting equals the lower bound of the arm’s length constraint, whereas if foreign taxes are higher than domestic taxes (\( \Delta > 0 \)), the optimal transfer price equals the upper limit of the arm’s length constraint. This transfer pricing policy assures that the largest acceptable part of the firm’s global profits is taxed in the country with the lowest corporate tax rate.

For a given tax transfer price \( t_i \) the profit maximizing pricing strategy of firm \( i \) is found by differentiating the profit function (3) with respect to \( p_i \):

\[ \frac{\partial \Pi_i}{\partial p_i} = \alpha \cdot \left( \frac{\partial R_i}{\partial p_i} - c \cdot \frac{\partial q_i}{\partial p_i} \right) + \Delta \cdot (t_i - c) \cdot \frac{\partial q_i}{\partial p_i} = 0. \tag{5} \]

According to condition (5), the optimal price of firm \( i \) equates the marginal profit after taxes with a marginal tax effect. For \( \Delta = 0 \), the marginal tax effect equals zero, and the optimal price is found by equating marginal revenue with marginal cost. This price would also be optimal in a world without taxes. For \( \Delta > 0 \) the marginal tax effect is negative from (1), so that the optimal price is lower than in a world without taxes. Intuitively, this price reduction is favorable because it increases the product demand and every additional unit that is shipped to the foreign country at a transfer price above marginal cost reduces the firm’s tax bill by the factor \( \Delta \cdot (\tau - c) \). The opposite holds for \( \Delta < 0 \), as long as \( \frac{\xi}{\tau} > c \).

The equilibrium prices in the final product market game of the two centralized multinationals are found by solving the pair of first order conditions in (5) for \( p_1 \) and \( p_2 \) given the optimal transfer pricing decisions defined in (4). This solution is based on the assumption that transfer prices are determined simultaneously with product prices. As an alternative, one might also analyze a two stage game, where the firms first set their transfer prices and then determine their product prices on stage two. This change in the order of moves does not affect the equilibrium condition for the final product market game in (5) but since the equilibrium prices on stage two are functions of both firms’ transfer prices, that is \( p^*_i = p_i(t_i, t_j) \), the equilibrium profit of firm \( i \) is also a function of both firm’s transfer prices, that is \( \Pi^*_i = V(t_i, t_j) \).

Since \( \partial \Pi_i / \partial p_i = 0 \) in equilibrium, the relevant expression for the condition

\[ \partial \Pi_i / \partial t_i \]
to determine the optimal transfer price on stage one becomes:

\[
\frac{\partial V_i}{\partial t_i} = \frac{\partial \Pi_i}{\partial p_j} \cdot \frac{\partial p_j}{\partial t_i} + \frac{\partial \Pi_i}{\partial t_i}.
\] (6)

According to (6), firm \(i\) not only considers the direct tax affect \(\frac{\partial \Pi_i}{\partial t_i}\), but also the impact of its transfer pricing policy on the final product market equilibrium. This strategic effect equals \(\frac{\partial \Pi_i}{\partial p_j} \cdot \frac{\partial p_j}{\partial t_i}\) and is characteristically for all two-stage games. Here, it captures the marginal profit change induced by the pricing reaction of firm \(j\) on a variation of the transfer price \(t_i\). Other than in a strategic delegation game, the strategic effect in (6) represents the marginal profit change resulting from a self-commitment to a particular transfer price before playing the final product market game.

It can be shown that the sign of the strategic effect depends on \(\Delta\) and that it has exactly the opposite sign of the tax effect.\(^9\) Intuitively, increasing the tax transfer price acts as a marginal cost reduction for firm \(i\) if \(\Delta > 0\) and as a marginal cost increase for \(\Delta < 0\). This change in marginal cost prompts firm \(i\) to decrease its optimal price for \(\Delta > 0\) and to increase its price for \(\Delta < 0\). Since prices are strategic complements, the optimal response of firm \(j\) to these price changes of firm \(i\) is to change its own price into the same direction.

Since the tax and the strategic effect are working in opposite directions, the optimal transfer pricing policy on stage one depends on the magnitude of the two effects. However, it can be shown that the tax effect unambiguously dominates the strategic effect if the following condition holds:

\[
\frac{\alpha}{k} \cdot \frac{\partial q_i}{\partial p_j} \cdot \frac{\partial^2 \Pi_i}{\partial p_j \partial p_i} < 1, \quad \text{where} \quad k = \frac{\partial^2 \Pi_i}{\partial p_i^2} \frac{\partial^2 \Pi_j}{\partial p_j^2} - \frac{\partial^2 \Pi_i}{\partial p_i \partial p_j} \frac{\partial^2 \Pi_j}{\partial p_j \partial p_i} > 0.
\] (7)

To simplify the analysis and for avoiding an unreasonable number of case distinctions in our comparison of centralized and decentralized pricing strategies, we will subsequently assume that (7) holds, so that the tax effect dominates the strategic effect in the centralized firms’ game.\(^10\) As a consequence, the optimal transfer pricing policy in (4) is also optimal in the sequential move game between the two centralized firms.

