

Keeping Two Sets of Books: The Relationship between Tax & Incentive Transfer Prices*

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Running Title: The Relationship between Tax and Incentive Transfer Prices

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Abstract

This paper studies two distinct roles that transfer prices play within multinational enterprises operating in two tax jurisdictions. Assuming that the multinational enterprise chooses one transfer price for tax purpose and another for providing incentives to its subsidiary's manager, we analyze the relationship between these two transfer prices. The two transfer prices are independent if taxable income is assessed based on the formula apportionment approach in both jurisdictions. Under the separate entity approach, however, they are interdependent: they both decrease as the expected penalty for noncompliance with the arm's length principle increases; the tax transfer price decreases and the incentive transfer price increases as the marginal cost of production increases. We also study how the relationship changes depending on whether the incentive transfer price is negotiated or dictated by the parent company. Our results are shown to be robust to different market and tax environments.

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1. Introduction

Transfer prices serve two distinct roles within multinational enterprises (MNEs). They affect the incentives of divisional managers who are remunerated on the basis of their division's performance. Second, transfer prices determine the tax liability of each division, thus affecting the overall tax exposure of the MNE. While the incentive literature is relevant to all multidivisional firms, the tax literature applies only to the subset of multidivisional firms that are also multinational. Despite this being a sizeable and growing segment of the global economy with transfer prices being the biggest issue for tax directors of big companies,¹ to a large extent these two distinct roles of transfer prices have been examined more or less in isolation.

Studies of the managerial incentive implications of transfer prices include Harris, Kriebel and Raviv (1982), Amershi and Cheng (1990), Holmstrom and Tirole (1991), and Anctil and Dutta (1999). The literature examining the implications of tax regulations governing the pricing of intrafirm transactions across sovereign jurisdictions includes Musgrave (1973), Samuelson (1982), Gordon and Wilson (1986), Kant (1988, 1990), Bucks and Mazerof (1993), and Goolsbee and Maydew (2000). Other papers have taken an integrated approach, explicitly recognizing both (managerial) incentive and tax considerations in deriving optimal transfer prices (Halperin and Srinidhi, 1991; Elitzur and Mintz, 1996; Schjelderup and Sorgard, 1997; Sansing, 1999; Haufler and Schjelderup, 2000; Smith, 2002a).

In all of the studies above, however, the MNE is assumed to nominate only *one* transfer price per intrafirm transaction. In effect, these models implicitly require that the tax transfer price do 'double duty' by also serving as an incentive mechanism. Equivalently, they implicitly assume that MNEs keep only one set of books to satisfy both cost and tax accounting requirements. Given that there is no statutory requirement in the US or many other countries that the incentive and tax transfer prices be the same, this assumption seems unwarranted. After all, logic dictates that MNEs can do better

¹ Trade within MNEs now accounts for 60% of international trade. A recent dispute between the IRS and GlaxoSmithKline over transfer prices highlights the importance of the issue both for tax authorities and MNEs (The Economist, 2004).

using two prices, rather than one, to pursue the two distinct goals of optimizing managerial incentives and minimizing tax (inclusive of expected penalties).

Since MNEs are not obligated to report the incentive transfer price, there is a paucity of evidence as to whether they do indeed decouple these two transfer prices. A study in the early 1980s showed that only a few MNEs employed separate transfer prices for incentive and tax purposes.² However, more recent evidence suggests that MNEs are now more inclined to nominate two different transfer prices, and that the issue is of central concern for CFOs of many MNEs.³ It is certainly plausible that the increased scrutiny by tax authorities in the last twenty years have led more MNEs to recognize the benefit of employing different transfer prices. Indeed, Springsteel (1999) suggests that stricter tax regulations governing MNEs – forcing the use of numbers that may not reflect internal realities – have helped popularize the use of a second managerial set of transfer pricing numbers for interdivisional purposes. This perspective is the distinguishing feature of our model – the MNE simultaneously chooses separate tax and incentive transfer prices, fully recognizing their interrelatedness.

We study the relationship between the two transfer prices in a simple model of an MNE consisting of two affiliates, called the parent and its subsidiary. The parent first sets the tax transfer price and the quantity to produce for its domestic market, and then the subsidiary determines the quantity it purchases from the parent for sale in the foreign market where it is located. The subsidiary maximizes its own, rather than consolidated, after-tax profit. In section 2.2, we discuss relevant incentive issues and justify the choice of such an organizational structure. Both the parent and the subsidiary are initially

² Czechowicz, et al. (1982) reported that 89 percent of US MNEs use the same transfer price for incentive and tax purposes. Additionally, they reported that some MNEs felt that tax authorities would be antagonistic toward the use of two different transfer prices.

³ Quoting an AnswerThink survey among a select group of companies with more than \$2 billion in annual revenues, Springsteel (1999) reports that 77 percent use separate reporting systems to track internal pricing information, compared with about 25 percent of large companies outside that “best practices” group. The companies that operate two sets of books include Hewlett-Packard and Microsoft. See also Ernst and Young (1999).

assumed to be monopolists in their own market – this assumption is later relaxed – and penalties are imposed for noncompliance with arm’s length pricing for tax transfer price.⁴

We ask three separate questions. First, does the relationship between the optimal tax and incentive transfer prices depend on how taxable income is determined? Specifically we consider two approaches: *formula apportionment* or *separate entity* approaches. Formula apportionment refers to the use of a formula based on consolidated sales, assets, payroll and possibly other factors to allocate consolidated taxable income among an MNE’s affiliates. In contrast, the separate entity approach treats each affiliate of the MNE as if it were an independent, “arm’s length” entity for determining taxable income. This approach is embraced by the OECD and is effectively the global standard for international transfer pricing (OECD, 1995).