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\(^9\) In particular, since \(\frac{\partial \Pi_i}{\partial p_j} > 0\), the sign of the strategic effect depends on the term \(\frac{\partial p_j}{\partial t_i}\). Because \(\frac{\partial^2 \Pi_i}{\partial p_i \partial t_i} = \Delta \cdot \frac{\partial q_i}{\partial p_i}\) and \(\frac{\partial q_i}{\partial p_i} < 0\), an increase of \(t_i\) results in a reduction of \(p_i\) for \(\Delta > 0\) and in an increase of \(p_i\) for \(\Delta < 0\). Because \(\frac{\partial^2 \Pi_i}{\partial p_i^2} \frac{\partial p_j}{\partial t_i} > 0\) from (1), \(\frac{\partial p_j}{\partial t_i} < 0\) for \(\Delta > 0\) and vice versa.

\(^10\) Indeed, this assumption is not very restrictive. For example, it can be shown that the tax effect always dominates the strategic effect for a general system of linear demand functions satisfying (1) and (2).
3.2 Decentralized pricing with two sets of books

We consider next the case, where the managers of the buying divisions in the foreign country are responsible for product pricing and the firm uses two different transfer prices for tax reporting and managerial purposes. Following Baldenius, Melumad and Reichelstein (2004), we assume that the division managers’ performance is evaluated on the basis of their divisional contribution to the firm’s global profit after taxes. For a tax transfer price $t_i$ and an internal transfer price $T_i$ the contribution of division $B_i$ equals

$$
\Pi_{i}^{Bt} = R_i(p_i, p_j) - T_i \cdot q_i(p_i, p_j) - (\tau + \Delta) \cdot (R_i(p_i, p_j) - t_i \cdot q_i(p_i, p_j)),
$$

or, after a rearrangement of terms:

$$
\Pi_{i}^{Bt} = \alpha \cdot [R_i(p_i, p_j) - T_i \cdot q_i(p_i, p_j)] + (\tau + \Delta) \cdot (t_i - T_i) \cdot q_i(p_i, p_j).
$$

(8)

The profit contribution in (8) comprises the divisional profit after taxes evaluated at the internal transfer price $T_i$ plus a tax-based profit contribution arising from a potential difference between the two transfer prices. The tax-based profit contribution is strictly positive whenever $t_i > T_i$. Maximizing (8) with respect to $p_i$ yields the first-order condition for the optimal pricing decision of the manager in division $B_i$:

$$
\frac{\partial \Pi_{i}^{Bt}}{\partial p_i} = \alpha \cdot \left( \frac{\partial R_i}{\partial p_i} - T_i \cdot \frac{\partial q_i}{\partial p_i} \right) + (\tau + \Delta) \cdot (t_i - T_i) \cdot \frac{\partial q_i}{\partial p_i} = 0.
$$

(9)

This condition would generally lead to a pricing strategy different from the centralized policy as defined in (5), but it has been shown by Baldenius, Melumad and Reichelstein (2004) that setting the internal transfer price equal to

$$
T_i^* = c + \tau \cdot (t_i - c)
$$

(10)

is sufficient to achieve perfect goal congruence between the pricing strategies of HQ and $B_i$. In other words, with an internal transfer price of $T_i^*$, the two objective functions of HQ and $B_i$ are identical$^{11}$.

More generally, the property of the internal transfer price in (10) need not be desirable from a strategic perspective. If the internal transfer price would be observable, the equilibrium prices in the product market games would not only be function of the tax transfer price

$^{11}$See Proposition 1 in Baldenius, Melumad and Reichelstein (2004). Göx and Schiller (2007) also provide a solution for the case, where the division managers are evaluated on the basis of their divisional profit before taxes.
t_i but also depend on the internal transfer prices T_i, so that the firm might find it useful to set an internal transfer price different from T_i'.

However, as T_i cannot be observed by firm j, the equilibrium price p_j cannot depend on it because the manager of division B_j cannot react on unobservable variables. The manager of division B_j must predict the correct T_i from anticipating the profit maximization problem of HQ_i for determining the product price p_j. Because the profit of firm i in (3) is only maximized if the manager of division B_i follows the optimal pricing strategy as defined in (5), HQ_i must set a transfer price of T_i* for assuring that the manager of division B_i sets the desired price. In equilibrium, the manager of division B_j will perfectly anticipate this fact and correctly predict that firm i sets an internal transfer price of T_i*. The following Lemma summarizes the result:

Lemma 1: If the internal transfer price is not observable, the optimal internal transfer price is given in (10). It follows that a decentralized firm using two sets of books follows the same product and tax transfer pricing strategy as a centralized firm. Proof: obvious.

3.3 Decentralized pricing with one set of books

3.3.1 Optimal product pricing

We next analyze the case, where the firm uses one single transfer price t_i for tax reporting and for managerial purposes. With this assumption, the profit of division B_i becomes:

\[ \Pi_i^{B_o} = \alpha \cdot (R_i(p_i, p_j) - t_i \cdot q_i(p_i, p_j)). \]  (11)

Differentiating the divisional profit function with respect to p_i yields the first order condition for optimal product pricing in case of one set of books:

\[ \frac{\partial \Pi_i^{B_o}}{\partial p_i} = \alpha \cdot \left( \frac{\partial R_i}{\partial p_i} - t_i \cdot \frac{\partial q_i}{\partial p_i} \right) = 0. \]  (12)

From (12), the manager of division B_i finds his optimal pricing strategy by equating the product’s marginal revenue with the division’s marginal cost, which is determined by the transfer price t_i. If both firms use one set of books, the equilibrium prices on stage three are found by solving the system of first order conditions as defined in (12) for p_1 and p_2. Because the tax transfer prices are observable, the equilibrium prices on stage three are functions of the transfer prices set by the firms’ headquarters on stage two, that is p_i^* = p_i (t_i, t_j).
Moreover, because \( \partial^2 \Pi_i^{Bo}/\partial p_i \cdot \partial t_i \) and \( \partial^2 \Pi_i^{Bo}/\partial p_i \cdot \partial p_j \) are both positive, the equilibrium prices of both firms, are increasing in both firms’ transfer prices. If firm \( i \) increases its transfer price, the manager of division \( B_i \) will increase \( p_i \) because a higher transfer price is equivalent to an increase of the division’s marginal cost. Because prices are strategic complements, the best response of firm \( j \) to an increase of \( p_i \) consists of increasing \( p_j \) as well. As a consequence, the equilibrium reactions on an increase of \( t_i \) are both strictly positive, that is \( \partial p_i/\partial t_i > 0 \) and \( \partial p_j/\partial t_i > 0 \). This property holds even if only firm \( i \) uses one set of books.

For analyzing the impact of firm \( i \)’s transfer pricing policy on its pricing strategy, we evaluate the first order condition in (5) for \( p_i^* \):

\[
\frac{\partial \Pi_i}{\partial p_i} \bigg|_{p_i=p_i^*} = (1 - \tau) \cdot (t_i - c) \frac{\partial q_i}{\partial p_i} \leq 0
\]  

(13)

In conjunction with Lemma 1, the expression in (13) permits the following observation:

**Proposition 1:** Whenever \( t_i > c \), the product price of firm \( i \) with one set of books is higher than the product price with two sets of books. **Proof:** From Lemma 1, the optimal price with two sets of books equals the optimal price of the centralized firm, \( p_i^* \). From (13), \( p_i^* > p_i^* \) for \( t_i > c \).

The result in Proposition 1 suggests that the firms’ general accounting policy affects the prices in the final product market. Except for the special case, where \( \Delta < 0 \) and the lower bound of the arm’s length constraint equals marginal cost \( (L = c) \), product prices with one set of books are higher than with two sets of books. This fact can be taken as a rationale for a strategic accounting policy because higher product prices are generally desirable with oligopolistic price competition. If both firms increase their product prices as a response to higher transfer prices, the intensity of competition is reduced and both firms realize higher profits.

### 3.3.2 Optimal transfer pricing

The optimal tax transfer price of firm \( i \) on stage two is derived by maximizing the firm’s profit considering the anticipated equilibrium prices on the third stage of the game. Differentiating the profit of firm \( i, \Pi_i^* = V_i(t_i, t_j) \), with respect to \( t_i \) yields the following expression:

\[
\frac{\partial V_i}{\partial t_i} = \frac{\partial \Pi_i}{\partial p_i} \cdot \frac{\partial p_i}{\partial t_i} + \frac{\partial \Pi_i}{\partial p_j} \cdot \frac{\partial p_j}{\partial t_i} + \frac{\partial \Pi_i}{\partial t_i}
\]

(14)

\[\text{A formal proof of this argument can be found in } \text{G"o"o}(2000).\]
The expression in (14) comprises three different terms. In what follows, we refer to the first term as the managerial effect, to the second term as the strategic effect, and to the last term as the tax effect. The managerial effect captures the profit change caused by the pricing reaction of manager $B_i$ on a change of its own transfer price $t_i$. This effect is negative whenever $t_i > c$ from Proposition 1 and the fact that $\partial p_i/\partial t_i \geq 0$. The strategic effect refers to the profit change caused by the pricing reaction of manager $B_j$ on a change of $t_i$. It is unambiguously positive because $\partial \Pi_i/\partial p_j > 0$ and $\partial p_j/\partial t_i > 0$.