Under the formula apportionment approach we show that the two transfer prices are independent, regardless of whether penalties for non-arm’s length pricing are applied or not. This stems from the fact that there is no role for a tax transfer price under this approach – the taxable income of each entity is instead calculated as an exogenously defined fraction of consolidated taxable income. In contrast, under the separate entity approach the two transfer prices are shown to be very much interdependent.

The second question follows naturally. How do changes in the tax and cost environment affect the relationship between the two transfer prices under the separate entity approach? We show that changes in the tax environment affect *both* the tax and incentive transfer prices. As the penalty for noncompliance with arm’s length pricing (or the probability of being penalized) increases, naturally a more conservative tax transfer price is adopted. Also, the incentive transfer price adjusts so as to cushion the effect of the tax transfer price adjustment on the subsidiary’s related-party purchases. This highlights an important result: changes in the tax environment have implications for the incentive transfer price.

⁴ In the US, §482 of the Internal Revenue Code authorizes the IRS to evaluate transactions between related parties on an arm’s-length basis. Pursuant to §6662(e) and §6662(h) of the Internal Revenue Code,

Changes in the MNE's cost structure also affect both transfer prices. Assuming the parent faces a lower tax rate than the subsidiary, an increase in the parent's marginal cost of production causes the incentive transfer price to increase and the tax transfer price to decrease. The former induces the subsidiary to purchase less from the parent, an efficient response given that the good has become more costly to produce. The decrease in the tax transfer price reinforces this incentive as a lower tax transfer price results in a higher taxable income, and thus tax payable, for the subsidiary. Because this effect is in proportion to the amount purchased, it is equivalent to an increase in the subsidiary's marginal cost. Thus, changes in both the tax environment and the technology have implications for *both* transfer pricing policies – incentive and tax.

Third, do the answers to the second question depend importantly upon whether the incentive transfer price is dictated by the parent or negotiated by both parties? If the parent has sufficient bargaining power, then our answers continue to hold for the case of negotiated transfer price, a direct consequence of continuity. However, if the subsidiary has sufficient bargaining power, we show that the incentive transfer price is independent of the tax transfer price due to the fact that the former will always be set at zero – a corner solution. This illustrates the importance of understanding the objectives of each affiliate and the distribution of price-setting power within the MNE group.

We further ask whether our results are robust. Specifically, what are the implications of oligopoly vis-à-vis monopoly for the relationship between the two transfer prices, and is the relationship affected by double or 'less than single' taxation?⁵ Our earlier results under dictated pricing are shown to be invariant to market structure. Specifically, they hold provided the law of demand is satisfied for intra-firm trade. The reason is that, while strategic rivalry needs to be taken into consideration in oligopolistic settings, the incentive role of the incentive transfer price remains essentially unchanged. Similarly, the earlier results are also shown to be unaffected by less than single or double taxation – both are very real possibilities, motivating the many international tax treaties in existence

noncompliance with this principle may result in penalties.

⁵ The term 'less than single taxation' is the opposite of double taxation – it refers to the situation where some income is not taxed in either jurisdiction.

today. While impacting upon the *level* of the two transfer prices, the qualitative nature of the relationship between the two prices remains unchanged.

Two recent papers in concurrent research have explicitly modeled two distinct transfer prices, although the focus of their analysis differs markedly from ours. Baldenius et al. (2002) examine how the incentive transfer price should be set given a range of admissible tax transfer prices. Assuming that the firm complies with tax rules, they focus on both market- and cost-based transfer pricing and examine how intra-company discounts are affected. Smith (2002b) studies an agency model in which the transfer price provides incentives for a manager, whose effort randomly affects the profitability of both the headquarters and the subsidiary. However, the transfer price does not coordinate inter-divisional transactions in his model. Moreover, the penalty for noncompliance is based on the difference between the tax transfer price and incentive transfer price, rather than the difference between the tax transfer price and the arm's length benchmark price.

After outlining the model in section 2, section 3 examines how the incentive and tax transfer prices are set under the formula apportionment (FA) and separate entity (SE) approaches. The case of negotiated transfer pricing is analyzed in section 4. In section 5 we show that our results continue to hold in oligopoly, and are unaffected by double or less than single taxation. Concluding comments and a brief discussion of policy implication are offered in section 6.

2. Model

2.1. General Structure

A multinational enterprise (MNE) has two affiliates, A and B. Affiliate A, to be called the parent, produces and markets an amount q_A of a good in country A. Affiliate B, to be called the subsidiary, purchases an amount q_B of the good from its parent at price s and markets it in country B. To simplify analysis we assume that only the subsidiary purchases from the parent, not the other way around. The amount q_B is determined by the subsidiary, while the internal (i.e., incentive) transfer price, s , is determined by the parent. That the subsidiary determines its own purchase amount is central to our analysis. The

whole issue of incentive transfer pricing becomes meaningless if the parent also chooses q_B . Both are monopolists in their own market.

The parent's cost is given by $C(q_A + q_B) = c(q_A + q_B)$ where $c > 0$. Assuming a linear cost function simplifies the analysis by breaking the link between the two markets through the cost function. The marketing and distribution costs for both affiliates are zero, so the subsidiary's only cost is that of purchasing product from the parent. Demand in market i is described by $p_i(q)$, where p_i is the price in market i , and market revenue is denoted by $R_i(q)$. We make standard assumptions on demand: $p_i'(q) < 0$, $p_i''(q)q + 2p_i'(q) < 0$. Thus marginal revenue is decreasing in both markets and, given the linear cost function, relevant profit functions are concave in quantity.