Finally, we have to consider the tax effect. As shown above, its sign depends on the sign of $\Delta$. It is positive for $\Delta > 0$, negative for $\Delta < 0$, and zero for identical tax rates in both countries. It follows that we have to distinguish two cases for determining the overall sign of expression (14). The first case considers a tax advantage for the home country and makes a high tax transfer price desirable. The second case assumes a tax advantage for the foreign tax jurisdiction and makes a low tax transfer price desirable.

We begin with the analysis of the first case. For determining the optimal transfer pricing policy for a positive tax rate differential, we note that the managerial effect in equation (14) is negative or zero, whereas the strategic effect and the tax effect are positive. In other words, for $\Delta > 0$ the strategic role of the transfer price and the tax saving function are complementary objectives but there exists a trade-off between these two objectives and the managerial effect. To examine this trade-off, we evaluate the firm’s marginal profit in (14) at the bounds of the arm’s length range. We begin with the lowest possible transfer price by assuming that $t_i = c$. For a transfer price at marginal cost, the marginal profit of firm $i$ in (14) becomes

$$\frac{\partial V_i}{\partial t_i} \bigg|_{t_i = c} = \frac{\partial \Pi_i}{\partial p_j} \cdot \frac{\partial p_j}{\partial t_i} + \frac{\partial \Pi_i}{\partial t_i} > 0.$$  \hspace{1cm} (15)

As suggested by Hirshleifer (1956), the objectives of $HQ_i$ and the manager of division $B_i$ are perfectly aligned if the transfer price is set at marginal cost. Hence, the managerial effect is zero for $t_i = c$, whereas the remaining two effects are strictly positive for this transfer price. It follows that the optimal transfer price is above marginal cost. This result is also intuitively appealing. With a transfer price at marginal cost, the firm would neither benefit from strategic transfer pricing nor would it save any taxes. Therefore, the firm has a strict incentive to establish a transfer price above marginal cost. The optimal transfer price has the following properties.

**Proposition 2:** For $\Delta > 0$ and $t = c$, the optimal transfer price with one set of books, $t^*_i$, is higher than marginal cost but less or equal to $\bar{t}$. **Proof:** Due to the conflicting signs of
the first and the last two terms in (14), \( \partial V_i / \partial t_i |_{t_i = \bar{t}} \) can have any sign. If \( \partial V_i / \partial t_i |_{t_i = \bar{t}} > 0 \), \( t^*_i = \bar{t} \). If \( \partial V_i / \partial t_i |_{t_i = \bar{t}} < 0 \), \( c < t^*_i < \bar{t} \) from (15), and the optimal transfer price is found by solving \( \partial V_i / \partial t_i = 0 \) for \( t_i \).

The result in Proposition 2 suggests that the optimal transfer price depends on the magnitude of the three effects determining the marginal profit of firm \( i \) in (14). We can distinguish two cases, a corner solution and an interior solution. The corner solution obtains if the sum of the tax and the strategic effect dominate the managerial effect over the whole range of admissible transfer prices. For this case, the optimal transfer price equals \( \bar{t} \), the upper bound of the arm’s length constraint. However, even if the tax and the strategic effect call for a transfer price above marginal cost, it is not necessarily the case that they always dominate the managerial effect. It is also possible that the managerial effect is stronger than the sum of the other two effects for a certain range of admissible transfer prices within the arm’s length constraint. In this case, an interior solution obtains. The optimal transfer price then balances the negative managerial effect with the sum of the positive tax and strategic effects.

We consider next the case of a negative tax rate differential (\( \Delta < 0 \)). Because the foreign country offers a tax advantage, this scenario makes shifting income to the foreign country attractive and a low transfer price desirable. Hence, the tax effect in (14) becomes negative, whereas the signs of the managerial and the strategic effect are not affected by the sign of \( \Delta \). The optimal transfer price for this case has the following properties.

**Proposition 3:** If \( \Delta < 0 \), the optimal transfer price can take any value from the admissible range of transfer prices. **Proof:** Because \( \partial \Pi_i / \partial t_i < 0 \), \( \partial V_i / \partial t_i |_{t_i = \underline{t}} \) can take any sign. It follows that \( t_i = \underline{t} \) for \( \partial V_i / \partial t_i |_{t_i = \underline{t}} < 0 \). The rest of the proof is identical to the proof of Proposition 2.