2.2. Separate Entity Approach

Under the SE approach, the *pre-tax profit* of the two affiliates is

$$\tilde{\pi}_A = R_A(q_A) - C(q_A + q_B) + s q_B, \quad (1)$$

$$\tilde{\pi}_B = R_B(q_B) - s q_B. \quad (2)$$

In contrast, the *taxable income* of each affiliate is determined by the tax rate in its jurisdiction, τ_A or τ_B , and the transfer price, t , the MNE nominates for tax purposes. Taxable income is given by

$$I_A = R_A(q_A) - C(q_A + q_B) + t q_B,$$

$$I_B = R_B(q_B) - t q_B.$$

We impose the restriction that $0 \leq t \leq T$, where T is the transfer price that results in zero taxable income for the subsidiary. The upper bound on t may be due to country B refusing to accept losses by affiliates in its jurisdiction. Some countries do in fact adopt such a stance for companies that bear relatively little risk. We define *after-tax profit* as the difference between pre-tax profit and tax payable, being given by⁶

$$\pi_A^{SE} = \tilde{\pi}_A - \tau_A I_A = (1 - \tau_A)[R_A(q_A) - C(q_A + q_B)] + (s - \tau_A t)q_B, \quad (3)$$

$$\pi_B^{SE} = \tilde{\pi}_B - \tau_B I_B = (1 - \tau_B)R_B(q_B) - (s - \tau_B t)q_B. \quad (4)$$

⁶ Note that we assume taxation occurs at source, not residence. This is consistent with the general thrust of the OECD model tax treaty, although some countries (e.g., the US) still tax worldwide income, granting tax credits for foreign taxes paid.

2.3. Formula Apportionment Approach

The FA approach allows for an affiliate's profit to be calculated as a fraction of consolidated profit, where the fraction is a function of its share of consolidated payroll, sales, assets and other factors. We follow previous analyses by focusing solely on sales as the allocation key. Defining $I_T \equiv I_A + I_B$, $\sigma_A \equiv q_A / (q_A + q_B)$ and σ_B similarly, after-tax profit under the FA approach is given by

$$\begin{aligned}\pi_A^{FA} &= \tilde{\pi}_A - \tau_A \sigma_A I_T \\ &= (1 - \tau_A \sigma_A)[R_A(q_A) - C(q_A + q_B)] - \tau_A \sigma_A R_B(q_B) + s q_B,\end{aligned}\tag{5}$$

$$\begin{aligned}\pi_B^{FA} &= \tilde{\pi}_B - \tau_B \sigma_B I_T \\ &= (1 - \tau_B \sigma_B)R_B(q_B) - \tau_B \sigma_B[R_A(q_A) - C(q_A + q_B)] - s q_B.\end{aligned}\tag{6}$$

Denote the arm's length price of the good by a . While there exists no *internal* comparable arm's length price in our setting (i.e., the parent does not have any comparable arm's length sales against which to benchmark their related-party sales to its subsidiary), *external* arm's length prices may exist in other markets. Even in cases where there also exists no external comparable arm's length price – tax authorities often have to deal with the transfer of unique intangibles between related parties – tax authorities in practice define a range of acceptable prices, usually the interquartile range obtained from analyzing a set of comparable firms. Note that $s \neq a$ does not imply noncompliance with the arm's length principle – this occurs only if $t \neq a$. Since the penalty for noncompliance with the arm's length price is irrelevant under the FA approach as we will show, the penalty will be introduced in the discussion of the SE approach in section 3.2.

The parent moves first, setting its output level and the two transfer prices, (q_A, s, t) , in order to maximize consolidated after-tax profit, $\pi_T^{SE} = \pi_A^{SE} + \pi_B^{SE}$. The subsidiary then responds by choosing q_B to maximize its own after-tax profit, π_B^{SE} , rather than consolidated profit. We use backwards induction to solve for the subgame perfect Nash equilibrium. One might ask why the subsidiary should not be motivated to maximize consolidated profit rather than its own profit, thereby achieving natural goal congruence. In section 2.4 below we discuss why this behavioral assumption is reasonable.

2.4. Organizational Structure

The parent delegates responsibility to the subsidiary for determining the quantity the latter purchases. In addition, the subsidiary seeks to maximize its own profit, rather than consolidated profit. Although the parent indirectly controls the subsidiary's purchase level through its pricing of the product, this loss of (direct) control over quantity is to the parent's detriment. Given that the parent wholly owns the subsidiary, this raises the question of why the parent does not dictate the subsidiary's quantity.

We begin by noting that our model accurately describes reality – while the parent often sets the transfer price, rarely will it also dictate the amount of product to be sold to its subsidiaries. The reason for this would appear to be the informational asymmetries the parent faces in assessing offshore market conditions. Thus, there are two pertinent questions. First, why not model these information asymmetries? Second, why assume that subsidiary management acts to maximize subsidiary, rather than consolidated, profit? After all, to solve the incentive misalignment problem the parent need only tie subsidiary management compensation to group profit.

While the incorporation of information asymmetries into this model is a natural next step, we omit them here in order to render a tractable benchmark model. On the second question, the theory of moral hazard provides a reason for not tying the compensation of subsidiary management to consolidated profit. Since consolidated profit depends on the performance of the parent and all of its subsidiaries, tying management's compensation to consolidated profit means rewarding them based on the performance of entities over which they exert little or no control. Standard incentive theory tells us that such a performance measure would not be an informative signal on which to motivate the subsidiary management. This dulls their incentive to undertake costly actions to improve the performance of their own subsidiary, as they can free-ride on the efforts of the parent and the other subsidiaries. Thus, the parent suffers a loss of control, resulting in an attendant loss of subsidiary performance. Indeed, in practice managers are usually remunerated against divisional performance and this has been recognized in the literature (Elitzur and Mintz, 1996; Baldenius et al., 2002; Smith, 2002b).