As for a positive tax differential, the optimal transfer price for \( \Delta < 0 \) depends on the magnitude of the three effects in (14). Here we can distinguish three cases, two corner solutions and one interior solution. The first corner solution is found at the lower bound of the arm’s length constraint, namely \( t^*_i = \underline{t} \). This solution obtains if the tax effect dominates the strategic effect. This solution coincides with the optimal tax transfer price in the case of two sets of books, whereas the product prices are only identical if \( \underline{t} = c \). The remaining two cases can only obtain if the strategic effect is so strong that it dominates the managerial and the tax effect. If the dominance of the strategic effect holds for the whole range of admissible transfer prices, the optimal transfer price equals \( t^*_i = \bar{t} \). Otherwise, the optimal
transfer price balances the strategic effect with the sum of the negative tax and managerial effects, and an interior solution obtains.

Comparing the variety of optimal transfer prices for one set of books with the optimal tax transfer price in (4) shows that the general accounting policy can have a substantial impact on transfer prices. The results generally depend on the magnitude of the strategic effect and its relation to the managerial and the tax effect. If the strategic effect is less important as compared to the tax effect, the optimal transfer prices are likely to take the same boundary solutions as with two sets of books. If the strategic effect becomes stronger, different solutions can obtain, especially when the tax effect and the strategic effect are working into opposite directions, that is for Δ < 0. This case is largely ignored in the analysis of international transfer pricing models because it creates no tension between managerial and tax aspects objective of transfer pricing because both objectives call for a transfer at marginal cost. Our analysis shows that the existence of a small number of competitors in the final product market can make this case more interesting and give rise to a transfer price above marginal cost.

3.3.3 Optimal accounting policy

The final element of our three stage game is the choice of accounting policies on stage one. To determine a unique equilibrium of the first stage game, we aim to identify conditions under which firm i would prefer one set of books over two sets of books regardless of firm j’s accounting policy. That is, we are looking for a subgame-perfect dominant strategy equilibrium of the three stage game. The choice of one set of books is a dominant strategy equilibrium if the following condition holds:

\[
\Pi_i(p^o_i, t^o_i, p_j) \geq \Pi_i(p^*_i, t^*_i, p_j) \text{ for } p_j \in \{p^o_j, p^*_j\},
\]

where \(p^o_i\) and \(t^o_i\) are the optimal product and transfer prices for one set of books, and \(p^*_i\) and \(t^*_i\) are the optimal product prices for two sets of books. From (16), an equilibrium requires that \(\Pi_i(p^o_i, t^o_i, p^o_j) \geq \Pi_i(p^*_i, t^*_i, p^*_j)\) and \(\Pi_i(p^o_i, t^o_i, p^*_j) \geq \Pi_i(p^*_i, t^*_i, p^*_j)\). The analysis can be restricted to the latter condition because it is always stricter than the former.\(^\text{13}\) A closer inspection of the condition yields the following result:

\(^{13}\)In particular, the fact that prices are strategic complements, implies that the marginal profit of firm i is increasing in \(p_j\). Because \(p^*_j > p^o_j\) from Lemma 1, the following condition is always met: \(\Pi_i(p^*_i, t^*_i, p^o_j) - \Pi_i(p^*_i, t^*_i, p^*_j) \geq \Pi_i(p^*_i, t^*_i, p^*_j) - \Pi_i(p^*_i, t^*_i, p^*_j)\).
Proposition 4: There exist conditions for which a commitment to one set of books is a dominant strategy equilibrium. For $\Delta < 0$, this equilibrium obtains whenever $t = c$, and $t^*_i > t$. For $\Delta > 0$ the optimal accounting policy depends on the magnitude of the strategic effect and the tax effect. Proof: See appendix.

The result in Proposition 4 suggests that strategic incentives can provide a rationale to use the same transfer prices for tax reporting and for managerial purposes. This result contrasts the findings of earlier theoretical literature and provides a possible explanation for the mixed empirical evidence on the issue. In the next section, we present a linear demand version of our general model to provide some additional insights into the factors governing the equilibrium accounting policy.

4 A linear demand example

In what follows we consider a special case of our model presented in section 2. For simplicity, we assume that the lower bound of the arm’s length constraint equals marginal cost ($t = c$) which we normalize to zero ($c = 0$). The final product market is characterized by the following system of linear demand functions:

$$q_i = a - p_i + b \cdot p_j.$$  \hfill (17)

Consistent with the assumptions in (1) and (2), the demand for product $i$ is decreasing in $p_i$ and increasing in $p_j$. The parameter $a$ measures the market size of product $i$, and the parameter $b$ captures the degree of product substitutability. At the same time, $b$ can be taken as a measure for the intensity of competition. The higher $b$, the higher is the reaction of a price change of firm $j$ on the demand for product $i$. Since we have normalized the own price effect to one, $b \in (0, 1)$. If $b$ approaches zero, firm $i$ becomes a monopolist in its market, and as $b$ goes to one, the products become perfect substitutes. Based on these assumptions, the profit of firm $i$ becomes:

$$\Pi_i = (\alpha \cdot p_i + \Delta \cdot t_i) \cdot q_i.$$ \hfill (18)

If both firms are keeping two sets of books, the equilibrium prices and quantities of both firms are equal to:

$$p^* = \frac{a - t^* \cdot \gamma}{2 - b}, \quad q^* = a - (1 - b) \cdot p^*, \quad \gamma = \frac{\Delta}{1 - \tau - \Delta}$$ \hfill (19)

where $t^*$ is the optimal transfer price as defined in (4), that is $t^* = T$ for $\Delta > 0$ and $t^* = t = 0$ for $\Delta < 0$. It follows that the optimal prices with two sets of books are independent of $t^*$. 

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and $\Delta$ for $\Delta < 0$. For $\Delta > 0$ the optimal prices are decreasing in $t^*$ and in $\Delta$. The opposite effect applies to the equilibrium quantities because the own price effect dominates the effect of the competitor’s price $(1 > b)$.\(^{14}\)

This effect is caused by the fact that the marginal revenue is decreasing in both $t^*$ and in $\Delta$ for $\Delta > 0$. Intuitively, the tax advantage of the home country makes a lower price and a higher quantity more desirable because each additional product unit that is sold to the foreign country reduces the firm’s tax bill by the amount of $\Delta \cdot \bar{t}$. Hence, the marginal tax savings are increasing in $\Delta$ and $\bar{t}$. This result is not withstanding the fact that the firm’s overall profit is decreasing in the two tax rate parameters $\tau$ and $\Delta$, regardless of what transfer pricing policy is implemented. Substituting the expressions in (19) into the firm’s profit function yields the equilibrium profit of each firm with two sets of books:

$$\Pi^* = \alpha \cdot (q^*)^2. \quad (20)$$

With both firms keeping one set of books and division managers deciding on prices on the basis of (11), the equilibrium prices on stage three become increasing functions of the firms’ transfer prices

$$p^0_i(t_i, t_j) = \frac{a}{2 - b} + \frac{2t_i + b \cdot t_j}{4 - b^2}. \quad (21)$$

From a strategic perspective, the important element in (21) is the change of $p^*_j$ caused by a change in $t_i$. This effect equals $\partial p^*_j / \partial t_i = b/(4 - b^2)$. It is smaller than the direct effect, $\partial p^*_i / \partial t_i$, but monotonically increasing in $b$. Intuitively, the importance of strategic considerations in transfer pricing become more important as products become more similar. Substituting the prices from (21) into (18), and maximizing the resulting value functions with respect to $t_i$ yields the following interior solution for the optimal transfer prices on stage two:

$$t^o = a \cdot z, \quad \bar{z} = \frac{\alpha \cdot b^2 + \Delta \cdot (4 - b^2)}{\alpha \cdot (4 - 2b - b^2) + \Delta \cdot (8 - 6b - 3b^2 + 2b^3)}. \quad z \in [0, \bar{t}/a]. \quad (22)$$

Since $b \in (0, 1)$, the factor $z$ in (22) is strictly positive for $\Delta > 0$, so that the optimal transfer price is above the marginal cost of zero. As shown in Proposition 2, the transfer price in (22) is optimal for $\Delta > 0$ as long as $t^o < \bar{t}$, otherwise the optimal transfer price equals the upper bound of the arm’s length limit.

For $\Delta < 0$, the factor $z$ in (22) can be positive or negative, depending on the relative importance of the strategic and the tax effects. Since the strategic effect is mainly determined\(^{14}\) here, it has to be taken into account that $\alpha = 1 - \tau - \Delta$, so that $\Delta/\alpha$ is monotonically increasing in $\Delta$.\(^{18}\)
by $b$, it proves useful to evaluate the sign of $z$ for the boundary values of the demand parameter $b$, yielding:

$$
limit_{b \to 0} z = \frac{\Delta}{1 - \tau + \Delta} < 0 \text{ for } \Delta < 0 \text{ and }$$
$$
limit_{b \to 1} z = \frac{1 - \tau + 2 \cdot \Delta}{1 - \tau} > 0 \text{ if } \Delta > -\frac{1 - \tau}{2}.
$$

As shown in Proposition 3, the optimal transfer price equals $\bar{t}$ if the strategic effect is dominated by the tax effect. For $b = 0$, the monopoly case, there is no strategic effect by definition, so that $t^o = 0$. For $b = 1$, the products are perfect substitutes and the strategic effect assumes its highest possible value. If $\Delta \in (-1, \tau)/2, 0)$, the strategic effect dominates the tax effect for $b = 1$, and the optimal transfer price $t^o$ is positive despite the opposite direction of the tax effect. If $\bar{t}$ is small, so that $\bar{t} < t^o$, it can even happen that the optimal transfer price is equal to the upper bound of the arm’s length constraint. With the optimal transfer prices from (22) the equilibrium prices and quantities on stage three become:

$$
p^o = \frac{a \cdot (1 + z)}{2 - b}, \quad q^o = a - (1 - b) \cdot p^o, \quad z \in [0, \bar{t}/a],
$$