3. Relationship Between Tax and Incentive Transfer Prices

Regardless of which approach (FA or SE) is used, in order to determine the parent's transfer pricing strategy we must first determine how the subsidiary responds to any given pair of transfer prices. The parent takes this anticipated reaction into account in determining how to optimally set the two transfer prices.

3.1. Formula Apportionment Approach

Inspecting Equation (6), it is clear that the subsidiary's after-tax profit depends on s but not t . While the latter ensures $dq_B^*/dt = 0$, concavity of the subsidiary's after-tax profit function also gives $dq_B^*/ds < 0$ – that is, the law of demand holds. Although consolidated after-tax profit, $\pi_T^{FA} = \pi_A^{FA} + \pi_B^{FA}$, does not depend directly on either s or t , it does depend *indirectly* on s through the functional relationship $q_B^*(s)$. It follows that the parent, while having a strict preference over the level of the incentive transfer price, is indifferent between all tax transfer prices. Hence, there is no loss to assuming that the parent always sets the tax transfer price equal to the arm's length price.

In the presence of penalties for non-arm's length pricing, the parent clearly has a strict preference for setting $t = a$. Quite simply, there is no rationale for penalties for noncompliance with arm's length pricing under the FA approach since, as we have shown, there is no role for the tax transfer price to play. To conclude, under the FA approach only the incentive transfer price has a non-trivial role to play.

Proposition 1. *If both jurisdictions use the formula apportionment approach and the same formula for assessing taxable income, then the tax and incentive transfer prices are independent.*

Given that we have established in Proposition 1 that the two transfer prices are independent under the FA approach, we henceforth restrict attention to the SE approach.

3.2. Separate Entity Approach

The subsidiary's after-tax profit is now given by Equation (4) and it can be shown that

$$\frac{dq_B^*}{ds} = \frac{1}{(1-\tau_B)R_B''(q_B)} < 0, \quad (7)$$

$$\frac{dq_B^*}{dt} = \frac{-\tau_B}{(1-\tau_B)R_B''(q_B)} > 0. \quad (8)$$

Now the subsidiary is affected by both transfer prices. While an increase in s still decreases the subsidiary's purchases, it now benefits from an increase in t as this reduces its taxable income and thus also tax payable. A higher tax transfer price essentially acts as a subsidy by lowering the subsidiary's effective marginal cost and thus inducing it to purchase more.

Turning to the parent's decision making, consolidated after-tax profit is given by

$$\begin{aligned} \pi_T^{SE} = & (1-\tau_A)[R_A(q_A) - C(q_A + q_B(s,t))] \\ & + (1-\tau_B)R_B(q_B(s,t)) - [\tau_A - \tau_B]tq_B(s,t). \end{aligned} \quad (9)$$

The parent now has a clear incentive to distort the tax transfer price because it directly impacts upon consolidated after-tax profit. In fact, it is straightforward to show that we obtain a corner solution, where $t \in \{0, T\}$. Quite simply, it should seek to shift as much taxable income as possible into the low tax jurisdiction. This idea is not new, being central to most discussions, both practical and theoretical, of transfer pricing.

Thus, in the absence of penalties MNE incentives in regards to tax transfer pricing can be understood without reference to incentive transfer pricing. In reality, however, MNEs that engage in non-arm's length transfer pricing are exposed to the risk of penalties by the tax authority whose revenue base has been eroded.⁷

To capture this, suppose now that the MNE has some probability of being penalized an amount $P > 0$ when choosing a non-arm's length tax transfer price – penalties are applied to after-tax profit. To simplify the analysis, we restrict attention to the case where $\tau_A < \tau_B$, in which case the MNE has an incentive to use high tax transfer prices to shift profit from country B to country A. Qualitatively similar arguments apply if $\tau_A > \tau_B$.

⁷ The realities of penalty exposure are complicated and we do not attempt a full exposition here. It is worth noting, though, that tax authorities typically make adjustments to transfer prices deemed not to be arm's

The probability that the subsidiary is penalized is described by the cumulative distribution function $F(t-a)$, where $F(0) = 0$ and $F(\bar{a}-a) = 1$. Thus, \bar{a} is a threshold transfer price in the sense that if $t > \bar{a}$, then the subsidiary is penalized with certainty. The associated probability density function is denoted $f(t-a)$, satisfying $f(0) = 0$ and $f'(\cdot) > 0$.⁸

Consolidated after-tax profit is now given by

$$\pi_T^{SE} = (1-\tau_A)[R_A(q_A) - C(q_A + q_B(s,t))] + (1-\tau_B)R_B(q_B(s,t)) - [\tau_A - \tau_B]tq_B(s,t) - F(t-a)P. \quad (10)$$

The first-order conditions describing the profit-maximizing values (t^*, s^*, q_A^*) are

$$t: \quad \frac{dq_B^*}{dt} [(1-\tau_B)R_B' - (1-\tau_A)c - (\tau_A - \tau_B)t] - (\tau_A - \tau_B)q_B - f(t-a)P = 0, \quad (11)$$

$$s: \quad \frac{dq_B^*}{ds} [(1-\tau_B)R_B' - (1-\tau_A)c - (\tau_A - \tau_B)t] = 0, \quad (12)$$

$$q_A: \quad (1-\tau_A)[R_A' - c] = 0. \quad (13)$$

Provided that the penalty, P , is sufficiently high, consolidated after-tax profit is concave in $s \times t \times q_A$ and the parent's profit maximizing tax transfer price is characterized by an interior solution. That is, the parent does not attempt to shift as much income as possible to the low tax jurisdiction. To see this, note that the expression in square brackets in Equation (12) must equal zero, implying that Equation (11) reduces to

$$[\tau_B - \tau_A]q_B(s,t) = f(t-a)P. \quad (11')$$

The optimal tax transfer price cannot satisfy $t \leq a$ since this ensures that the right hand side of Equation (11') is zero while, recalling the restriction $\tau_A < \tau_B$, the left hand side is strictly positive. On the other hand, for all $t \geq \bar{a}$, the right hand side is greater than the

length. This possibility is not explicitly factored into our model, although such adjustments could possibly be viewed as being implicitly embedded in the penalty.

⁸ Note that $f' > 0$ implies that as t increases, the probability of being penalized increases at an increasing rate. This seems plausible and perhaps even likely.

left if the penalty is sufficiently high. Thus, by the Intermediate Value Theorem, we have $t^* \in (a, \bar{a})$.

We now examine the relationship between s^* and t^* by analyzing how they both vary with the underlying parameters of the model.

Proposition 2. *Both the optimal incentive and tax transfer prices decrease as (a) the penalty for non-arm's length pricing increases, or (b) the probability of being penalized increases.*

The fact that the tax transfer price decreases as the penalty for noncompliance with the arm's length principle increases or the probability of being penalized increases is not surprising – the latter was also observed by Kant (1988). The fact that the incentive transfer price also decreases with the penalty, however, is more interesting. It establishes that there is indeed a connection between the tax environment and the incentive transfer pricing policy of the MNE. Changes in the tax regime do not affect only the tax transfer price, but also the transfer price used to provide incentives to the subsidiary.

But what is the purpose of this adjustment to the incentive transfer price? Does it serve simply to preserve the MNE's competitive position in the subsidiary's market or is it geared to restoring the effectiveness of the MNE's profit shifting strategy? From Equation (10) it can be seen that s does not directly affect consolidated after-tax profit, rather entering only indirectly through the subsidiary's choice of output, $q_B(s, t)$. Thus, the incentive transfer price cannot be used as a direct instrument to shift profits. Rather, the adjustment in s serves to minimize the distortion in supply to country B caused by the associated change in the tax transfer price. To see this, note that as t decreases, we know from Equation (8) that the subsidiary reacts by decreasing q_B . This is undesirable for the parent as it causes the marginal benefit of sales in country B to be higher than the marginal cost of production. The parent's optimal response is to decrease the incentive transfer price, which from Equation (7) results in an offsetting increase in q_B , thus restoring equality at the margin.

Having established how the transfer prices vary in response to a change in the MNE's tax environment, we now examine how they vary with the MNE's cost environment. Specifically, we analyze how s^* and t^* vary as the parent's marginal cost of production increases.

Proposition 3. *An increase in the marginal cost of production results in an increase in the optimal incentive transfer price and a decrease in the optimal tax transfer price.*

Both q_A^* and q_B^* should decrease in response to an increase in the marginal cost of production – this follows from the requirement that marginal revenue and marginal cost be equated and the fact that marginal revenue decreases with output. While the parent directly controls q_A , it must vary s and t in such a way as to induce the subsidiary to reduce q_B^* . Equations (7) and (8) indicate that this requires some combination of increasing s and reducing t . But why vary the tax transfer price in order to implement the change in q_B ? After all, varying s affects q_B while introducing no other distortions – in contrast, varying t also affects the extent of profit shifting. Given that the tax regime is unchanged, however, the rationale for changing the extent of profit shifting is unclear.

The answer lies in the optimizing condition that requires the parent to increase the tax transfer price up to the point where the marginal benefit from increasing it further just equals the marginal cost. The marginal benefit is simply the additional profit that can be shifted out of country B from increasing t , while the marginal cost is a function of the expected penalty. An increase in s^* causes q_B^* to fall, which in turn decreases the marginal benefit from varying t – the smaller volume of trade means the tax transfer price now has less leverage. While the marginal benefit from increasing t is now lower than what it was before the increase in marginal cost of production, the marginal cost associated with increasing t remains unchanged since the expected penalty remains as it was before. Profit maximization thus requires the parent to make a downward adjustment to the tax transfer price.

Thus, the relationship between the two transfer prices can be complicated and difficult to anticipate. Depending on the nature of the change in the MNE's economic

environment, the prices may move in the same direction or in opposite directions. Also, the change in the tax transfer price may drive, or be driven by, the associated change in the incentive transfer price. Models that do not distinguish between the two transfer prices necessarily fail to appreciate these possibilities and complexities.

4. Negotiated Transfer Pricing

So far we have assumed that the parent unilaterally determines both transfer prices. It is not uncommon, however, for affiliates to negotiate over the incentive transfer price – this is true even where one of the parties is the parent company. Indeed, it would be no exaggeration to say that negotiation is the norm rather than the exception (Vaysman, 1998; p. 910 of Horngren, Foster and Datar, 1997). This suggests that the ‘hold-up problem’ paradigm may also be an appropriate perspective for analyzing internal transactions (Williamson, 1985; Grossman and Hart, 1986; Holmstrom and Tirole, 1991). We now examine how our previous results are affected if the incentive transfer price is negotiated rather than dictated.