(23)

where $z$ is defined in (22), and the boundary values are derived from the arm’s length constraint. Comparing the expressions in (19) and (23) shows that the optimal prices (quantities) with one set of book are always weakly higher (lower) than with two sets of books. The equilibrium profit with one set of books equals:

$$\Pi^o = (\alpha \cdot p^o + \Delta \cdot t^o) \cdot q^o.
$$

(24)

Observe first that $\Pi^o < \Pi^*$ for $b = 0$ because without competition in the final product market, it cannot pay to commit the manager of division $B_1$ to set prices above marginal cost. For $b = 1$, however, the difference between the two equilibrium profits with one and two sets of books equals

$$\Pi^o - \Pi^* = (1 - \tau) \cdot z \cdot a^2.
$$

(25)

The expression in (25) is positive whenever $z > 0$. As shown above, this requirement is always met for $\Delta > 0$. For $\Delta < 0$, the equilibrium profit with one sets of books is higher than with two sets of books whenever $\Delta \in -(1 - \tau)/2, 0)$. More generally, it can be shown that there exists a critical value of $b_1$, above which the profit with one set of books is higher than with two sets of books. Figure one gives a numerical example for the following parameter values: $a = 100, \tau = 0.5, \Delta = 0.2, \bar{t} = 80$. 

[please insert figure 1 here]
The equilibrium profit for a symmetric policy of two sets of books is given by the solid line in figure 1, whereas the equilibrium profit for a symmetric policy of one set of books is given by the dotted line in figure 1. It can be seen that \( \Pi^o > \Pi^* \) if \( b > b_1 \) so that both firms benefit from restricting themselves to using only one set of books. For \( b < b_1 \) both firms would be better off from using two sets of books. This result shows that the potential strategic benefits from using one set of books are increasing in the degree of product substitutability, or equivalently, the intensity of competition in the final product market. Similar observations can be made for a tax advantage in favor of the home country. In figure 2 we give an example for the same parameter values as in figure 1 except that we assume a foreign tax advantage \((\Delta = -0.05)\). As for a domestic tax advantage there exists a critical value of \( b_1 \) for the product substitutability parameter \( b \) above which the symmetric equilibrium profits for one set of books are larger than for two sets of books. The main difference between the cases of a foreign tax advantage in figure 1 and a domestic tax advantage in figure 2 is the fact that the symmetric equilibrium profits for one and two sets of books are identical for profits for \( b < b_1 \) in case of a foreign tax advantage because the tax effect dominates the strategic effect and calls for a transfer price of \( t = c \) regardless of the accounting policy implemented by the firms on stage one.

[please insert figure 2 here]

In figure 1 and figure 2, we report also the profit of firm \( i \) for the asymmetric accounting policy, where firm \( i \) uses one set of books and firm \( j \) is using two sets of books. The prices and transfer prices of the two firms for this case are

\[
\begin{align*}
p_i^o &= \frac{a}{2-b} + \frac{2t_i + b \cdot t^* \cdot \gamma \cdot p_j^*}{4-b^2} \\
t_i^o &= \frac{2t_j \cdot \gamma + b \cdot t^*}{4-b^2}
\end{align*}
\]

where \( \gamma = \Delta/\alpha \) as defined in (19). The profit of firm \( i \) for this asymmetric combination of accounting policies equals:

\[
\Pi_i^o = (\alpha \cdot p_i^o + \Delta \cdot t_i^o) \cdot q(p_i^o, p_j^o).
\]

In figures 1 and 2 this profit of firm \( i \) is given by the dashed lines. It can be seen from the examples in figures 1 and 2 that there exists a critical value \( b_2 \) for the parameter \( b \) above for which firm \( i \) prefers to adopt a policy of one set of books even if firm \( i \) keeps two sets of books. This cutoff value is larger than \( b_1 \) because the transfer prices are strategic complements so
that firm $i$ realizes a higher profit for any value of $b$ if firm $j$ also keeps only one set of books. Hence, a higher value of $b$ is required to satisfy the condition for a dominant strategy equilibrium in (16). However, once this condition is met for both firms, the actual profit is given by the dotted lines labeled with $\Pi^o$ for both firms.

## 5 Summary and discussion

This paper analyses the optimal accounting and transfer pricing policies of two multinational duopolists facing price competition in the final product market. Assuming that the transfer prices for tax reporting are observable and that internal transfer prices are not observable, we analyze the incentives of the firms for using the same or different prices for tax reporting and internal purposes. Our main finding is that firms in industries with a small number of competitors may benefit from using the same transfer price for tax and managerial purposes even if the tax and managerial objectives are conflicting.

Our analysis is governed by a fundamental trade-off. If a firm keeps two sets of books, it can efficiently decouple tax and managerial objectives and achieve goal congruence between the firms’ headquarters and the divisional managers but it cannot use its transfer prices strategically. With one set of books, a potential conflict between tax and managerial objectives arises but the single transfer price can be used strategically because the division managers are making their pricing decisions on the basis of the observable tax transfer price.

We show that the optimal solution of this fundamental trade-off between the two accounting policies under consideration depends on the relative importance of strategic versus managerial and tax considerations. We distinguish two scenarios. In the first scenario, the tax incentives are making a high transfer price desirable, and in the second scenario they call for a low transfer price. In the first case, the strategic considerations and the tax incentives are complementary objectives, whereas in the second case these objectives are conflicting. For both cases we identify conditions under which a joint commitment to a policy of one set of books is a dominant strategy equilibrium. We find that the existence of this equilibrium is more likely the more the products are substitutable from the consumers’ perspective, or, equivalently, the higher the intensity of competition between the two firms.

Our analysis contributes to the transfer pricing literature by broadening the understanding of the potential incentives for the choice between one and two sets of books. Earlier literature has analyzed this question without considering the strategic aspects of transfer pricing.
Other papers have analyzed international transfer pricing in the context of oligopolistic product markets but none of the existing papers has analyzed the trade-off between one and two sets of books. Our analysis does not only broaden the theoretical understanding of the factors governing the optimal accounting policy but it also provides testable empirical predictions. According to our results, the practice of one set of books should, ceteris paribus, be the prevalent accounting method in markets with a small number of competitors and similar products, whereas for other industry structures the firms should be expected to use rather two than one set of books. Future empirical research will hopefully address this issue and thereby further broaden our understanding of the complex incentives in international transfer pricing.
Appendix

Proof of Proposition 4:

To prove the existence of the equilibrium, we first consider the case where $\Delta < 0$ and $t = c$. Assume now that the equilibrium condition is not met, so that $\delta \Pi_i = \Pi_i(p_i^o, t_i^o, p_j^o) - \Pi_i(p_i^*, t_i^*, p_j^*) < 0$. If this condition would be true, a firm using one set of books could always set a transfer $t_i^o = t_i^* = c$ and thereby assure that prices and profits are the same as with two sets of books. However, from Proposition 3, we know that $t_i^o > c$ whenever the strategic effect dominates the tax effect for a transfer price of $t_i = c$. If $\delta \Pi_i < 0$ for this case, the optimal transfer price must be $t_i^o = c$, a contradiction to Proposition 3.

Consider next the case where $\Delta > 0$. To prove the existence of the equilibrium, we focus on the case where $t_i^o = t_i^* = \bar{t}$. For an arbitrary value of $\bar{t}$, the equilibrium condition becomes

$$\delta \Pi_i = \alpha \cdot [(p_i^o - p_i^*) \cdot q_i^* + (p_i^* - c)(q_i^o - q_i^*) + \Delta \cdot (\bar{t} - c) \cdot (q_i^o - q_i^*)] \geq 0,$$

where $p_i^o > p_i^*$ and $q_i^o < q_i^*$ from Proposition 1. To verify that (26) can indeed be satisfied, observe next that

$$(p_i^o - p_i^*) \cdot q_i^* + (p_i^* - c)(q_i^o - q_i^*) > 0$$

for a world without taxes ($\Delta = 0$) as long as $\bar{t} < t_i^* + \varepsilon$, where $t_i^*$ is the optimal strategic transfer price in a world without taxes and $\varepsilon$ is an arbitrary constant satisfying that strategic transfer pricing increases the firm’s profit\textsuperscript{15}. The term in (27) is equivalent to the first two terms in squared brackets in (26). Assume now that $\bar{t} = t_i^*$, so that this term takes its maximum. For this case it is always possible to define an arbitrary small but positive tax differential so that (26) is satisfied.

It follows from Proposition 2 that the optimal accounting policy for more general values of $\bar{t}$ depends on the relative magnitude of the strategic and the tax effect.

\textsuperscript{15}See Göx (2000) for a formal proof of this argument.
References


Figure 1: Intensity of competition and equilibrium profits with one and two sets of books for a domestic tax advantage

Plot for parameter values: $a = 100, \tau = 0.5, \Delta = 0.2, \bar{f} = 80$
Figure 2: Intensity of competition and equilibrium profits with one and two sets of books for a foreign tax advantage

Plot for parameter values: $a = 100, \tau = 0.5, \Delta = -0.05, t = c = 0$