The approach we employ to modeling the outcome of the negotiations differs from that used by Baldenius et al. (1999). While they postulate some fixed surplus over which the entities bargain in a zero-sum game, there exists no such clearly defined surplus in our setting.⁹ Indeed, whatever profit the subsidiary obtains is also enjoyed by the parent since the parent cares about the welfare of its subsidiary. We parameterize the parent’s bargaining power by $\gamma \in [0,1]$, where the negotiated price, \tilde{s} , is defined by¹⁰

$$\tilde{s} = \arg \max_s \gamma \pi_T^{SE} + (1-\gamma) \pi_B^{SE} = \arg \max_s \gamma \pi_A^{SE} + \pi_B^{SE}.$$

Note that if $\gamma = 1$, then $\tilde{s} = s^*$. That is, they agree on the incentive transfer price that is optimal for the parent. Similarly, if $\gamma = 0$, then the negotiated price is the one that maximizes the subsidiary’s welfare.

⁹ Their approach is perhaps more appropriate for understanding negotiations between sister companies, who have no reason to be concerned for the other’s welfare – indeed, to some extent they may vigorously compete for fixed parent resources.

¹⁰ We assume below that the penalty for non-arm’s length price is included in the parent’s profit function.

We assume that the timing is as before – they negotiate over the incentive transfer price at the same time as the parent determines the tax transfer price and the quantity to sell in its own market. The subsidiary then responds by choosing its quantity, q_B . The conditions describing the equilibrium (t, \tilde{s}, q_A) are now given by Equations (11), (12') and (13), where

$$\tilde{s} : \frac{dq_B^*}{ds} [(1 - \tau_B)R_B' - \gamma(1 - \tau_A)c + \gamma(\tilde{s} - \tau_A t) - (\tilde{s} - \tau_B t)] - (1 - \gamma)q_B = 0. \quad (12')$$

Note that Equation (12') is the same as Equation (12) if $\gamma = 1$. We now establish that the results of section 3 are robust in the following sense.

Proposition 4.

- (a) *If the parent's bargaining power is sufficiently strong, then Propositions 2 and 3 also hold when the incentive transfer price is negotiated.*
- (b) *If the parent's bargaining power is sufficiently weak, then the negotiated incentive transfer price is independent of the penalty and cost environment, while the tax transfer price varies according to Propositions 2 and 3.*

This result shows that the relationship between the cost/tax structure and the transfer prices depends importantly on organizational features of the MNE – in particular, the relative bargaining power of the affiliates over the internal pricing of product. The intuition for part (a) is that if the parent exerts considerable power over the level of the incentive transfer price, then the decision problem is essentially the same as that considered in the previous section where the parent unilaterally determined this price. In particular, both the incentive and tax transfer equilibrium prices continue to be defined by an interior solution and the factors affecting these prices remain the same.

On the other hand, if the subsidiary exerts considerable control over the incentive transfer price, then their preference is naturally to set the price as low as possible – at zero. Because this is a corner solution, the negotiated price is then invariant to perturbations in the penalty regime or the parent's marginal cost of production. The asymmetry in the model properties across the two extremes of bargaining power simply reflects the different pricing incentives facing the two affiliates and the mathematical fact that interior solutions are more easily perturbed than corner solutions. The properties of

the negotiated transfer price for intermediate levels of bargaining power are less clear, due to the possible existence of non-convexities in the objective function defining \tilde{s} .

We conclude by examining how the transfer prices vary with (small) changes in the degree of bargaining power held by each affiliate.

Proposition 5.

- (a) *If the parent's bargaining power is sufficiently strong, then the incentive transfer price is positively related to the parent's bargaining power while the tax transfer price is negatively related to the parent's bargaining power.*
- (b) *If the parent's bargaining power is sufficiently weak, then both the incentive and tax transfer prices are unaffected by a change in the parent's bargaining power.*

The fact that the incentive transfer price increases with γ in Proposition 5(a) is not surprising, since we know that the subsidiary's incentive is to set it as low as possible. More interestingly, why does the parent respond by decreasing the tax transfer price? The rationale is similar to that discussed in relation to Proposition 3. Specifically, as \tilde{s} increases, the subsidiary naturally responds by decreasing their purchases, q_B^* . This contraction in the quantity of goods flowing between the two affiliates means that a given transfer price is associated with a smaller amount of profit shifting. Given that the penalty remains unchanged – it is independent of the value of the transaction – it is optimal for the parent to decrease t in order to reduce their penalty exposure so that it is commensurate with the now lower benefits from distorting the tax transfer price. More precisely, this adjustment is required to restore equality of the marginal costs and benefits associated with varying the tax transfer price.

Proposition 5(b) follows from the fact that γ affects the equilibrium calculus only via the condition defining the negotiated price. However, we have already established in Proposition 4 that, under the conditions described in part (b), the negotiated price satisfies $\tilde{s} = 0$ in equilibrium and, being a corner solution, is unaffected by small perturbations in the model parameters (including the level of bargaining power). Thus, γ has no direct effect on the tax transfer price – Equation (11) is independent of γ – and nor does it have any indirect effect through Equation (12').

To conclude, a clear understanding of the relationship between the two transfer prices requires recognition not only of the tax and cost environment of the MNE, but also knowledge of the internal mechanisms by which the transfer prices are determined. Specifically, the degree of control that each party has over internal price setting has been shown to affect importantly how exogenous features of the economic environment impact upon the transfer price.

5. Robustness

In this section, we check if our results are robust to changes in market and tax environments. Specifically we show that the relationship between the two transfer prices continues to hold in oligopoly, and are unaffected by double or ‘less than single’ taxation.

Let us first consider oligopoly. It might be conjectured that the richer strategic interactions arising from inter-firm rivalry will result in a more complex, and perhaps realistic, relationship between the incentive and tax transfer prices. Specifically, if rivals compete in quantities in country B it is well understood that the parent has a stronger incentive to reduce s under oligopoly in order to make the subsidiary a lower cost competitor. This enables it to increase market share, which in turn increases consolidated profits (Vickers, 1985; Sklivas, 1987). Indeed, this is suggested by Nielsen et al. (2001), whose analysis of the FA approach purports to show that MNEs have an incentive to distort the transfer price under oligopoly but not under monopoly.¹¹

In the monopoly setting, the parent uses s to provide appropriate incentives to the subsidiary in relation to their purchase decision, q_B . Moving to oligopoly requires the parent to work through another layer of complexity in solving for the optimal incentive transfer price – it must anticipate not only the subsidiary’s response to a given pair of transfer prices, but also the subsidiary’s rivals’ responses. However, the fact that s

¹¹ The reason for this is that, in their analysis of monopoly, they implicitly assume that the parent chooses q_B , in which case there is clearly no need to craft the transfer price with the subsidiary’s incentives in mind – the subsidiary has no decision making ability. In contrast, under oligopoly they assume the subsidiary chooses q_B , giving rise to a role for the incentive transfer price that was not observed under monopoly. Thus, the strategic role of transfer price is not driven by the oligopolistic market setting but rather by the decentralization of decision-making.

defines the subsidiary's unit cost is just as true under oligopoly as under monopoly. Indeed, while it is easy to show that $dq_B^*/ds < 0$ under Cournot and Bertrand oligopoly in country B, it is hard to imagine a market setting under which this property fails. Thus moving from monopoly to oligopoly only changes the equilibrium level of s^* rather than the comparative static properties of s^* and t^* . The properties established in Propositions 1-3 therefore hold across a broad range of market structures, implying they are robust in an important sense.

Proposition 6. *Propositions 1-3 hold for all market structures such that intrafirm trade satisfies the law of demand.*

An important function of international tax treaties is to eliminate both 'double' and 'less than single' taxation. That is, tax authorities agree that income should be taxed once, not more and not less. Many of the issues that arise in competent authority negotiations – for example, source versus residence taxation – are rooted in this principle. Indeed, the benefit of using the FA approach to calculate taxable income is that it eliminates the possibility for double or less than single taxation by allocating consolidated taxable income amongst the affiliates of the MNE, thus ensuring that all profit gets allocated (and thus taxed) once and only once.

In contrast, it might be argued that the SE approach is more susceptible to both double and less than single taxation due to the tendency of tax authorities not to share information with each other when assessing the taxable income of affiliates in their jurisdiction. This leaves open the possibility that – through error of judgment or calculation by one or both authorities – some income is either taxed twice or not at all. The FA approach effectively avoids this problem by implicitly centralizing the taxation process.¹² It might be further argued that there is more scope for less than single taxation than there is for double taxation, given that each affiliate has recourse to the competent authority procedure if they suffer double taxation. In contrast, affiliates have no incentive to reveal mistakes resulting in less than single taxation.

¹² That is, in order for the FA approach to be implemented the two tax authorities must (at least implicitly) reach agreement on the magnitude of the MNE's consolidated taxable income and also on the rule used to allocate this income between the affiliates.

Then do our previous results change under the SE approach in presence of double or less than single taxation? For example, under less than single taxation does the incentive transfer price now also have a direct effect on consolidated after-tax profits? Again our answer is in the negative. Suppose that, while taxable income is correctly assessed in country B, either double or less than single taxation may occur in country A. Letting \tilde{I}_A denote assessed taxable income in country A, less than single taxation occurs if $\tilde{I}_A < I_A$, while double taxation occurs if $\tilde{I}_A > I_A$. The direct effect of less than single taxation is to lower the effective tax rate in country A, which in turn induces the MNE to increase the tax transfer price. As we have shown previously, this will have a spill-over effect on the optimal level of the incentive transfer price – the logic of Proposition 2 can be applied to show that the incentive transfer price will also increase. However, the comparative static properties of s^* and t^* remain intact, thus adding further weight to the robustness of our results.

Proposition 7. *Propositions 1-3 are unaffected by less than single or double taxation.*

6. Conclusion

The purpose of this paper has been to understand the implications of multinationals assigning different transfer prices for tax and cost accounting purposes. While such a decoupling of transfer prices is not only legal but also typically desirable, it has not been allowed for in previous analyses of transfer pricing. We have drawn out the relationship between the two transfer prices, showing that it can be complex and difficult to anticipate. Failing to recognize that MNEs can employ two transfer prices, rather than one, results in an inability to recognize the full scope of potential MNE responses to changes in the underlying economic environment. For example, changes in the tax environment were shown to induce changes in the MNE's internal cost accounting policy, while changes in the MNE's cost structure were shown to induce changes in its tax accounting policy.

The fact that the effect on each price differs establishes the need to distinguish between the two transfer prices. This also points to the need for an integrated approach

to government tax and industry policy. For example, our results imply that an output subsidy that affects production costs will not only impact upon the incentive policy of a MNE, but also their tax policy. If it induces the MNE to distort their tax transfer price even further from the arm's length price, governments may need to link the subsidy to increased transfer pricing penalties and tax audit activity.

The model employed here is simplistic in a number of respects and there is considerable scope for further research to better understand how MNEs determine their transfer prices. For example, it would be useful to model more carefully the institutional details, such as the ability of tax authorities to make adjustments to transfer prices, the conditions under which this occurs and the determinants of the magnitude of the adjustments. Also, modeling the link between the size of the penalty and the magnitude of the adjustment could increase our understanding of how MNEs choose their transfer prices.

Appendix

Proposition 2.

Proof:

(a) Totally differentiating Equations (11)-(13) and applying Cramer's Rule gives

$$\text{sign}\left\{\frac{ds^*}{dP}\right\} = \text{sign}\left\{\frac{dt^*}{dP}\right\} = \text{sign}\left\{f' \frac{dq_B^*}{ds}\right\} < 0.$$

(b) Similarly,

$$\text{sign}\left\{\frac{ds^*}{df}\right\} = \text{sign}\left\{\frac{dt^*}{df}\right\} = \text{sign}\left\{P \frac{dq_B^*}{ds}\right\} < 0. \quad \blacksquare$$

Proposition 3.

Proof: Totally differentiating Equations (11)-(13) and applying Cramer's rule gives

$$(\tau_B - \tau_A) \frac{dq_B^*}{dt} - f' P < 0 \quad \Rightarrow \quad \frac{ds^*}{dc} > 0.$$

The expression on the left is clearly negative if P is sufficiently large.

Also, by the same process,

$$\text{sign}\left\{\frac{dt^*}{dc}\right\} = \text{sign}\left\{(1+\tau_A)(1-\tau_A)\frac{dq_B^*}{ds}\frac{dq_B^*}{dt}\right\} < 0. \quad \blacksquare$$

Proposition 4.

Proof:

(a) If $\gamma = 1$, then Equations (12) and (12') are identical in which case Propositions 2 and 3 clearly hold. By continuity, these results also hold for all γ sufficiently close to one.

(b) Suppose now that $\gamma = 0$. It follows that

$$\begin{aligned} \frac{d^2\pi_B^*}{ds^2} &= (1-\tau_B)\left[R_B''\frac{dq_B^*}{ds} + R_B'\frac{d^2q_B^*}{ds^2}\right] - 2\frac{dq_B^*}{ds} - (s-\tau_B t)\frac{d^2q_B^*}{ds^2} \\ &= [(1-\tau_B)R_B'' - 2]\frac{dq_B^*}{ds} > 0. \end{aligned}$$

That is, the subsidiary's profit is convex in the incentive transfer price. It follows immediately that the optimal incentive transfer price satisfies $\tilde{s} \in \{0, S\}$. Suppose that $\tilde{s} = S$ maximized profit. But by choosing $\tilde{s} = 0$ and selling $q_B^*(0) > q_B^*(S)$ the subsidiary must increase its profit, since at zero cost it sells a larger quantity, each unit of which earns positive marginal revenue. This contradicts the initial assertion that $\tilde{s} = S$ is optimal. Since \tilde{s} is characterized by a corner solution, $d\tilde{s}/dP = d\tilde{s}/df = d\tilde{s}/dc = 0$ follows. Since we have established that \tilde{s} is effectively fixed for the purposes of comparative statics analysis (when $\gamma = 0$), the expressions for dt^*/dP , dt^*/df and dt^*/dc can be determined from analyzing Equations (11) and (13) in isolation. Applying Cramer's rule, it is straightforward to show that Propositions 2 and 3, as they pertain to t^* , continue to hold. By continuity, the results here also hold for all γ sufficiently close to zero. \blacksquare

Proposition 5.

Proof:

(a) Taking the approach of Propositions 2 and 3, totally differentiating Equations (11), (12') and (13), applying Cramer's Rule and evaluating at $\gamma = 1$ gives $dt^*/d\gamma < 0$ $d\tilde{s}/d\gamma > 0$.

By continuity, these results also hold for all γ sufficiently close to one.

(b) Note that

$$\frac{dt^*}{d\gamma} = \frac{dt^*}{ds}\frac{d\tilde{s}}{d\gamma} + \frac{\partial t^*}{\partial \gamma}.$$

Proposition 4(b) has already established that $\gamma = 0 \Rightarrow d\tilde{s}/d\gamma = 0$. Also, it is clear from Equation (12) that $\partial t^*/\partial \gamma = 0$. Thus, evaluated at $\gamma = 0$, we have $dt^*/d\gamma = 0$. By continuity, these results also hold for all γ sufficiently close to zero. \blacksquare

Proposition 6.

Proof: The arguments underlying Proposition 1 rely in no way upon the market structure, so certainly hold for market structures consistent with intrafirm trade satisfying the law of demand.

Inspecting the proofs of Propositions 2 and 3, it is clear that these two results hold provided the market structures in countries A and B are consistent with $dq_B^*/dt > 0$ and $dq_B^*/ds < 0$. Note also that it follows immediately from Equation (4) that, regardless of market structure, $dq_B^*/dt = -\tau_B dq_B^*/ds$, implying that dq_B^*/dt and dq_B^*/ds are always of opposite sign. Finally, by definition, $dq_B^*/ds < 0$ if the subsidiary's demand for the parent's product satisfies the law of demand. ■

Proposition 7.

Proof: Suppose that $\tilde{I}_A = \mu I_A$, where $\mu > 0$. Consolidated after-tax profit is now

$$\pi_T^{SE} = (1 - \tau_A \mu)[R_A(q_A) - C(q_A + q_B)] + (1 - \tau_B)R_B(q_B) - [\tau_A \mu - \tau_B]tq_B - F(t - a)P.$$

Letting $\tilde{\tau}_A = \tau_A \mu$, consolidated after-tax profit can be rewritten as

$$\pi_T^{SE} = (1 - \tilde{\tau}_A)[R_A(q_A) - C(q_A + q_B)] + (1 - \tau_B)R_B(q_B) - [\tilde{\tau}_A - \tau_B]tq_B - F(t - a)P.$$

But this expression is identical to Equation (10) except that $\tilde{\tau}_A$ now replaces τ_A . This reflects the fact that the expressions for π_A^{SE} and π_B^{SE} remain essentially unchanged. It follows immediately that, regardless of whether $\mu > 1$ or $\mu < 1$, Propositions 2 and 3 remain unchanged. Similarly, in the absence of penalties the same argument applies to Proposition 1. ■

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